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CANADIAN MECHANIC'S MAGAZINE AND PATENT OFFICE RECORD

Vol. 5. FEBRUARY, 1877. No. 2.

ON THE IMPORTANCE OF

MECHANICS' INSTITUTES.

THE necessity for the promotion of knowledge among the mechanics of Canada cannot be over estimated, and in no way can mechanical information be better afforded, and scientific knowledge brought within reach of that important class of the community, than by the establishment of libraries of reference in every small town and village throughout the Dominion. Standard works of the Arts and Sciences are so expensive to purchase, that they are beyond the means of any working mechanic to obtain, who has a family to support, and many of these books, when purchased at a sacrifice of some of the comforts of life to his family, are found to contain but a portion of the information sought for; for this reason mechanics are deterred from expending money in books, that are only in, part, of any service to them in their particular trade. The consequence is that, from the want of such books to refer to from time to time, and also some of a light, pleasing, instructive, and domestic character, all desire for reading is lost, and many men who would have risen to a high position in their respective trades, and have been of great service to their country, plod on to the end of their days as mere journeymen, from the want, in early life, of that nourishment to the mind that would have stimulated it to action.

The usefulness of institutions like mechanics' institutes, for affording such information as artisans, particularly young men, require to know, and through which they can keep themselves posted in all the new inventions and improvements of the day, cannot be doubted, and if they were more numerous, it would be of great advantage to the country; their usefulness, however, to a great extent will depend upon their management by those who are nominated, annually, to superintend their affairs. In making these remarks upon their management we by no means do so a reflex upon any particular institution, we speak entirely from our experience of the mismanagement that has taken place, not only in mechanics' institutes, but in many other institutions where its members are appointed, not from their qualifications and suitableness to office, but from personal reasons, and who are allowed to remain from year to year office-bearers, without taking any active interest whatever in the institution whose welfare is entrusted by its members into their hands.

If an institute answer no other purpose than that of supplying a few scientific books and periodicals for the use of its members, then it fails in the main object for which such institutions were originally intended, and it is therefore with reference to this point that we wish to call the attention of our readers. Too many of the institutes in Canada (and unfortunately we have but few of them) are mere news-rooms, or places of reference to such works as they may contain, whereas they ought to be institutions for the promotion of useful information and instruction, not only through books, but by practical instruction to the mechanical classes; but this is seldom the case. But why should it be so? Why should not the same energy which is shown in similar institutions in England and in the United States be displayed in Canada? The answer is, as before stated, simply because those who are chosen for members of the committees are too often men of inactive minds and sometimes not connected with any mechanical business, consequently little able to judge of what is required of them; or, men too old and devoid of energy to act, men who accept the office as a compliment, or consider it, on account of their position and age, as a right. Such men are mere drags to the wheels of action and impeders to progress, and should at once retire and give place to younger and more energetic members, who would initiate something that would tend to instruct and benefit those with whom they are associated. Year after year such men are re-elected simply because, in social life, they are respected, and it would, perhaps, give offence to displace them for those more youthful; this is a great mistake, for under their somnient influence year after year do such institutions grow more feeble and less supported, until they gradually expire. Now, that which is particularly wanted in the management of mechanics' institutes is that the boards of management should be composed of younger men,

men who would be particularly alive to the necessities of the times; we want more young life—more action—more fire and genius—men who will devote their best energies for the object they have taken in hand, and not committees composed of lukewarm members who, both in age and thought, are men of the past generation—we want "live men" able to take the helm in all of our important measures. We regret to see so many of our young men set altogether in the back ground when their energy would give life to these institutions; not, however, that we would think for a moment of shutting out wisdom and talent because the grey shade of age had paled the brow—or that time had lessened energy—we would desire to see the fire of youth tempered by the calm reasoning of experience and age, and both working in unity together; but what we deprecate most is that system which, year after year, re-elects men too old, too apathetic or too incompetent to work, and who deem that, because they probably, at the founding of some institution, had made to it a donation of books, or, because a life subscriber, they felt they were entitled, henceforth, to remain as permanent members of a board of Directors. Such men, if even not active enough in mind to advance the institute by their example, very frequently, on the other hand, have many antiquated notions far behind the days in which we live, and only clog, by their influence and vote, all action that should be taken for the advancement of knowledge.

In order to give more vigour and impetus to the mechanical industries of Canada, it is desirable that there should be an association of Mechanics' Institutes, corresponding with, and tendering assistance to each other; and that classes should be formed, with competent instructors, to teach both theoretical and practical informations to its members—and if some small aid were afforded by the Government to every Mechanics' Institute in the Dominion, in proportion to the percentage of mechanics among its population in each town or village, to be laid out in the acquirement of philosophical, mathematical and other useful instruments necessary for their education, it would be money well expended, as these instruments are generally too expensive to be purchased out of a subscription fund, which would be all required for the purchase of books and for general instruction—the advantage to the country by this encouragement to the education of mechanics would soon be reaped ten, aye, twenty fold.

But the question will arise as to who will take the lead to establish an association of Mechanics' Institutes that should have a library and hold classes in every town in the Dominion? Who will take the initiative and burthen of forming them? and then, when the wheel is in motion, will mechanics respond to the call and keep it rolling? will they support them for their advantages to themselves and their children? We think that if the Government of this country would take the initiative by granting to every Mechanics' Institute, as an encouragement, a small annual allowance in proportion to its members, only to be disbursed for certain purposes, that a few active and prominent mechanics in each place would endeavour to enrol sufficient subscribers to carry out a scheme that would soon have a wide spreading influence over the country.

The rules that should bind together a general association for mutual benefit and support, it would be at present premature to discuss; we should like, however, to have the views of some of our readers upon this subject.

KING'S AUTOMATIC RAILWAY COUPLING.

(See page 36.)

The accompanying engraving illustrates an automatic railway coupling invented and patented by Mr. E. King, of Badwellroad, Southampton. The advantages claimed for it are—That on the vehicles being brought together, even on the sharpest curves, they couple themselves, passenger carriages being held closely and tightly together without the attendant going between to tighten up the bars, while goods wagons are left slackly coupled as at present. All the vehicles can be reversed, and admit of being of different heights. The coupling is double. It is very simple, and entails no alteration in the rolling stock.

It will be seen that a new drawbar, hook, bracket, and shackle are provided. A is the drawbar, B the hook fitted into a slot at the end of A, and backed by the short lever K, which works in a slot and slides up the whole back of the hook B and the thickness of the drawbar end. D is bracket secured with four screw bolts and nuts. The drawbar A is put through the flange of the bracket and into the old hole of the vehicle, and secured in the usual way, allowing for the spring that is required. A small shaft is provided with a lever at each end and one in centre for the purpose of uncoupling. This is secured under the carriage with three brackets H. A shackle is provided with a piece of chain which works through a thimble-shaped hole in the bracket. E is a weight hooked into the chain which balances the shackle, keeping it always in line with the drawbar hooks, and rising and falling as the shackles are pushed to either side. When the coupling takes places the shackles are pushed on one side, passing between the guide spring and edge of the hook until they pass the curve up the hook, into which they drop by the action of the weight E. The uncoupling is effected at either side by lifting the levers G, when the hook B leaves the shackle. On letting go the levers the hooks go back into their former position, and are again ready for coupling. A hook and chain can be used for keeping the levers up and the hook B out of gear, or to keep them down and in gear. The eye at the top end of the lever G can be used by the guard or engine-driver for uncoupling the train while in motion by putting a line through the eye, and passing the end up to the engine-driver or into the guard's van.

THE ASSIMILATION OF PATENT LAWS.

At the Hague Conference, last year, of the Association for the Reform and Codification of the Law of Nations, a paper on "Assimilation of the Patent Laws" of various nations, was read by M. W. Lloyd Wise, and referred to a committee, consisting of Mr. J. Hinde Palmer, Q.C. (member of the House of Commons' Select Committees of 1871-2, on Letters Patent for Inventions), Messrs. H. D. Jencken, R. E. Webster, and Joseph G. Alexander, Barristers-at-Law, and Mr W. Lloyd Wise. At the Bremen Conference on the 26th ultimo, this committee presented the following report:

"We have had under our consideration the subject of assimilation of the Patent Laws of various nations, in connexion both with the paper of Mr. Lloyd Wise referred to us last year, and with the resolutions of the International Patent Congress, held at Vienna in 1873. A copy of the first three of these resolutions, excluding only some formal ones relating to a permanent committee which has practically ceased to exist, accompanies this report. We consider it to be abundantly established by experience, that it is for the commercial interest of every nation to grant protection in the shape of patents to inventors. But in these times of international intercourse, the patent granted in one country may become to some extent a restriction, unprofitable and obstructive, if the same invention, without limitation or increase in price, becomes in an adjoining country common property: although a country offering the protection of a Patent Law will usually obtain the earliest benefit of new inventions. Hence the wide-spread practice of patenting the same invention in several countries, and the necessity for assimilation of the Law of Patents in the different civilised States. Unless some common principle be agreed upon, it is evident that much of the benefit of patents will be lost, by their being granted in one country, whilst they are refused, or granted upon wholly different conditions, in another. For by such inequalties, the reward by which the inventor is stimulated to exercise his ingenuity for the benefit of the commercial world at large is rendered precarious, and the stimulus becomes less powerful.

Influenced by these considerations, the Congress at Vienna in its second resolution, laid down certain principles as the basis of a model Patent Law, to which future legislation on the subject

should conform. That Congress was a very influential and representative body, including many eminent patent lawyers, inventors, manufacturers, and other authorised persons from the different civilised States, and we do not think it would be advisable to depart from the general principles then laid down. We, therefore, recommend that in any action taken by this Society in favour of the assimilation of Patent Laws, the Vienna resolution should be adhered to as a basis, though it may be necessary to supplement the principles there enunciated by some others. In particular, it may probably be found desirable to embody in the framework already sketched out, some suggestions to be found in Mr. Lloyd Wise's paper, among which may be indicated (first), that the preliminary examination mentioned in Clause C of the resolution already referred to, should be limited in its scope to the questions whether the specifications are clear, whether the invention is open to objection, as being contrary to morality or wanting in novelty, regard being had to prior publications; (secondly) that an adverse report should not disentitle the applicant to a patent, except in cases of fraud, or where the invention is contrary to morality; (thirdly), that if the applicant specifies the prior matter found by the examiners, and clearly defines what he, nevertheless, claims as his invention, no adverse report should be published.

"At the present time there are two important countries which have no Patent Laws, Holland and Switzerland. In Holland, where a Patent Law existed until 1869, there is evidence that it was repealed because of its defects as a measure, and not because the principle of rewarding inventors in this way was considered objectionable *per se*. In Germany, a draft law founded on the 2nd resolution of the Vienna Congress is now under consideration of the Government, for embodiment in the revised Code of the Empire. In England, a Bill for the modification of the existing Patent Law has been twice before Parliament, but has not yet been discussed in the House of Commons. It has met with great opposition from inventors, manufacturers, and others. The Patent Laws of several other countries are far from conforming to the principles enunciated at Vienna; but, as far as we are aware, the only bodies which are doing anything to carry out the resolutions of the Vienna Congress are the committee in Germany which prepared the draft law just spoken of, and a committee in London of which Dr. C. W. Siemens, F.R.S., is chairman.

"We therefore suggest that a committee be appointed by the Conference to deal with the subject of Patent Laws alone, with power to add to its number, and especially to invite the co-operation of persons who have already devoted themselves to this subject, and may be willing to join our association. That such committee be empowered to take such steps as they may think desirable in promoting the reform and assimilation of Patent Laws on the basis of the resolutions of the Vienna Conference, amplified by any additions they may consider necessary to the equitable working of the system, and in bringing the subject before the attention of the Governments and people of the civilised States, including in particular those of Holland and Switzerland. We hope that in this way a comprehensive and efficient committee may be formed, capable of satisfactorily dealing with this important practical question."

Copy of the First Three Resolutions of the Vienna Patent Congress

1. That protection of inventions should be guaranteed by the laws of all civilised nations, because:
   - (*a*). The sense of right among civilised nations demands the legal protection of intellectual work.
   - (*b*). This protection affords, under the condition of a complete specification and publication of this invention, the only practical and effective means of introducing new technical methods without loss of time, and in a reliable manner, to the general knowledge of the public.
   - (*c*). The protection of invention renders the labour of the inventor remunerative, and induces thereby competent men to devote time and means to the introduction and practical application of new and useful technical methods and improvements, and attracts capital from abroad, which, in the abscence of patent protection, will find means of securing investment elsewhere.
   - (*d*). By the obligatory complete publication of the patented invention, the great sacrifice of time and money which the technical application would otherwise impose upon the industry of all countries, will be considerably lessened.
   - (*f*). Great injury will be inflicted upon countries which have no rational Patent Laws, by the native inventive talent emigrating to more congenial countries, where their labour is legally protected.
   - (*g*). Experience shows that the holder of a patent will make the most effectual exertions for a speedy introduction of his invention.

2. An effective and useful Patent Law should be based on the following principles:
   - A. Only the inventor himself, or his legal representative, should be entitled to a patent.
   - B. A patent should not be refused to a foreigner.
   - C. It is advisable, in carrying out these principles, to introduce a system of preliminary examination.
   - D. A patent should be granted either for a term of fifteen years, or be permitted to be extended to such a term.
   - E. Simultaneously with the issue of a patent, a complete publication of the same should take place, rendering the technical application of the invention possible.
   - F. The expense of obtaining a patent should be moderate; but, in the interest of the inventor, a progressive scale of fees should be established, inducing him to abandon a useless patent.
   - G. Facilities should be given, by a well organised patent office, to obtain in an easy manner the contents of the specification of a patent, as well as to ascertain what patents are still in force.
   - H. It is advisable to establish regulations, according to which the patentee should be compelled, in cases in which the public interest may require it, to allow the use of his invention to all suitable applicants for an adequate compensation.
   - I. The non-application of an invention in one country shall not involve the forfeiture of the patent, if the patented invention has been carried into practice at all, and if it has been rendered possible for the inhabitants of such country to purchase and make use of the invention.
   - K. In all respects, and particularly as regards the proceedings in the granting of patents, the Congress refers to the English, American, and Belgian Patent Laws, and to the draft of a Patent Law prepared for Germany by the Society of German Engineers.

3. Considering the great differences in present patent administration, and the altered international commercial relations, the necessity of reform is evident, and it is of pressing moment that Governments should endeavour to bring about an international understanding upon patent protection as soon as possible.

The report having been discussed, the following resolution, proposed by Mr. Hinde Palmer, and seconded by Mr. Alexander, was passed:

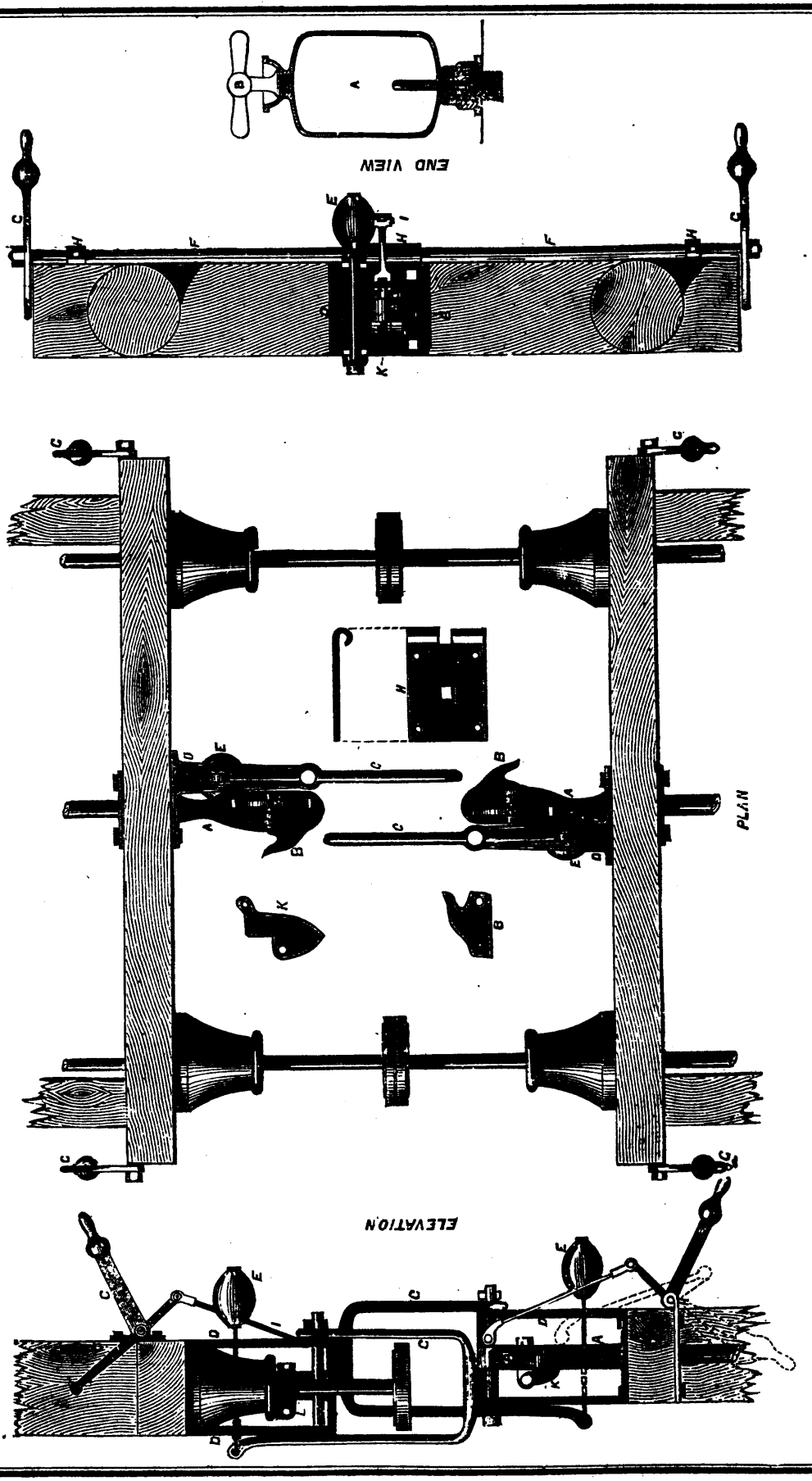
"That the report on the subject of patent right be recorded, and that a committee be appointed and consist of such members of the former committee as will consent to act, with power to add to their number such other members of the association as take an interest in the question."

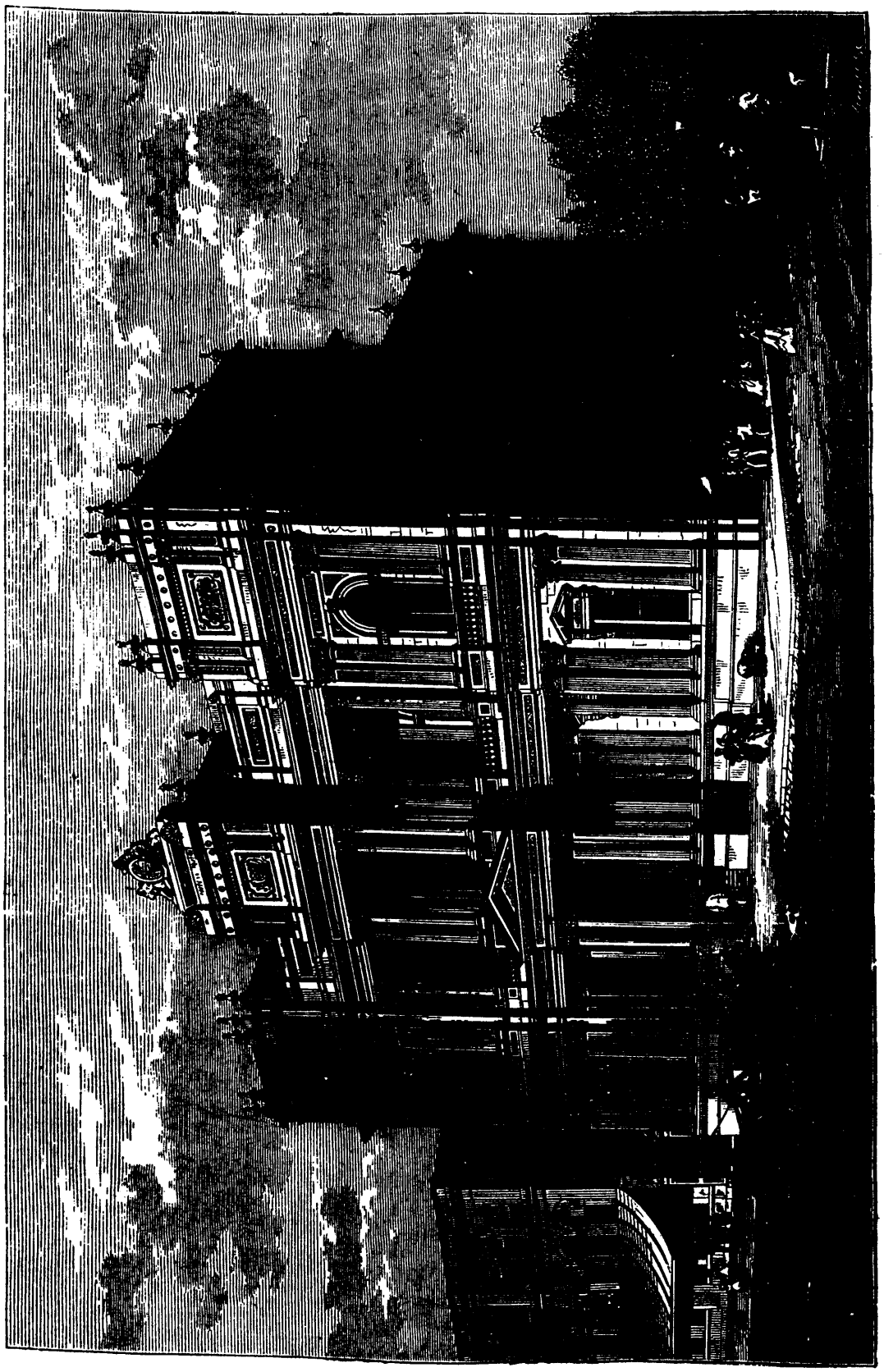
It is expected that a very strong committee will be the result, and we are requested to state, that the present members of the committee are very anxious to obtain the co-operation of manufacturers and others, who will join them in thoroughly going into the question. Sir Travers Twiss, who presided at the conference in Lord O'Hagan's absence, stated that the Vienna resolutions would only be considered as a basis on which to work, and the new committee would not be all bound by the particular details contained in them.

PUNCHING AND SHEARING MACHINE.

We publish on page 48, illustrations of a heavy punching and shearing machine recently constructed by Messrs. Francis Berry and Sons, of Sowerby Bridge, for Messrs. Joseph Wright and Co., Tipton. The machine is of a very massive design and weighs 34 tons. It is driven by two engines having cylinders 12 in. in diameter, with a stroke of 14 in. The crankshaft is 5½ in. in diameter; on this shaft is keyed the first motion pinion of 15 teeth, 3 in. pitch and 8 in. wide; this pinion drives a wheel of 57 teeth keyed on the second motion shaft, on which is another pinion with 13 teeth 4½ in. pitch and 12 in. wide, gearing into the large wheel of 54 teeth, which is keyed on the main shaft. This shaft is 14 in. in diameter and three eccentrics 10 in. in diameter and 4 in. throw turned into it, which work the slides. The punching slide is 3 ft. wide and 10 in. deep, and is capable of punching a 2 in. hole through a 2 in. plate 24 in. from the edge. The middle slide is 18 in. wide and 13 in. deep, and is capable of shearing 2 in. plates 24 in. from the edge, or slitting up old steel rails. The slides are all made of cast steel. Each slide has a disengaging motion, so that the whole machine need not be stopped to adjust a plate.

KING'S AUTOMATIC RAILWAY COUPLING.





THE BANK OF SOUTH AUSTRALIA, ADELAIDE.

MORE MONSTER GUNS.

If the advice of the Woolwich authorities had been taken long ago, we should, observes the *Daily News*, probably not now have to deplore the possession of a fleet which, however imposing in appearance and really powerful in offensive armament, is yet defensively so weak that the armour-plating of our most formidable ironclad can be readily pierced by the 100-ton gun recently built for the Italian Government, a weapon which does not by any means represent the limit of power that can be reached by modern artillery. Messrs. Armstrong & Co., for the Italians, and Messrs. Krupp, for the German navy, have probably facilities at their factories for turning out guns of the highest calibre yet reached sufficient to arm, by the beginning of next summer, all the ironclads at present in existence in those countries, whereas the building of a ship to resist the force of their projectiles would be a labour of some four years. The very common sense advice of the heads of the Factory Department at Woolwich was that the greatest possible power of any single piece of artillery should be approximately ascertained before large numbers of costly ironclads were built which a great increase of velocity and energy in heavy projectiles might soon render comparatively useless. In this opinion expressed ten years ago, they clearly anticipated the day of such monster guns as the "Woolwich Infant" of 80-tons, and the latest production of the Elswick firm, which weighs something over 100 tons. Instead of this, however, public and private yadrs in various parts of England were busily employed in building numerous ironclads, the thickness of the armour-plating of which was calculated on purely theoretical bases, so far as the penetrative power of the artillery that might be brought against them in the future was concerned. The result is that we have not a ship in the English navy capable of withstanding a direct hit from the great Armstrong gun, or even from the 80-ton Fraser gun, which will soon be tried for penetration at Shoeburyness, and which will, in the opinion of our most experienced artillerists, be found capable of doing all that the Italian 100-ton gun has yet accomplished. It is some satisfaction, however, to know that in this respect other countries are at a still greater disadvantage, while there is every reason to believe that Woolwich is quite prepared to hold its own against the world in the matter of heavy ordnance, and to begin building, at a week's notice, Fraser guns of greater calibre and power than the highest triumphs of Elswick or Essen. Thanks to the exhaustive trials at Shoeburyness and Woolwich, the results, and even every detail of which have been open to the wold, data have been furnished whereby one of those firms at least has been enabled to steal a march on our our gun factories. But the advantage is happily only temporary, for Woolwich is now in a better position to build guns of 200-tons than it was to undertake those of 80-tons when the order for manufacturing an experimental weapon of the latter weight was first issued. Designs for a gun of 164-tons have been for some time in the hands of the War Department, but it is now almost certain that this immense calibre will be surpassed, and that the pet piece of ordnance for the English navy of the immediate future will be a Fraser gun, weighing about 200-tons, 50 feet in length, having a bore of 20 inches, and throwing, with a powder-charge of something like 800 lb., a projectle weighing from 3900 to 4000 lb., or considerably over a ton and a-half. As we have said, Woolwich is quite prepared to undertake the construction of such a weapon and the only obstacle in the way is the difficulty of providing working space in a turret for such a monster. The question of weight is not so material as that of length; and it was the opinion of Admiral Boyd (Director of Naval Artillery) and Mr. Barnaby (the Chief Constructor) that 164-tons represented the extreme limit for turret-guns in such ironclads as the *Inflexible*. The hydraulic system of loading devised by Mr. Rendle, of Sir William Armstrong's firm, has, however, considerably modified the conditions, and the hydraulic checks by which recoil is reduced to a minimum have so far contributed to economy of space that it may now be found possible to work a gun of 50 feet in length within turrets only slightly larger than those of the *Inflexible*. If not, this length, and consequently the power and accuracy of the weapon, will have to be somewhat diminished, though it is thought that the 800 lb. powder-charge and the 4000 lb. projectile might still be used. At all events, the factories at Woolwich are quite equal to any demands that may be made on them to build guns of either 164 tons or 200 tons, and the choice between these two now rests with the Admiralty authorities and their constructors.

MARSHALL'S AGRICULTURAL LOCOMOTIVE.

(See page 40.)

In the construction of traction engines the general custom of the largest builders has been to adhere closely to ordinary portable engine practice, and to dispense, as far as possible, with all framing, the boiler itself being made the foundation to which the engine proper and the working gear are attached. It is quite true that this general system of construction has been departed from in numerous instances, and that—in the earlier days of traction engines especially—many engines have been built in which a framing more or less independent of the boiler was provided for carrying the cylinders and carrying gear; but while this is so, the fact remains that the great bulk of traction engines now in use have little or no framing, and that they are so made that some of the chief strains due to the working of the engine are resisted by the boiler.

The advantages attendant upon what may thus be called the ordinary system of traction engine construction are tolerably well known. The absence of framing saves some weight, the engine being on the top of the boiler is under the eye of the driver, and is readily accessible, and the cylinder being fixed to the boiler is in a convenient position for being effectually steam-jacketted. Against these advantages are the disadvantages that the boiler is called upon to resist strains that do not properly belong to it, and that as boiler work is never absolutely true to dimensions, there is always a certain amount of special fitting in making the attachments for each particular engine, while the execution of repairs is not so easy as it wou ld be if the boiler and engine were independent.

It is to some extent to meet these latter objections to the present system of construction that Messrs. Fowler and Co. have of late adopted the plan of employing a kind of partial framing carrying the bearings of the crankshaft, countershaft, &c., this framing being either attached to the boiler, or, as in Messrs. Aveling's case, formed by extension of the side plates of the firebox casing. Messrs. Robey and Co. also, with the same object in view, last year brought out an engine in which the cylinder and crankshaft plummer blocks were carried by a cast-iron frame of peculiar form, this frame being mounted on the top of the boiler in such a way as not to interfere with the free expansion of the latter. Now, however, we have to record a much more decided move in the same direction which has been made by Messrs. Marshall, Sons, and Co., of Gainsborough, who have lately introduced the type traction engine or agricultural locomotive, of which we give an engraving on page 000 of the present number, our illustration representing an engine which Messrs. Marshall lately exhibited at the Smithfield Show.

In designing the engine under notice Messrs. Marshall have acted on the principle that the boiler should not merely partially, but be entirely, independent of the engine proper, and that it should be capable of being readily removed for examination or repair without interfering with the engine or gearing. In other words they desired that the boiler and engine should stand in the same relation to each other as they do in an ordinary railway locomotive. With this object in view they have provided their engines with a complete frame, this frame carrying the cylinder, the plummer box for the crankingshaft and countershaft, the bearings for the driving axle, the fore-carriage, the water tank, coal bunkers, &c., while the boiler, which is fixed to the cylinder at the smoke-box end, is at the fire-box end, merely connected to the frame and thus allows the boiler to expand freely.

The frame consists of a pair of frame plates suitably connected by tranverse stays, the cylinder being fixed to these frame plates at the front end under the smoke-box, as shown in our engraving. The engine we illustrate has a single cylinder 8½ in. in diameter with 10 in. stroke, there being fixed by the side of this cylinder a feedwater heater through which the feed water is pumped on its way to the boiler. The cylinder is steam jacketted, and special provision is made for draining the jacket of water. The guide bars are supported by a motion tranverse stay at about one-fourth their length from their rear ends, the guide bars passing through this plate and being of such length that they are slightly overrun by the crosshead. This arrangement, which has lately been much adopted in locomotive practice, enables the guide-bars to be made shorter and stiffer, and at the same time enables the crosshead to be drawn out when required, without disturbing the bars. The motion plate just mentioned also carries the weigh-bar bearings, and the bracket for the governor.

The crankshaft is carried by plummer blocks fixed to the frame plates, a flywheel being mounted on at the left-hand side of the engine. This flywheel is so situated that it can be got at by the

driver in the event of the engine stopping on a centre, but if the engine is properly handled this rarely occurs, and we have seen one of the engines we are describing worked about a yard with a load for a considerable time, stopping in and starting from awkward places without there being occasion to touch the fly-wheel at all. The flywheel is also so placed that a belt can be led off from it to a thrashing machine, &c., well clear of the leading wheels, while the crankshaft can also carry a smaller pulley, from which a mortar mill or other machine requiring a slower speed can be driven.

Of course when the engine is employed in driving a thrashing machine, &c., the road gear will be thrown out of action. This is effected in the usual way by sliding the crankshaft pinion on the crankshaft. This pinion, when the road gear is in use, drives a spur wheel on an intermediate shaft, this wheel having cast on it a pinion gearing into the main spur wheel on the driving axle.

The latter axle is driven through compensating or "jack-in-the-box" gear, this gear being made very strong, and its details being exceedingly worked out so as to give ample bearing sur-surfaces. The driving wheels and leading wheels are both of wrought iron and of neat design, the former being provided with an efficient brake. The fore carriage is all of iron, and it is situated under the cylinder, as shown on our engraving on page 000.

The boiler has fished-topped firebox casing and is without a steam dome, the steam being collected by a perforated pipe extending from end to end of the boiler, and communicating with a stop valve case fixed to the smoke-box tube plate above the tubes. This stop valve is arranged so as to be readily accessible, and the steam is led down to the cylinder by a steam pipe in the smoke-box as in an ordinary railway locomotive. The boiler exposes 129½ square feet of heating surface, while the fire-grate area is 4.9 square feet. The blast nozzle is kept low and carefully set in the proper position in relation to the chimney so as to insure a good draught with a large area of nozzle, this being a point in which ordinary portable engine practice is very defective. The boiler of the engine under notice is well stayed and the fittings are neatly arranged.

The feed water is carried into a tank at the hind end of the frames below the footplate, and the fuel in coal bunkers on each side of the footplate. The feed water is, as we have said, warmed by forcing it through a heater on its way to the boiler, this heater being traversed by the exhaust steam, and being so arranged that the pipes through which the exhaust steam passes are quite free to expand and contract, while the whole can be very readily taken apart for cleaning. A tool box is provided between the frames at the leading end.

As will be seen from our engraving the general appearance is very neat, and we thing that Messrs Marshall, Sons and Co. are decidedly to be congratulated on the results of their bold departure from ordinary practice. The details of the engines have been worked out with much care, and the proportions are good and substantial throughout. We anticipate that this engine of Messrs. Marshall's will be one of the chief novelties at the Smithfield show next week, and that it will attract considerable attention from all interested in traction engine construction.—*'Engineering.'*

Phosphor Bronze.—An American paper says that the exhibit made by the Phosphor Bronze Company of London, consists of a considerable variety of bearings and working parts of machinery, wrenches, scissors, &c., the most of which have been subjected to tests appropriate to them, and the results shown. Among these are a pair of worms, or endless screws which have been run in articulation with toothed "worm wheels" for eighteen months in a place, and under circumstances such as had, previous to the adoption of this material, destroyed them when made of brass in twelve days; and these specimens showed but slight signs of wear after such an ordeal. A large shaft bearing forming a step, which had suffered more than ordinary pressure on its collar, and which had been repeatedly replaced when made of brass, after three weeks' service, had suffered a diminution in the thickness of collar scarcely appreciable after eight months' use, the mills running night and day. An eccentric-strap which had run eighteen months was reduced in thickness at the crown ¼ inch, where the ordinary gun-metal straps had been replaced every three months. Perhaps the most striking example given of the ability of this alloy to resist wear and tear is that of an hydraulic pump plunger. This plunger had been at work for 572 days at the rate of sixty strokes per minute, under a pressure of three tons to the square inch, and showed no signs of wear; while lying by its side is a hardened steel plunger, which had been subjected to the same work during sixty days, and was worn to such an extent as to be of no further use. Specimens of wire made from this alloy are also shown, with tabulated data of experimental tests made with it, which establish that, while it is more ductile than copper, it exceeds in tenacity some of the strongest of steel.

ON THE CHIEF SYSTEMS OF SEWAGE DISPOSAL NOW IN OPERATION.

The attention of the Local Gorvernment Board having been directed to the great difficulties experieneed by sanitary authorities in devising means for the disposal of the sewage of their districts; and, having regard to the frequent applications which are made to them for advice on this subject, deemed it expedient that inquiry should be made under their direction into the practical efficiency of the chief systems of sewage disposal now in operation, and for which loans have been sanctioned by them.

So they appointed Mr. C. S. Read, M.P., one their secretaries, and Mr. Robert Rawlinson, C.B., their chief engineering inpector, in conjunction with Mr. Smith, the secretary to the late Rivers Pollution Commission, as their assistant, to visit a limited number of localities in which the processes in question are in operation, and report fully thereon to the Board.

These gentlemen accordingly visited Edinburgh, Wrexham, Chorley, Blackburn, Doncaster, Harrogate, Wolverhampton, Leamington, Warwick, Rugby, Banbury, Bedford, Crydon, Norwood, Reigate, Worthing, Aldershott, Romford, Tunbridge Wells, Cheltenham, Merthyr-Tydfil, Barking, Norwich, and Enfield; Kendal, where the downward intermittent principle is carried out · Leeds, Bolton, Conventry, Tottenham, Edmonton, and Hertford, where sewage is treated by a chemical process; Bradford, Birmingham, and Luton, where sewage-sludge is precipitated by the addition of lime; and Halifax, Rochdale, Salford, ane Manchester, where pail system is partially used for dealing with excreta. They also visited Leyden and Amsterdam, where the pneumatic system is partially in operation; Paris, where only a portion of the sewage is utilised in irrigation; and Brussels and Berlin, where the sewage is about to disposed of in irrigation, and their report is just now issued,* and contains the following:

London: Eyre & Spottiswoode. 1876.

Conclusions.

"1. That the scavenging, sewering, and cleansing of towns are necessary for comfort and health; and that, in all cases, these operations involve questions of how to remove the refuse of towns in the safest manner and at the least expense to the ratepayers.

2. That the retention for any lengthened period of refuse and excreta in privy-cesspits, or in cesspools, or at stables, cowsheds, slaughter-houses, or other places in the midst of towns, must be utterly condemned; and none of the (so-called) dry-earth or pail systems, or improved privies, can be approved, other than as palliatives for cesspit-middens, because the excreta is liable to be a nuisance during the period of its retention, and a cause of nuisance in its removal; and, moreover, when removed leaves the crude sewage, unless otherwise dealt with by filtration through land, to pollute any watercourse or river into which such sewage may flow. We have no desire, however, to condemn the dry-earth or pail systems for detached houses, or for public institutions in the country, or for villages, provided the system adopted is carefully carried out.

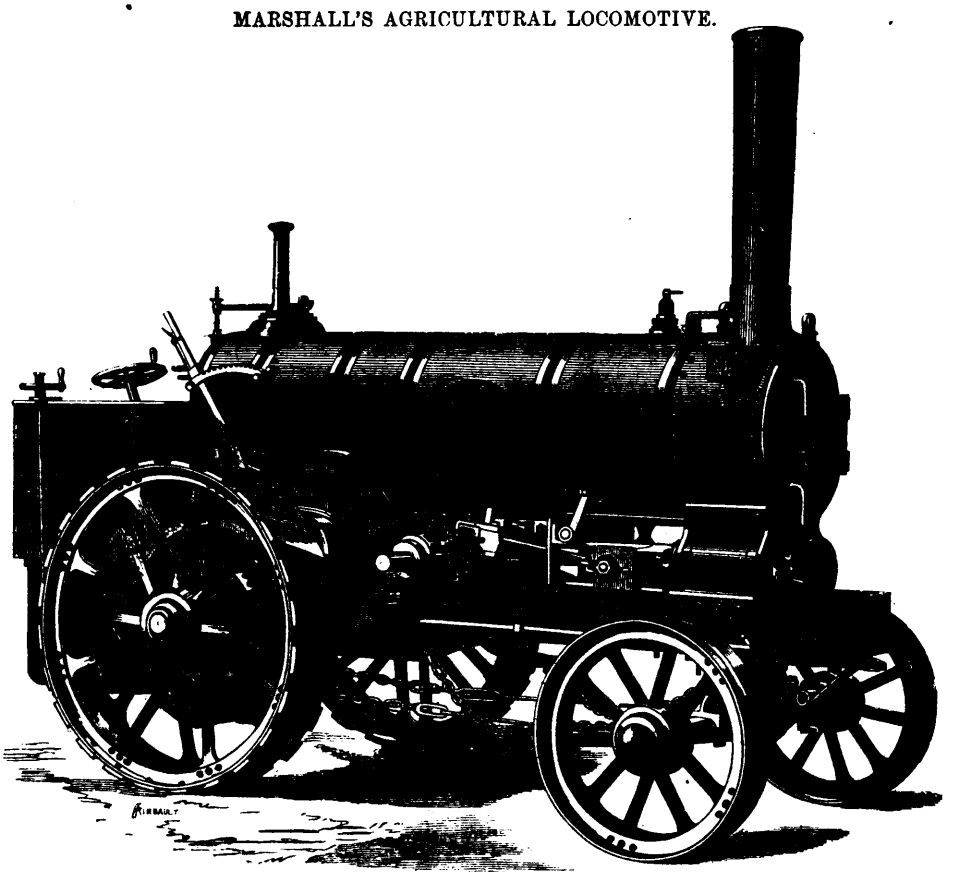
3. That the sewering of towns and the draining of houses must be considered a prime necessity under all conditions and circumstances, so that the sub-soil water may be lowered in wet districts, and may be preserved from pollution, and that waste-water may be removed from houses without delay; and that the surfaces and channels of streets, yards, and courts may be preserved clean.

4. That most rivers and streams are polluted by a discharge into them of crude sewage, which practice is highly objectionable.

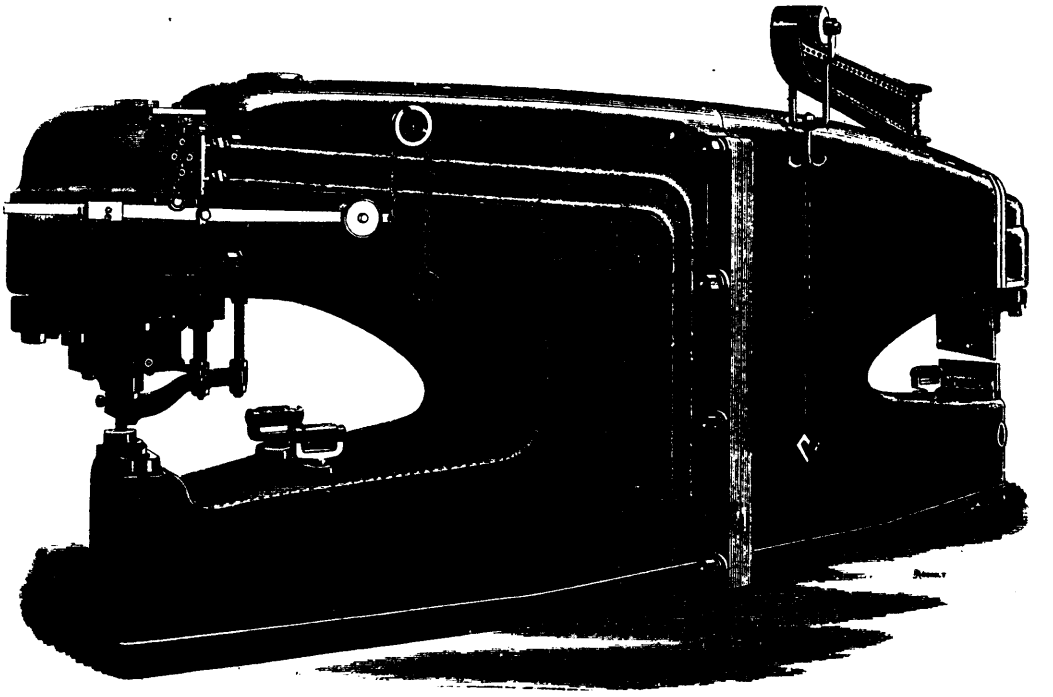
5. That as far as we have been able to ascertain, none of the existing modes of treating town-sewage by deposition and by chemicals in tanks appear to effect much change beyond the separation of the solids, and the clarification of the liquid. That the treatment of sewage in this manner, however, effects a considerable improvement, and, when carried to its greatest perfection, may in some cases be accepted.

6. That so far as our examinations extend, none of the manufactured manures made by manipulating town refuse, with or without chemicals, pay the contingent costs of such modes of treatment; neither has any mode of dealing separately with

MARSHALL'S AGRICULTURAL LOCOMOTIVE.



HYDRAULIC PUNCHING MACHINE.



MELLING'S SAFETY VALVES.

Fig. 2.

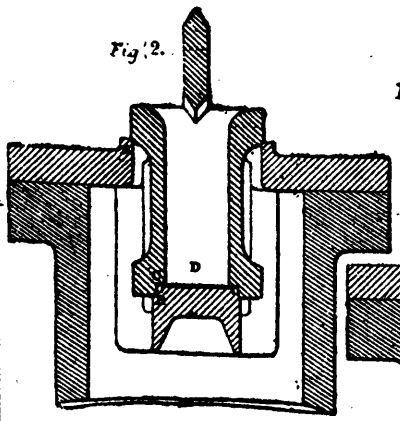


Fig. 1.

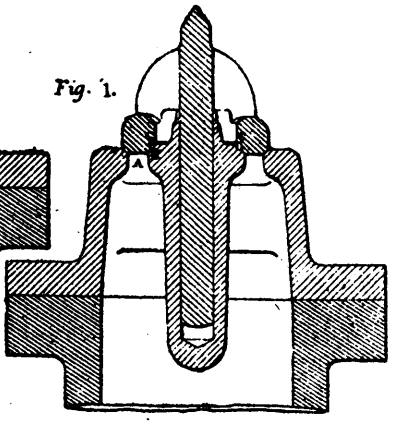


FIG. 4.

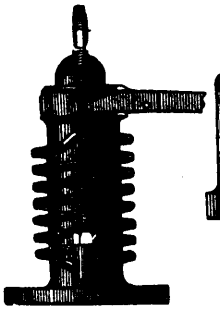
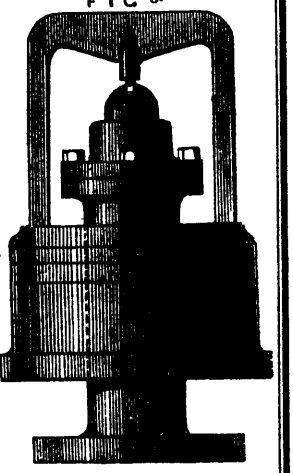
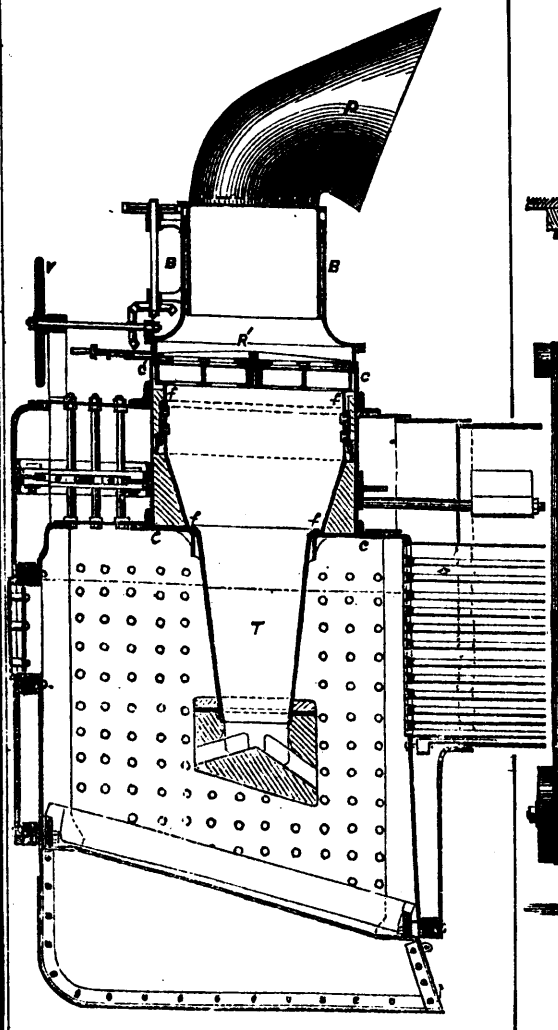


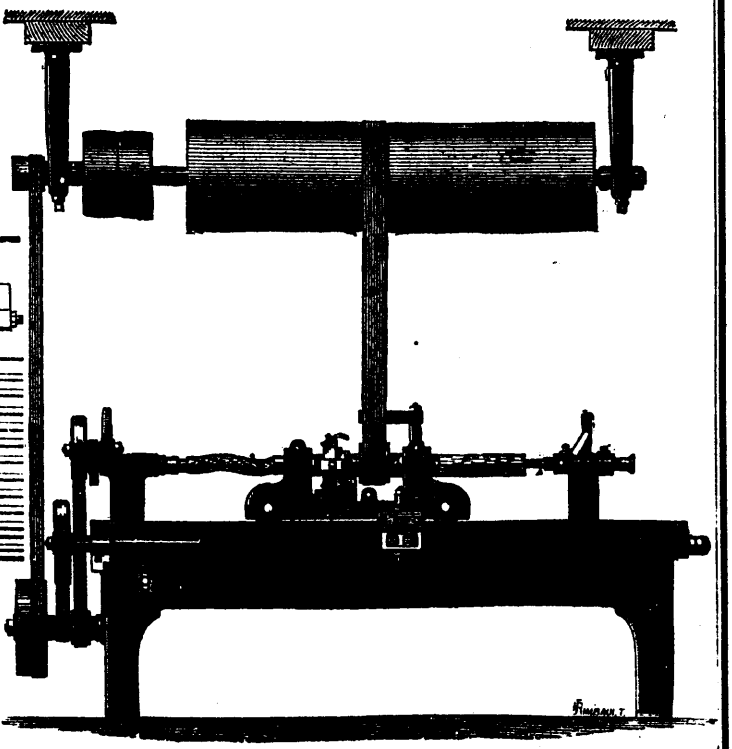
FIG 3.



REIMHERR'S SMOKE PREVENTER.



MACHINE FOR TURNING IRREGULAR FORMS.



excreta, so as to defray the cost of collection and preparation by a sale of the manure, been brought under our notice.

7. That town-sewage can best and most cheaply be disposed of and purified by the process of land irrigation for agricultural purposes, where local conditions are favourable to its application: but that the chemical value of sewage is greatly reduced to the farmer by the fact that it must be disposed of day by day throughout the entire year, and that its volume is generally greatest when it is of the least service to the land.

8. That land irrigation is not practicable in all cases; and, therefore, other modes of dealing with sewage must be allowed.

9. That towns situate on the sea-coast, or on tidal estuaries, may be allowed to turn sewage into the sea or estuary, below the line of low-water, provided no nuisance is caused; and that such a mode of getting rid of sewage may be allowed and justified on the score of economy."

The statements of Commissioners accord so nearly with the views which have been set forth and urged in this journal that little comment will be necessary. We shall content ourselves with giving the pith of the more important parts of the Report, commending the whole, with its appendices, to the serious attention of all who are interested in the subject.

With respect to the laboratory value of town refuse and of sewage, or of the manipulated solids of sewage, they have not found a single case where it is sold at a profit; and, as a consequence, there have been local dispointment and accummulations of several thousands of tons of manufactured manure, asserted to be worth from one to several pounds sterling per ton, which prices are not realised; consequently there are these vast heaps encumbering the premises where manipulated. In the case of town sewage, its unceasing flow and the great volume of water to be disposed of day by day detract from the undoubted manurial value which there is in it, so that sewage containing ammonia, representing a manurial value of 2d. per ton, has to be given away, or has to be wasted into the sea. With respect to solid manure made from town refuse and extracted from sewage, its bulk and weight reduce its value, and as, like sewage, the production goes on all the year round, it must be heaped up until farmers can be induced to remove it,—the inducement for them to do so being a price far below the cost of production.

Town Scavenging.—Town refuse, both fluid and solid, must be got rid of, and the more completely and rapidly the process is effected the better it will be for the inhabitants. The cost of any process should, however, be a secondary question,—always provided that due skill has been and is used in devising the local works, and proper care has been and is exercised in supervision and labour.

Sewage not Profitable to the Extent estimated.—In 100 tons (224,000 gallons) of sewage, having the equivalent of eight grains of ammonia to the gallon, the ingredients are estimated as having a manurial value of 17s. 7d. The suspended matter, which will subside when at rest, or which chemicals will assist to precitate, is worth 2s. 2½d.; other dissolved matter which remains in the clarified water being worth 15s. 4½d. This makes the value 2-1 penny per ton, or say 2d. per ton; the Royal Commission (1858 to 1865) accepting this estimate of 2d. per ton after a set of exhaustive experiments fully recorded in their three Reports, came to the conclusion that a farmer having to take and dispose of sewage day by day, all the year round, would not give more than a ½d. per ton, if even this could be afforded. An examination of the abstracts in this Report will show that sewage has very generally been used in irrigation at a loss. Although this estimate appears so favourable, we find that it fails to be commercially productive in practice, and we may repeat that no chemical or other treatment of town sewage with which we are acquainted is a commercial success. The suspended solids may be precipitated, and the sewage so far clarified by these processes; but the sewage is not purified, nor does the sludge appear to be increased in value as a manure so as to command a sale sufficient to pay the costs of production. The pail system, as practised at Rochdale and other places, does not produce a solid manure of sufficient value to repay the contingent expenses, and command a ready sale.

Sewage not to be stored in Cesspools.—Sewage should not be stored in cesspools beneath houses, or near to houses within a town; neither should it be allowed to rest stagnant in badly formed sewers, nor, indeed, in any sewers; but all waste water and excreta should pass to the drains unperceived, and should then flow in an unceasing stream; and, if practicable, at once over and through land properly prepared for its reception and agricultural use.

Mechanical Power of Water. Water is a purifier, a cleanser, a dissolver, and a mechanical power, and will along down an incline the solid ingredients of town sewage, with road *detritus*,—such as grit and silt; the moving power of water being in proportion to the volume, the vertical depth, and the gradient down which the flow is directed. Flushing by volume and head, artificially formed, will remove *detritus* from sewers of low gradients where accumulation may have taken place. A velocity in the sewage of 2 ft. 6 in. per second will remove any solids likely to be passed into drains and sewers.

Sewage Irrigation proved not to be Injurious to Health.—There is no record of any special outbreak of disease at or near the sewage farm. The men working on the land and amongst the sewage are reported to be healthy, the men cutting the grass are healthy, and the cows fed upon the grass are also as healthy as other cows, producing wholesome milk; and with respect to tapeworm, the medical men who attend the Edinburgh hospitals do not find and exceptional excess of this disease amonst their cases; but, on the contrary, less than in other hospitals. The Craigentinny meadows were made the subject of an exhaustive inquiry by the War Department during the time that Lord Macaulay was member for Edinburgh and Parliamentary secretary for that department. Official inquiry was made by army medical officers, who took the returns of health and mortality for twenty years back from barracks situate in different parts of Great Britain, where troops similar in numbers and performing similar duties had been quartered, and these returns were tabulated, the results obtained proving that the barracks adjoining the Edinburgh sewaged meadows had the lowest sick and death rate in the list, so that the allegations against the Craigentinny meadows fell to the ground. It must not, however, be supposed that rough-and-ready sewage irrigation is advocated, as the evidence should only be taken as proving that the application to land of putrid and crude sewage in the most gross form does not necessarily breed a pestilence, though such mal-arrangements may produce an offensive nuisance which ought not to be continued.

The Pneumatic System.—One of the most complicated and costly processes for dealing with the solid of human excreta (not with town sewage), is the system known by the name of the inventor, Capt. Liernur. The pneumatic system has been partially introduced at Leyden, Amsterdam, and Dordrecht, where they have seen it working. They agree that the pneumatic system is ingenious, but it is complicated in its construction and working arrangements, and consequently it is liable to derangements, which are sometimes difficult to mend. They do not know one English town in which the apparatus, if adopted, would be other than a costly toy. As may be imagined, when the nature of the arrangements and complications are considered, the pneumatic apparatus gets out of order, the slightest crack in any pipe or pipe-joint will reduce the force of the partial vacuum, and even where all the apparatus remains sound the closet-pans may not be emptied; and, in fact, neither the pipes nor the pans ever are entirely emptied; the power of air and water to remove solids through pipes being as their relative weights and velocity, and air is to water, by weight, about as 800 to 1.

Town Sewage: Its Treatment and Characteristics.—All chemical treatment of sewage, by patented processess or otherwise, aims at deodorisation; that is, a clarification and purification. The processes are reported to take from sewage turbidity, colour, and scent; but no such process has ever restored sewage water to its original purity, though most of the suspended solids may have been removed, the salts of sewage remain, and generally some of the chemicals, mixed with the water. The only safe way to utilise sewage is by a daily application of it to land whilst it is comparatively fresh, as at Bedford, Aldershott, Carlisle, Doncaster, Chorley in Lancashire, Leamidgton, Rugby, and other places where sewage irrigation has been established and the sewers transmit in a continuous stream the daily volume. Receiving sewage in tanks to abstract the solids will add to the impurity and offensiveness of the fluid if there is any lengthened retention, or if the tanks are not rigidly cleansed at short intervals, so as to remove any of the leaven of putridity from the surfaces. All sewage-tanks should be simple in form and construction; the material should be either of vitreous character on the surfaces, such as glazed bricks, or of Portland concrete; no sewage-tank should be arched or vaulted over. There may be an open-sided shed louvred at the ridge, and the area of land occupied by both yard and tanks should be fenced in. The sludge separated from sewage contains from 80 to 90 per cent. of water, and deposited on the surface in this state it will not dry in any reasonable

length of time, but will skin over and remain wet. Artificial drying is not practicable on account of the cost. Mixing with dry ashes and street sweepings appears to answer best.

UNVENTILATED FOUL SEWERS AND SEWAGE TANKS DANGEROUS.—Foul sewers and foul vaulted sewage-tanks, if unventilated, will contain carbonic acid gas, and will give off sulphuretted hydrogen, both of these gases being generated from decaying vegetable and animal matters. A complete and perfect disinfection of sewage and sewage deposit by the addition any known materials, solid or fluid, would be so costly as to be impracticable, and the materials so disinfected would have no equivalent increase in commercial value. To completely disinfect one cubic foot of sewage-sludge and excreta would cost, in the materials, about 1s., or 27s. per ton.

(To be continued.)

ITALIAN SHIPS.

The *Dandolo*, which is now building at Spezzia, is to be a companion ship to the *Duilio*, already launched and waiting for her plates. Here again we find novelties. Spezzia is just now a very paradise of engineers, and the new Italian ship is not the least interesting of the works to be seen there. The *Duilio* and the *Dandolo* are sister turret ships, designed to move entirely by steam. The *Dandolo*, as she now lies half built on the slips, is curiously dwarfed in size by the mountains which surround the gulf, but she is 103 metres long between perpendiculars, 18 metres beam, and 11 metres in depth. When acting as a cruiser her draught will be 8 metres, but when in action with an enemy she can so fill her fore and aft compartments with water that she will sink more than a third of a metre lower, so that her draught will then be 8·87 metres. Her deck is plated with 2 inches of iron and round the vulnerable part of her she will have 22 inches on a backing described lately as that fired at by the 100-ton gun. The two turrets are arranged diagonally, so as not to interfere with each other in giving fore and aft fire. They are enclosed in a box, which is covered by 22 inches of armour at the water line 18 inches above, and 14 inches below. The armour at the water line tapers off to the ends, but a shot through the ends would not add to the quantity of water in the ship, because what water it could contain has been admitted already, and the buoyant part of the vessel is all enclosed within the armour of the box. Of course, the bottom of the ship has a double skin, with watertight compartments. In the *Duilio* and *Dandolo* the distance between the sides of the cellular structure is about one metre or a little more than a yard; but the present idea, to be carried out hereafter, is to meet the destructive force of torpedoes by leaving a greater space than has yet been tried between the point where the torpedo will strike and the inner skin, which is the life of the ship. Of course, the whole ship is full of watertight compartments.

So far for the defensive arrangements of the sister ships; now for their means of offence. First, there are four 100-ton guns, which can all be fired at the same time, and though we have seen what one can do, it remains to be known what the discharge of four, with shots striking near each other, would do to a ship. Moreover, the *Duilio* and the *Dandolo* have spurs weighing 17 tons each. To add to the means of attack from the prow of the ship, tubes are laid straight forward for Whitehead torpedoes, which can be discharged in the line of the ship's progress. We do not say in a line with the keel, because there is no keel below the axis of the ship, but two bilge keels, arranged on Mr. Froude's plan, to check and diminish rolling. Harvey's torpedoes will also be towed, and since they are sometimes dangerous to friends as well as enemies, if self-acting, they will be ignited at will by electrical means. Yet one means of offence and that a novel one, remains to be mentioned. In the stern of the vessel is an iron door partly below the water-line, partly above it. Within the door is a large iron tube containing a steam launch. Generally speaking, the launch is laid up in its dry dock, for the door is watertight. But suppose the *Duilio* is close to an adversary against whom she wishes to bring all her powers to bear, the iron door in the stern opens, enough water rushes into the tube to float the launch, and immediately a steam ram darts backward out of the ship and pushes the boat out of its iron cave with great velocity. This velocity is increased by the little engines in the launch, and she can, of course, steer and turn in a much smaller space than a ship. Before the enemy has had time enough to see that a blow is intended, long before any measure could be taken to meet it, the launch is under the counter of her big foe, the ironclad, and strikes her with a torpedo.

So then the *Duilio* and *Dandolo* have the heaviest armour except that of the *Inflexible*. Their engines of 7500 indicative horse power (1200 nominal) are supposed to drive them at the rate of 16 knots an hour; they have spurs to strike with, guns to dash in armour sides, smaller guns for less stringent difficulties; torpedoes which can be launched from beneath the bows and travel under water, other torpedoes which are to be towed and strike an enemy alongside, and, finally, a torpedo boat, which, with its voluntary crew of one or two men, may be launched in the midst of an action to strike a particular foe or join in the *mêlée*. Such is the state of naval progress on which the third quarter of the 19th century opened. Supposing all ships to be equally well provided with means of offence, it is almost impossible to believe that any ironclad will escape being sunk, or any wooden ship remain unburnt in future naval actions. The precision and power of field artillery and small arms are making battles terrible enough on shore, but what are their dangers compared with the combination of ships' sides dashed into thousands of splinters by guns, rams and torpedoes of three different kinds? Why the air would be full of shells, each carrying the life of a ship, and the sea will be covered with torpedoes both on and below the surface. How friends are to avoid striking each other in the *mêlée* is difficult to conceive, and we might almost imagine that the story of the next naval battle will never be told because nobody will be left alive to tell it.

HITCHIS' RAPID SYSTEM OF PLASTERING.

By the use of this system, the lathing and two coats of plastering, with lime and hair, give place to large slabs fixed to the joists, which form the body of the ceiling at once. The edges of these slabs are bevelled reverse ways, and fit into each other so that the stopping cannot be shaken out. The face of the slabs are made rough, and the whole receives a thin finishing coat of cement or stucco, which effectually conceals the joints, and produces ceilings of good appearance. By this means no time is lost in waiting for drying; and the annoyance of dirt and rubbish caused by mixing and using lime and hair, is entirely avoided. The manufacture of the slabs may be briefly described. A sufficient quantity of plaster and fibre is mixed with glue-water; half of this, while in a plastic state, is spread evenly upon a plate-glass bench, the edges of which are raised ⅜ in. and bevelled. A sheet of strong open canvas is then stretched tight cross, and wrapt round two laths which are embedded in the awo opposite edges of the slab. The object of having these laths ts to tighten the canvas, and stiffen the edges of the slabs in itheir span from joist to joist. The remaining portion of the plaster and fibre is spread evenly upon the canvas, which then remains firmly embedded through the centre of the slab. A bass broom is then passed over the face of the slabs to form a "key" for a finishing coat. When sufficiently set, the slabs are removed from the bench, and exposed to the air to dry. These slabs are made 2 ft. 6 in. wide, and of sufficient length to reach across four joists, and are secured to the joists by driving 1½ in. zinc nails through the laths before-mentioned, and about 4 in. apart, along wherever the joists come. The joints are then roughly stopped with cement, and the whole receives a thin "setting" or finishing coat of cement or "stucco," as in the ordinary way. The system certainly has its advantages.—*Builder*.

THE BANK OF SOUTH AUSTRALIA, ADELAIDE.

(See page 37)

We give an illustration of this bank, copied from the *Builder*, to illustrate the extent to which colonists are successfully competing with the palatial buildings in the United Kingdom.

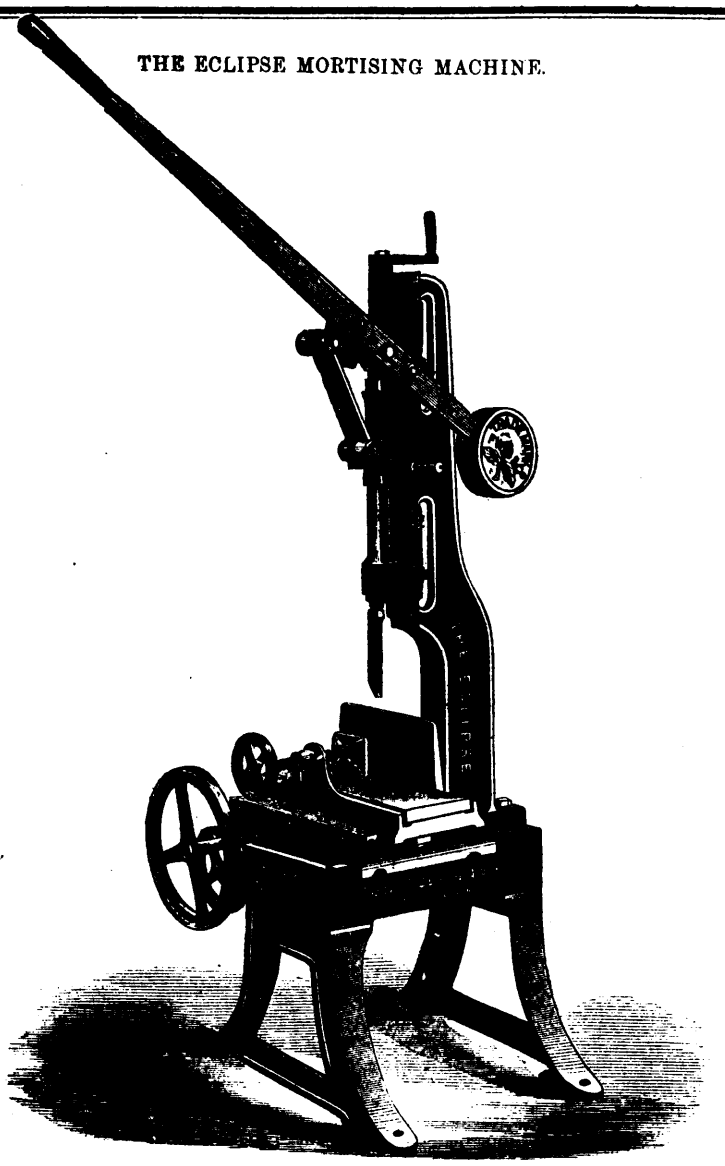
We regret that our space will not allow us to enter into a detailed description of this fine building, which is very highly spoken of by the *Builder*. The colonial architects were Mr. Lloyd Tayler, F.R.I.B.A., of Melbourne, and Mr. E. W. Wright, of Adelaide.

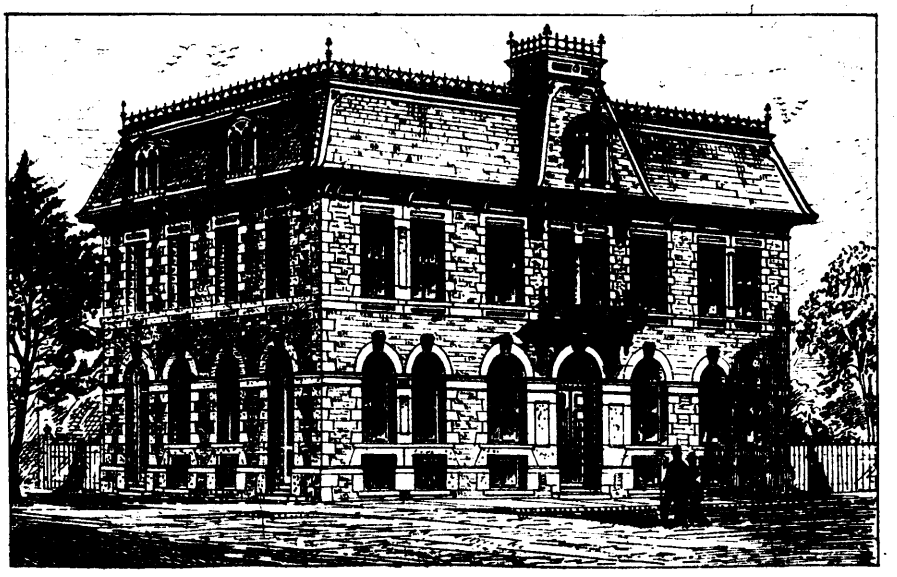
THE GUELPH NEW POST OFFICE

(See page 44.)

The Guelph Post Office is to be a building of about 63 feet by 40 feet, the foundations of which have been recently laid. It is to be built of stone and will contain the Post Office, Inland Revenue, Custom House, Weights and Measures, and Gas Inspector's office.

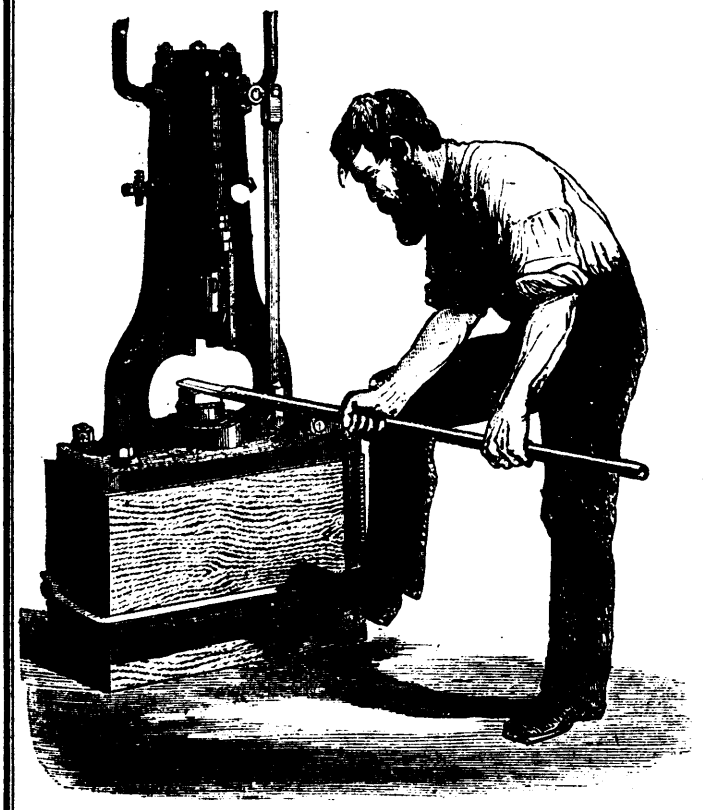
THE ECLIPSE MORTISING MACHINE.





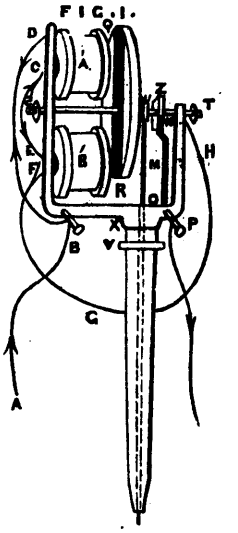
NEW POST-OFFICE, GUELPH.

The Warsop Light Forging Hammer.



The Electric Pen.

FIG. 1.



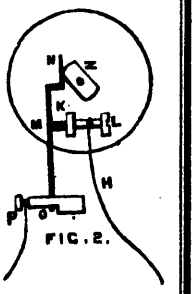
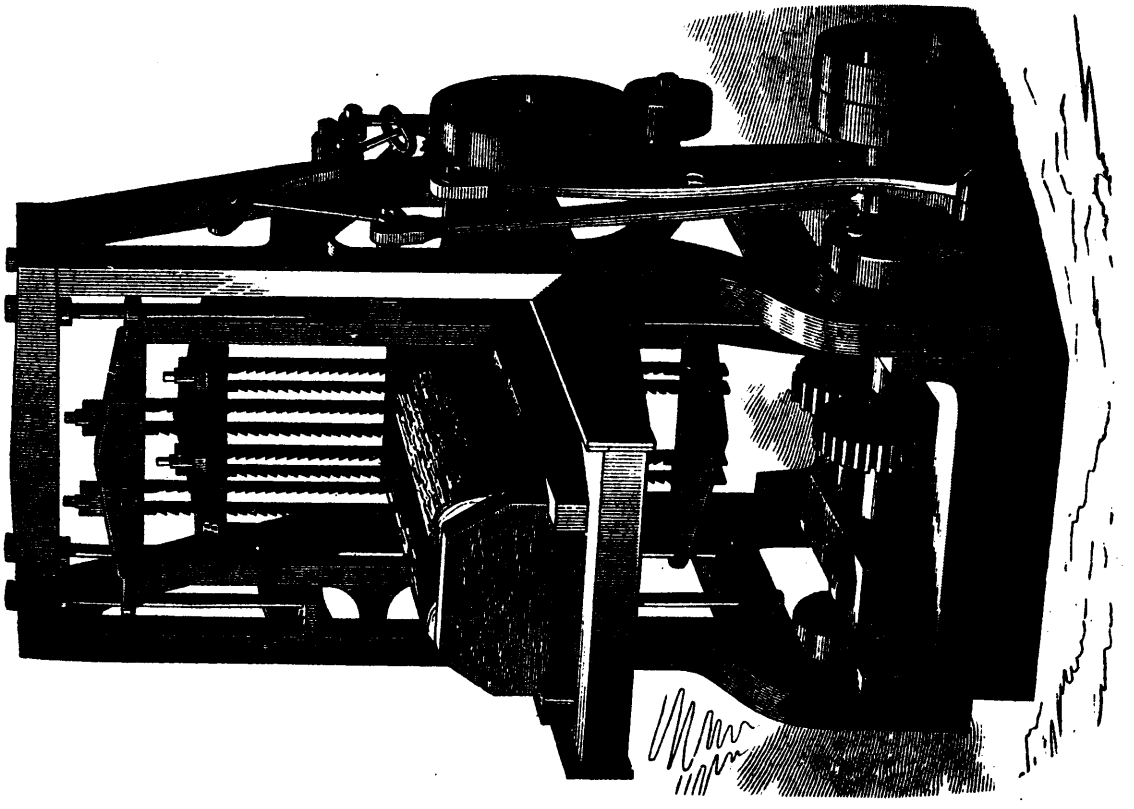


FIG. 2.

IMPROVED PORTABLE GANG-SAW.



THE "ECLIPSE" MORTISING MACHINE.

(See page 44.)

Mortising, like all operations in which great accuracy is required, is much better performed by a well constructed machine than by hand. Even an expert and thoroughly competent workman is not always able to do his best, and, unfortunately, the majority of workmen in nearly every department cannot be included in the category of experts. There are various mortising machines, more or less ingenious in construction and efficient in operation, in use, most of them having a rack and pinion, or rack and cog action in connecting the hand-lever to the part which carries the spindle of the cutter or chisel. That which we illustrate, which is manufactured by Messrs. F. W. Reynolds and Co., Southwark Street, London, differs from all others in having, in place of the usual rack and cog-wheel, an articulated elbow or toggle movement, the action of which not only produces the requisite vertical motion of the chisel, but gives an increased power as it penetrates deeper and deeper into the material being worked. This motion also insures uniformity in the depth of such mortises, as it is not required to cut quite through the wood. Again, the requisite uniformity of depth is secured in the whole length of the mortise much more certainly and easily than in previous methods, owing to the bearings of the chisel spindle and the fulcrum of the lever being adjustable, and the lever having always to be brought down to the lowest point. In respect of ease and certainty of working, therefore, as well as accuracy, the "Eclipse" appears to possess capabilities that must give it a foremost place among machines of its class.—*Iron*.

THE WARSOP LIGHT FORCING HAMMER.

(See page 45.)

The application of steam power to smithwork has lately occupied much attention among tool makers, and the result has given a wide field of selection to the purchasers of such appliances. We illustrate a light forcing hammer which most unquestionably claims a place among the useful and handy tools which do the work of the striker at a great saving of time and money. It is now several months since the first of these hammers was set to work, and from that time it has, we understand, worked continuously without a single repair, although frequently doing very rough work. The engraving represents a 55 lb. hammer with a 4in. cylinder. It will forge iron from 1½in. thick or draw a 1¼in. square steel bar down to §in. thick at one heat in a fifth of the time it would take by hand. The slide valve is balanced, and cuts off the steam so close to the piston as to allow of no loss in the passages, it also is automatic and quite independent of the steam cock. It can also be adjusted to any grade of expansion or give steam for the full stroke. The size of the piston varies from 3in. to 6in. The foot gear is for regulating the amount of steam admitted to the machine, and thereby controlling the speed, and with it the force or weight of the blow may be regulated. It enables the hammer to be held up while work is being changed, and gives the power of striking single blows. When the foot is removed from the treadle the hammer stops. This hammer is suitable for forcing bolts, spikes, keys, spindles, &c., for drawing out files, knife blade, and scythe blades, for roughing out work, and for stamping metal for hot dies. A special form of this tool is made for planishing brass and copper work. It may be attached to a post or column in the workshop, or if the work requires much clearness it may be fixed on the end of a beam or girder projecting from the wall. We may add that Messrs. Tangye Bros. and Rake, of Newcastle-on-Tyne, who manufacture the hammer, have worked it in some cases with compressed air. The internal arrangement of this hammer and planisher is almost identical with that of the Warsop rock drill, an illustration of which appeared in the *Engineer* January 8th, 1875, and therefore requires no further description.

Small hammers of various descriptions worked by springs, cams, straps, &c., have long been known, but we believe this is the first instance in which the principles involved in the construction of a rock drill have been applied in a machine intended to make or work light forgings. The compactness of the tool is a strong point in its favour.—*Engineer*.

THE STRENGTH OF CAST IRON FITTING BLOCKS.

Cast iron fitting blocks are used freely by boiler makers under the impression that such blocks while of small diameter compensate for the weakness caused by the hole which the block goes over. There is, however, reason to believe that this impression is erroneous, and Mr. Fletcher, of the Manchester Steam User's Association, deprecates the use of such blocks very strongly.

In our impression for March 24th, 1876, we referred at considerable length to the experiments carried out by Mr. Fletcher with a boiler specially constructed for experimental purposes by Mr. Beeley, of Manchester, and we illustrated the boiler in question. In all eleven bursting tests were applied up to last March in order to ascertain the weakest portions.

In the engraving on page 000, we illustrate from a photograph the fracture of a cast iron mouth-piece or fitting block at the base of a 6 in. steam stop valve. The casting was very good and sound. The pressure was 275 lb. on the square inch. The plates of the 7 ft. boiler shell were seven-sixteenths thick, double rivetted and carried 342 lb. before giving way. It is evident from this that the cast iron fitting piece did not compensate for the loss of strength in the plate caused by cutting a 6 in. hole in it. A point worth notice in cutting holes in boiler shells has never received the attention which it deserves. These holes are very frequently left ragged at the edge, and if closely examined, it will be found that minute cracks radiate from them into the plate. The weakening influence of such cracks, however, small and short, is well understood. In all cases the edges of holes in boilers should be cut off clean and sharp, and the general use of some modification of the rose cutter which would smooth off holes up to 6 in. in diameter would be a very good thing.—*Engineer*.

IMPROVED PORTABLE GANG SAWMILL.

(See page 45.)

In the machine herewith illustrated a series of vertically reciprocating saws cut, simultaneously, a number of boards from a log. It will be remembered that the old form of gang-saw embodies but a single gate, the saws in which, of course, act upon the log only in one direction. In the present apparatus, two gates are employed, each carrying a number of pairs of saws, the pairs in one gate being arranged in alternation with those in the other. The teeth in the alternate saws in each gate are oppositely directed, so that one set of saws is always acting during each part of the stroke. The gates counterbalance each other, and in this way, it is claimed, the troublesome springing and trembling of the log (which often occurs when a single gate is used) are entirely avoided. Another new feature is found in the reversed blocks, which are fitted to notches at the ends of the saws, and by means of which the distance between the saws is regulated. Screws passing through said blocks are provided for tightening the blades. The log carriage is constructed in the usual way, and is provided with head blocks and dogs for engaging the log between each pair of saws, so that the latter may run completely through the log and leave no stub. The feed motion is adjustable as to rate of feed, and the usual friction apparatus is provided for carrying the carriage quickly back.

The important feature of the machine lies in the arrangement of saws. The two gates, A and B, are similar, and both slide upon ways in the main frame. On the cross-bars of the frames are projecting studs, which support the saws; each pair of blades is connected at the bottom by means of a pin, which is drawn against the under side of the stud by the straining device. The latter consists of a reversed block, the lugs formed on which are fitted to notches cut in the edges of the saw. A screw passes through the block and bears on the projecting log on the cross-bar beneath, so that by turning said screw, the pair of blades is quickly stretched out. The reverse direction of the teeth of alternate saws is plainly shown in the engraving, all the teeth being of course turned toward the front of the machine.

A shaft, journaled in the bed-piece, carries, at each end, similarly arranged double cranks, C, the wrist pins of which are placed diametrically opposite each other. D are rods which connect the pins with studs that project from the gates. By this ingenious mechanical device, the cranks impart, as they rotate, a reciprocating motion to the gates.

The saws that cut down are overhung at the top, while those that cut up are overhung at the bottom, so that there is always a clearance for either set. They are so adjusted that the front part of the cuts comes even in line. Among the advantages claimed is, that long and slender logs may be sawn without difficulty, if the force is equally exerted from above and below.

To Make Labels Adhere to a Polished Surface.—Brush the back of a label over with polish, and press down with a soft rag; this must be done quickly, as the polish soon becomes dry. Pianoforte labels are put on in this manner.

PATENT LAW REFORM.

The following remarks from an English Scientific paper (*Iron*) will be interesting to Patent Solicitors both in Canada and the United States:

The expediency of revising, or—to state the subject more accurately—of carrying out the existing Patent Law of the United Kingdom, has been once more suggested by that useful body, the Society of Arts. After ample deliberation, the Council of the Society decided that the best form of communicating their opinions would be a memorial the to Lord Chancellor, the substance of which will be found in another column of IRON. Possibly Lord Cairns may be inclined to view the memorial with mixed feelings, among which must be present a certain amount of mortification at the failure of his own measure, which, after running the gauntlet of two successive sessions, has been relegated to that department of the Shades which is popularly supposed to be occupied by the phantoms of slaughtered innocents. At the first appearance of the Lord Chancellor's Bill, it became evident that its only effect would be to abolish, in a costly and cumbrous manner, the granting of patents altogether—a result which it is only fair to admit would have been hailed with pleasure by a small knot of advanced economists, who, by a process of reasoning peculiar to themselves, have arrived at the conclusion that brain property is distinct from other property, and that the fruit of many years of study and of great outlay should be nobly laid on the altar of Britannia—the inventor resting content with taking his chance against an army of manufacturers. It is needless to expose the hollowness of this position further than once more to reiterate that the inventor is rarely a manufacturer ruling over a "going concern," and hardly ever a capitalist, but frequently an artisan, and, in the case of really great inventions, generally a theorist and not a "practical man" able to profit immediately by the success of his improvement. It would also be foreign to our purpose to dilate, at this moment, on the manifest defects of the luckless Bill introduced by Lord Cairns, which provided for a costly machinery which, after all, like the Patent Law of France, could not guarantee the invention against the common law of the country. The Lord Chancellor's Bill is a thing of the past, and the Society of Arts, with that practical knowledge which is one of its most salient characteristics, has pointed out that the existing law, if completely carried out, is amply sufficient for the requirements of patentees and the public. It is quite in consonance with English feeling to make the best of existing legislation, rather than begin again from first principles, and the course adopted by the Society of Arts will therefore meet very general approbation.

It is, above all, necessary to bear in mind that no possible Patent Office can give a patentee a valid guarantee for the sole enjoyment of his invention. All that can be done is to enable him to make such thorough and complete investigation of previous patent awards as shall preserve him from a downright blunder. The fees he pays do not "warrant him a line" in actual fact. Due investigation having been made of previous patents, he is only granted protection against all and every—saving always those who can make good a prior claim in a court of law. This being the value of a patent, neither more nor less—the Great Seal of England to the contrary notwithstanding—it remains to be seen what the patentee gets for his money. Chaff-waxes and other dim and mythical persons have disappeared from the Patent Office, and the salaries of Her Majesty's Attorney and Solicitor General no longer depend upon Patent Office fees; but the result is the same—the patentees, if less vexed with ceremony and less mulcted in heavy fees than in the old evil days, are yet taxed sufficiently, and have a right to expect a fair, and, indeed, a liberal return. At the present moment the Patent Office returns a profit of £100,000 to the Exchequer—not an enormous sum, but yet one of the most unfair of taxes—an impost not upon profit and success, but upon invention and outlay, with a hope, generally remote and shadowy, of ultimate reward. Taxes upon industry of other kinds have been in great measure remitted, but this toll upon the brain yet sends in its full contribution to the Exchequer. It is therefore time that an office which returns a handsome profit out of purses ill able to spare it, should be called upon to do its work, and do it, so far as is possible, efficiently.

The memorial of the Society of Arts sets forth that the Patent Law Amendment Act of 1852 has never been fairly carried out. Under the provisions of that Act—mainly brought about by the exertions of the Society of Arts and the vigorous advocacy of the late Mr. Charles Dickens in *Household Words*—the Lord Chancellor, the Master of the Rolls and certain Law Officers of the Crown therein named, together with *such other persons as Her Majesty the Queen should appoint*, are made Commissioners of Patents, with full powers, as therein specified, to conduct the business of granting Letters Patent for Inventions, and to make regulations for the administration of the Patent Office."

This Act, excellent in itself, has remained practically a dead letter, and the government of the Patent Office an anomaly. Theoretically, it is ruled by the four Commissioners—the Lord Chancellor, the Master of the Rolls and the Attorney and Solicitor General—but, practically, it is entirely administered by their clerk, who, however competent, is not responsible to Parliament for the management of his department. Luckily this post has been well filled successively by Mr. Bennet Woodcroft and Mr. Reader Lack, but each of these gentlemen has been left almost alone to his work—the Commissioners of Patents being in the same position as the Trustees of the British Museum, *i.e.*, having too much to do elsewhere. They have become a merely ornamental body—not easily dislodged, however—for their salaries as *ex officio* Commissioners of Patents are simply commutations of the fees which previously accrued to them as representatives of the Great Seal, an impression of which—like a muffin in a tin box—is appended to every patent issued to this day. The myth exists that a patent is a grant of monopoly under the Great Seal, although it is no such thing, but a mere provisional protection to the inventor until somebody can dethrone him. The actual Commissioners having become mere sinecurists, the Society of Arts, with whom is the great body of inventors, suggest the specific performance of the provisions of the Act of 1852. At present the Patent Office—abundantly supplied with ornamental wigs—has no real head, and the Government is now asked to supply this want, by the appointment of one, two or three competent persons, who shall be Commissioners of Patents and nothing else. The Patent Museum, the Publications of the Patent Office, its departments, all and sundry, require that vitality which can only be communicated by a real governing power; and as the department returns a clear profit of a hundred thousand a year, no economical reason can intervene to prevent the consummation of this necessary reform.

CEMENT FOR JOINING AMBER.—A solution of hard copal in pure ether, of the consistency of castor oil, is suggested by Ph. Rust for cementing amber. The carefully-cleaned surfaces of fracture, coated with the solution, should be pressed together, and retained in contact by means of a string wound around the object, or in some other suitable way. The operation should be performed as rapidly as possible, since the evaporation of the ether impairs the adhesiveness of the cement; so that all arrangements for compressing the object should be made before laying on the cement. A few days are required for the complete hardening of it. In repairing tubes, as for pipes, any of the solution happening to pass into the interior should be carefully removed at once with a slender feather.

THE MINERAL WEALTH OF AFRICA.—The recent African discoveries have developed the fact that vast mineral wealth underlies the surface of that great continent. Lieutenant Cameron, who has just returned from there, tells of enormous deposits of coal and iron; enough, he says, to supply the world for untold centuries. A canal of 120 miles in length, connecting the Congo and Zambesi rivers, will open up these deposits, and provide communications between the Indian and Atlantic oceans. Already England shows an inclination to take possession of this valuable country, which was disclosed to the world by Lieutenant Cameron's important explorations.

WORTH KNOWING.—We are assured that one pound of green copperas, dissolved in one quart of water, and poured down a water-closet, will effectually concentrate and destroy the foulest smells. On board ships and steamboats, about hotels, and other public places, there is nothing so nice to purify the air. Simple green copperas, dissolved in anything under the bed, will render a hospital, or other place for the sick, free from unpleasant smells. In fish-markets, slaughter houses, sinks, and wherever there are offensive gases, dissolve copperas and sprinkle it about, and in a few days the smell will pass away. If a cat, rat, or mouse dies about the house, and sends forth an offensive gas, place some dissolved copperas in an open vessel near the place where the nuisance is, and it will purify the atmosphere.

PUNCHING AND SHEARING MACHINE.

FIG. 1.

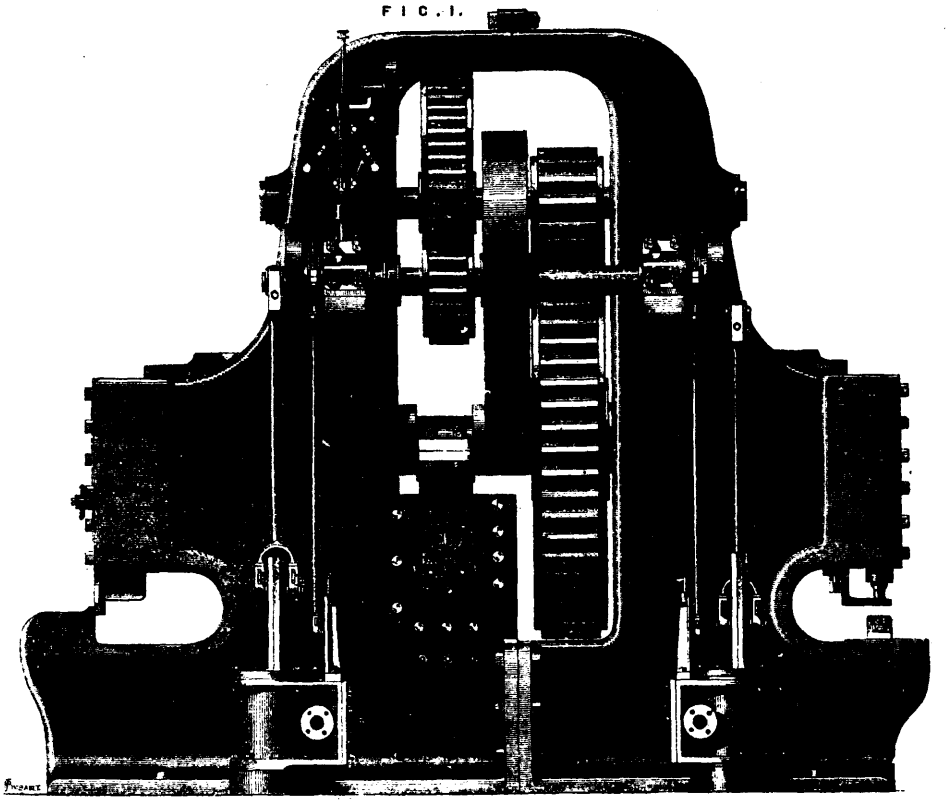


FIG. 2.

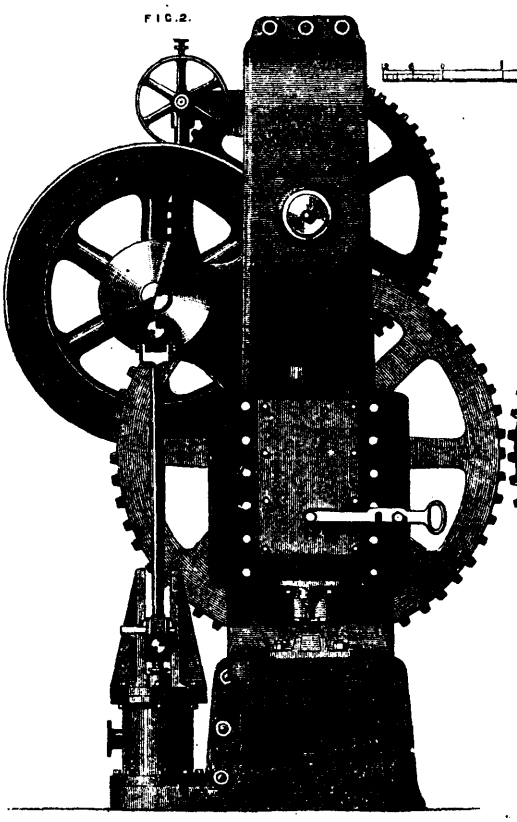
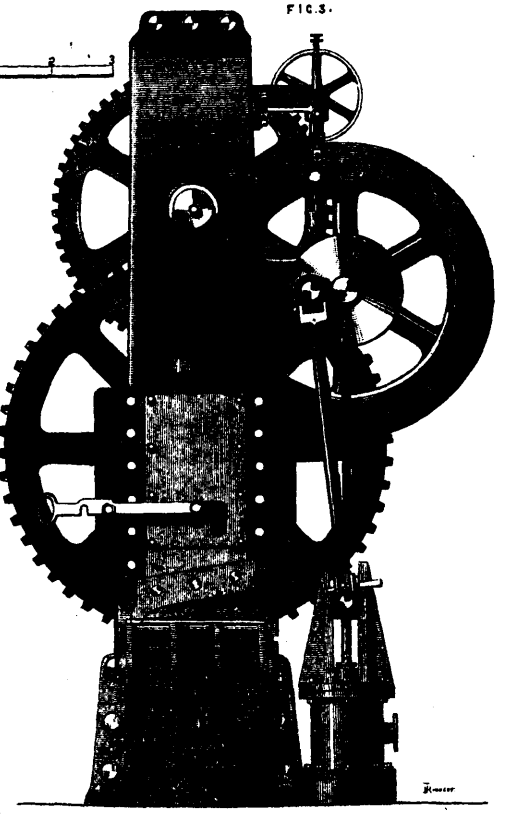


FIG. 3.



THE FAMILY FRIEND.

This part of the MAGAZINE, for the future, will be devoted to instructive domestic reading for the *Home Circle*, such as SHORT PLEASING STORIES, DRAWING, MUSIC, BOTANY, NATURAL HISTORY, POPULAR GAMES, and amusements for boys and girls, NEEDLE WORK, AMATEUR MECHANICAL PURSUITS, and all the elements of a *practical domestic education ;* also GARDENING and AGRICULTURAL NOTES.

FLORAL CULTURE.

HELIOTROPIUM

HUMEA ELEGANS.

LUPINUS CRUIKSHANKII.

IBERIS SEMPERVIRENS.

ICE PLANT.

MALOPE TREFIDA.

IPOMEA HEDERACEA SUPERBA.

LOPHOSPERMUM SCANDENS.

MARIGOLD FRENCH.

HYDRAULIC PUNCHING MACHINE.

(See page 40)

The powerful hydraulic punching and shearing machine we illustrate this week forms part of an entire plant of hydraulic machine tools on Mr. Tweddell's well-known system at the French Government dockyards, at Toulon. In an article on hydraulic tools which appeared in our columns some five years ago, we made the following remarks: "To obtain the full benefit of such a system of working machine tools as that of which we have just been speaking, it would be necessary, of course, that it should be carried out on a large scale, but its employment in even a less complete form would, we believe, be attended in many instances with advantages." The almost universal adoption of Mr. Tweddell's hydraulic machinery for rivetting proved the justice of the latter portion of our remarks, and this extensive application of the system at their new dockyard at Toulon, shows that the French authorities, having already tested this class of machine ry at their arsenal at Indret and elsewhere on single machines, are now determined to obtain the full benefit of this mode of working by fitting up an entire work on Mr. Tweddell's plan.

M. Berrier Fontaine, of the engineering staff at Toulon, having gone into the whole question of economical working very closely, furnished the patentee with his reqnirements and the general arrangements of the shops, and when we state that there is a 50 horse power pumping engine to force water into two accumulators, each 20 ft. stroke and loaded to 1500 lb. per square inch, the extensive nature of the application is apparent.

The whole contract was placed in the hands of Mr. Henry Chapman, of Paris, whose applications of this class of work have been very successful in France. As much misconception exists as to the economy of hydraulic machinery, we propose shortly to lay before our readers a series of tables and diagrams prepared by M. Berrier Fontaine and Mr. Tweddell, and we think that a careful perusal of them will disclose some startling facts and prove what has been always claimed by the designer of these machines, that even for an isolated machine in operation, it will compare favourably with other methods of doing the same work, but on taking a group of machines or the result of several average hours' or days' working of one machine, the economy of the hydraulic system is still more apparent, to say nothing of many collateral advantages which we have neither time or space to discuss here, but which Mr. Tweddell maintains are in themselves sufficient to justify the adoption of the hydraulic system. However we must briefly describe the machime we have chosen as an illustration this week.

The whole machine weighs about 28 tons. Although shown as one combined machine, there are really two entirely separate tools, and no breakdown in the one affects the other, or, if desired, they can at any time be placed apart if required for the better working of the shop, or as is often done, to have a third cylinder inserted for angle bar shears. The machine will punch 1¼-in. holes in 1½-in. plate at a distance of 5 ft. from the edge, and it shears 1¼-in. plates 5 ft. from the edge, taking at each cut a length of 18 in.; this long cut is a great advantage in straight work and reduces the number of strokes to cut the same length of plate fully one-shird as compared with the ordinary geared machines; the knives also may be turned round, so as to cut at right angles to centre line of machine at an angle of 450 deg. either way, or in a line with centre line, thus enabling bars of any length to be cut to the length required.

The drawback motion is self-acting, and by means of tapped rods and nuts, as shown on the punching end in the engraving, the length of stroke, and consequently the consumption of water can be regulated so as to proportionate it to the thickness of plate punched or sheared.

The levers admitting the pressure and opening to exhaust can either be worked by the man in front of the plate being operated on, or from behind the chain as shown. It may be added that no stop motion is required in these machines, as the machine becomes stationary at any point of stroke the moment the man working it releases the handle, and as the first impulse of a man on discovering an error is to do this, it is found to answer admirably, and to insure extremely accurate work.

The machine requires no foundation, and as the pipes from the main are all underground, the whole space above and round the machine is clear of belts, &c., and thus the cranes fixed on the machine itself can travel all round, and the travelling crane overhead, which works the whole shop, has a traverse clear of all belts, and over the whole area of the shop. The workmanship is of a superior order, and the castings are especially clean and well-finished job. *Engineering.*

MELLING'S SAFETY VALVES.

(See page 41.)

We annex engravings of a safety valve designed and patented by Mr. J. W. Melling, of Birkett Bank, Wigan, the special feature of this valve being the arrangement adopted to secure a large discharge area. This increase of discharge area, as compared with ordinary valves, is due partly to the increase of lift and partly to there being two openings through which the escape of steam can take place. The increased rise is obtained by providing a large area for the steam to act on when the valve is blowing off, than when it is closed. This will be seen on reference to the sections Figs. 1 and 2. When blowing off, the steam that passes the inner face B acts with effect on the additional surface provided by the part C on the valve. The width of the space left between this part C and the top of the boss on the seat, determines what amount of increase in pressure the valve will allow before rising to its full height; for instance, if a valve was loaded to commence blowing at 60 lb. it would act something like an ordinary valve until the pressure reached, say, 62lb., when it would rise at once to its full height; but if the escape was made wide it would allow the pressure to rise to 63 lb. or 64 lb. before going to its full height, which is, when loaded by dead weight, about equal to the width of the orifice in the seat, so that the area given for discharge is as much as is required by that orifice. In addition to the outer discharge, there is the inner one that is equal to from 30 to 40 per cent. of the outer one, and the combined areas amount to six or eight times as much as would be given by the ordinary kind of valve of the same outer diameter, when working with pressures over 50 lbs. per square inch.

It will be seen that the discharge from the outer face is uninterrupted, whilst the inner discharge gives these valves an additional advantage when used as reducing valves, where the difference required in the pressures is small. Mr. Melling's valves also overcome the objection to spring-loading, as the increasing resistance of the spring is compensated for by the additional area that is provided for the steam to act upon. These valves also differ from the ordinary ones, as the lift is as great with high as with low pressures. The lift of the valve shown in Fig. 1, when loaded by dead weight, is self-regulating, as the steam which lifts the valve has first to pass through the orifice in the seat, but with Fig. 2 the lift has to be limited. These valves may be so proportioned as to give a large discharging area with a smaller loaded or lifting area, which makes them specially valuable when used as combined low-water and high-pressure valves.

Fig. 3 shows the simplest and most direct mode of loading for stationary boilers, the weights being carried by the cross bar or stirrup, the socket of which fits loosely on the end of the valve spindle. Fig. 4 is a spring-loaded valve in which the spring fits round the body of the seat, and at the top is held at each side by the hooked ends of the cross-bar or stirrup, which rests on the valve; at the bottom it is held by the projections on the collars that fit round the screw studs by which the tension is regulated. The easing lever bears against two shoulders on the stirrup, and is so mounted that it cannot prevent the valve from rising.—*The Engineer.*

MACHINE FOR TURNING IRREGULAR FORMS.

(See page 41.)

We give, an engraving showing a front elevation of a machine for turning spokes for waggon wheels, elliptical or crooked tool handles, &c., designed by Mr. J. Richards, London, and Kelly, engineers, Philadelphia, U. S. A.

The machine is on the whole arranged substantially on the plan of what is in America known as the Blanchard lathes, that is to say, the material to be operated upon is mounted on a pivoted swing frame, the cutters moving in a straight line, and the motion to produce the elliptic or crooked form of the work is given to the pieces to be turned, and not to the cutters.

The carriage on which the cutters are placed is mounted on wheels, so as to be easily run back after finishing a piece, and is made very heavy to resist any jar from the cutters, which are driven at a velocity of 8000 feet a minute at the perimeter.

The feed movement is positive, by means of the screw shown on the front, and is regulated by change pulleys, as the irregularity of the work or other conditions may render necessary.

The model or pattern is in the same plane with the pieces to be shaped, and in this feature there is a considerable gain over the older forms of the Blanchard lathe, where the patterns employed were not duplicates of the article to be produced. In this

last remark we refer, of course, to but one and the principal modification of the Blanchard machines, those intended for the work before named, and not for small thin pieces, or for the larger kinds of works.

In the construction of machines of this kind in Europe, we may remark that there has not been the same progress made as in most other cases. There has been by most makers an attempt to construct what are copying machines, which should perform every kind of elliptical or other irregular turning, while in America such machines have for many years past been divided into classes, and adapted to special kinds of work.

For example, no one would think of turning small carriage spokes on what is called auxiliary rests for supporting the pieces and preventing them from jarring when operated upon by the cutters. Such rests, which are an essential detail of a machine of one class, are not required on another, and so on.

We may also mention the cutting tools, which are wholly different for various kinds of work.

A copying machine may, and no doubt some of them will, produce almost any kind of work, but at a rate in most cases which is too slow to be profitable. The American machines for turning gunstocks are familiar to most of our readers; such machines constitute a class for the work named, for boot lasts and some other articles. For spokes another machine on the principle of the one illustrated is used, while for axe handles and similar articles the model is placed at the end of the pieces to be turned and connected to the same spindle, or as we should say, the running is double, with the pattern at one end and the piece to be turned at the other.

In operating machines of this kind, where it is desirable to perform as much work as possible, there is a feature which, unmechanical as it may seem, cannot be neglected. This is the elasticity of the reciprocating parts; they must either vibrate as a spring or else move slowly, and in this has been the failure to produce machines which would compete with those made in America, which will turn from 1200 to 1400 lineal feet of elliptical work in ten hours.

REIMHERR'S SMOKE PREVENTOR.

(See page 41.)

We illustrate in the accompanying engraving a very curious arrangement for consuming smoke in locomotives, used with great success on the Constantinople and Adrianople section of the railways of European Turkey. The device has been patented by Herr v. Reimherr, locomotive superintendent of the line; it will be seen at a glance that a wind cowl directs a strong current, when the engine is running, on the fire. The apparrtus is characterised by the two following features:— Natural injection, the progressive motion of the locomotive occasioning a certain quantity of hot air to spread evenly over the fire. Introduction of an iron plate cylinder between the crown of the fire-box and the outer shell of the boiler, which releives the crown-plate of about one-third of the pressure which it generally bears. The manner in which the smoke-consumer, constructed according to those principles, may be applied to a new as well as to already existing locomotives, will be easily understood from the adjoined drawings and the following description:—*c c* is the iron plate cylinder which unites the fire-box-crown with the boiler-shell, and relieves the former of a part of the pressure; this cylinder is open at top and bottom; *f f*, cast iron cylindro-conical tube placed inside of cylinder *c c*; the empty space round these two is to be filled with fireclay to prevent the cooling of cylinder *c c*; T, conical cast iron tube resting with its upper flange on the lower bearing of tube *f f*; an air distributor made of fireclay, is fixed to lower end of the conical tube T; R is a register valve for regulating the admission of cold air; B, cast iron mantle; P, bell-mouthed air catcher, which can be turned and fixed in all positions by a gearing of tooth-wheels worked by the small hand-wheel V. The self-progressive motion of the locomotive forces the air into the air-catcher P, whose mouth must always be turned in the direction of the motion of the engine, The air, heated by its contact with the cylindro-conical tube *f f* and the cone T, escapes through the channels in the fireclay air-distributor being evenly dispersed over the surface of the burning fuel, and at a sufficiently elevated temperature to produce a complete combustion.—*Engineering.*

During the recent storms in the north a striking illustration of the inertia of motion of large bodies of water was reported, a block of concrete weighing 1000 tons having been removed by the waves in the Wick new harbour works.

MISCELLANEOUS.

Impertinent.—Stout Gent (naturally suspicious of the street boys): "Ge' out o' my way, you young rascal!"—Street Boy: "Vich way round, gov'nour?"

A British Ruffian.— Lady: "If you are not satisfied with what I have given you, there's a gentleman here who will settle with you."—Cabman: "No, there ain't; there ain't no gentleman here."—Lady: "I tell you there is; there is a gentleman in this house."—Cabman: "Oh, no, there ain't not if he belongs to you!"

Curious Place for a Bird's Nest.—A pair of cole tits have built their nest in the letter-box at a Jink's-gate, making the fifth year they have built there. We marked the hen bird the second year, so that there should be no mistake about it; the old birds do not object to the letters, &c., being dropped on them. The hen lately sat very quietly and tame on ten eggs.

A Profitable Hen.—Thinking that the following might interest some of the readers of the *Young Fancier's Guide*, I send it to you for publication:—I set a Dorking hen upon thirteen eggs, four of which were from my own fowls, on the 13th of April, and on the 4th of May brought off four chicks, which were from my own fowls' eggs, the others were addled. On the 22nd she laid two eggs between the hours of 4 a.m. to 4 p.m., the two weighing 5oz.

Anecdote of Sheridan.—Amongst young Sheridan's schoolfellows was the son of a physician, who boasted that his father was a gentleman and professionally attended the nobility. "An' so is mine, and as good as yours, any day," said Sheridan. "Ah, but your father is an actor, Dick," said the doctor's son, "therefore it is impossible that he can be a gentleman." "You may think so," rejoined Sheridan; "but I don't, for your father kills people, while mine only amuses them."

A Dog Dying from Measles.—Several American papers give an account of a most unusual instance of a dog contracting the measles from a human being. It is stated that a large Newfoundland dog, a pet in the family of Mr. Wallace, of Upton, Mass., contracted measles from one of the children of Mr. Walker, who was suffering from them, and died. He exhibited all the symptoms of the disease in the human being, and under medical treatment was convalescing, when he ran out in the snow, got cold, and collapsed.

Nest-building Extraordinary.—During a recent visit to Anstey, near Leicester, I saw in a box tree (about 8ft. from the ground) the nest of the long-tailed titmouse, with a nest of a song thrush resting immediately on the top thereof, both of this year's construction. My host could not tell me for certain which species was first in the field, but fancied that the titmouse commenced building operations. The nests of two species of such different character thus joined together presented a most curious appearance, and the sight was so novel to me that I thought an account of the same might interest some of the numerous lovers of natural history who read your paper. I may add that there was no bough or twig between the two nests to form a support, the upper one being literally built on the lower.

A Cat that Died of Grief.—A lady in France possessed a cat which exhibited great affection for her. She accompanied her everywhere, and when she sat down always lay at her feet. From no other hands than those of her mistress would she take food, nor would she allow any one else to fondle her. The lady kept a number of tame birds; but the cat, though she would willingly have caught and eaten strange birds, never injured one of them. At last the lady fell ill, when nothing could induce the cat to leave her chamber; and on her death, the attendants had to carry away the poor animal by force. The next morning, however, she was found in the room of death, creeping slowly about, and mewing piteously. After the funeral, the faithful cat made her escape from the house, and was at length discovered stretched out lifeless above the grave of her mistress, having evidently died of a broken heart.

A Cat Attacking A Child.—An Irish gentleman had an only son, quiet a little boy, who being without playmates, was allowed to have a number of cats sleeping in his room. One day the boy beat the father of the family for some offence, and when he was asleep at night the revengeful beast seized him by the throat, and might have killed him had not instant help been at hand. The cat sprang from the window and was no more seen. If you are always gentle and kind, you will never arouse anger or revenge. It may be aroused in the breast of the most harmless-looking creatures and the most contemptible. Your motive, however, for acting gently and lovingly should be, not fear of the

YOUNG LADIES' FANCY WORK.

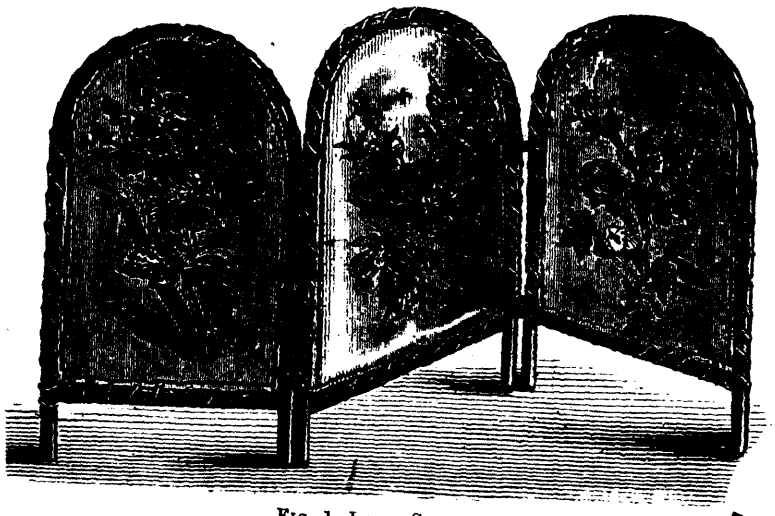


FIG. 1. LAMP SCREEN.

FIG. 7.

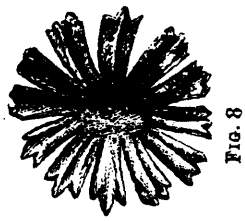


FIG. 8

FIG. 5. PAPER FLOWERS.

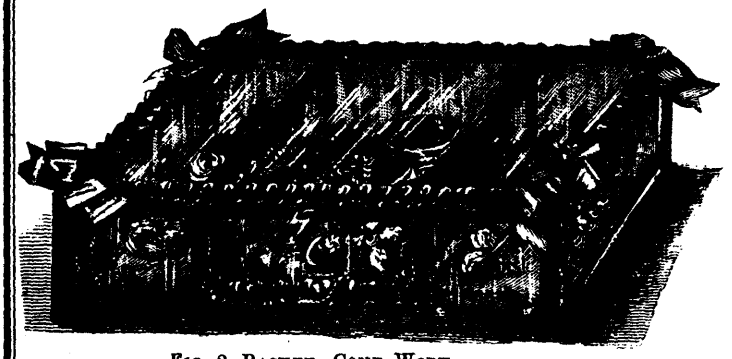


FIG. 2. BASKET. CONE WORK.

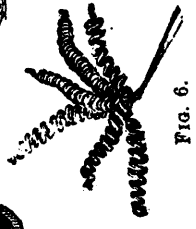


FIG. 6.

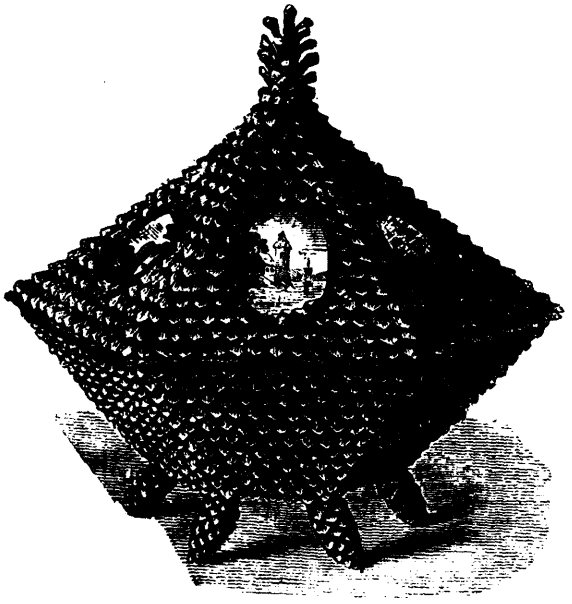


FIG. 3. GLASS BOX FOR TRINKETS.

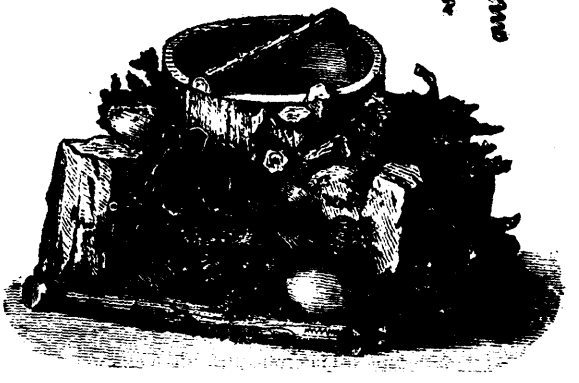
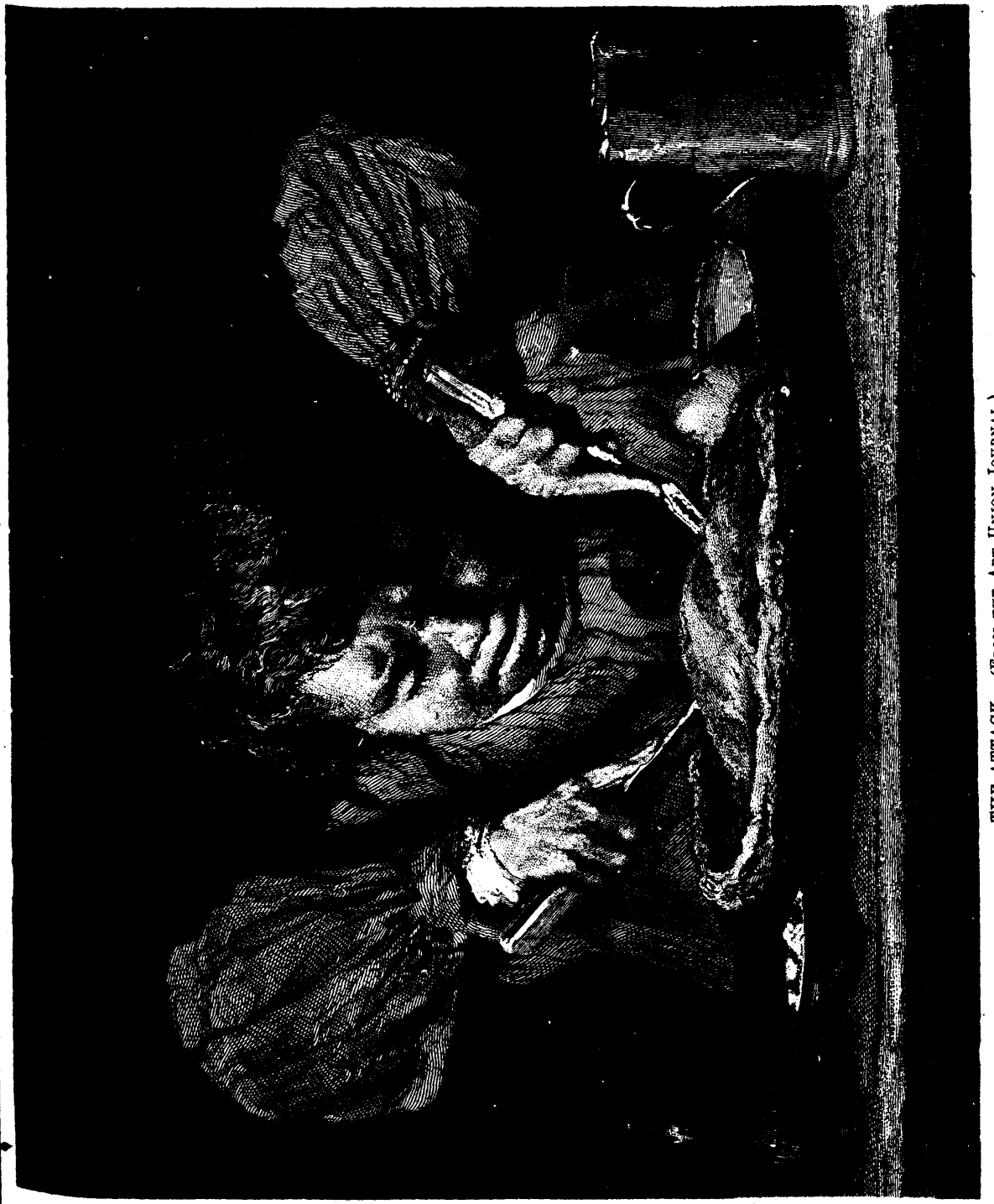


FIG. 4. CONE WORK CIGAR ASH BOWL.



THE ATTACK.—(From the Art Union Journal.)

consequences of a contrary behavior, but that the former is right.

A YANKEE has submitted to the French Government a decapitating machine intended to supersede the guilotine. It is on the pneumatic-tube system, and automatic in action, thus doing away with the executioner. When it does away with the culprit it will be complete in all its arrangements.

CHARLES II. AND DR. BUSBY.—King Charles II. on a certain time paying a visit to Dr. Busby, the doctor is said to have strutted through his school with his hat upon his head, while his Majesty walked complaisantly behind him, with his hat upon his arm ; but when he was taking his leave at the door, the doctor, with great humility, thus addressed the King ; "I hope your Majesty will excuse my want of courtesy and respect hitherto ; but if my boys were to imagine there was a greater man in the kingdom than myself, I should never be able to rule them."

FUNNY.— The following dialogue is said to have taken place in a national school near Salisbury :—EXAMINER : "Now, then, the first boy of the grammer class stand."—First boy stands up, blushing : "Here I be, zir."—EXAMINER : "Well, my good boy, can you tell me what vowels are ?"—FIRST BOY : "Vowls, zir ? Eas, of course, I can."—EXAMINER : "Tell me then, what are vowls."—FIRST BOY (grinning at the simplicity of the question): "Vowls, zir ? Why vowls be chickens !"

PECULIARITY OF THE CUCKOO.—My house is situated in immediate contact with some iron works, which make plenty of noise and smoke. In front there is a small lawn, skirted with shrubs and evergreens. This year some cuckoos have paid me a visit. I and others have frequently seen three, which apparently keep company, and are about this place on some low bushes by the river side which skirts the lawn. One bird seems of a lighter color than the other two. They call or shout quite close to the house, and twice I have heard them calling between ten and eleven p.m., when the nights were very dark and misty. Having always considered the cuckoo a shy, solitary bird, it struck me as an unusual thing for them to be in company, and come near such a frequented place. I may also say, some few years since one of my men saw two birds fighting so furiously that one was killed. He brought it to me to know what it was. It was a cuckoo, struck through the eye. The other bird, he said, was of the same size and color.

THE REVENGEFUL CAT.—Cats often show that they possess some of the vices as well as some of the virtues of the human beings. The tom-cat is frequently fierce, treacherous, and vindictive, and at no time can his humor be crossed with impunity. Mrs. F—— mentions several instances of this. A person she knew in the South of Ireland had severely chastised his cat for some misdemeanour, when the creature immediately ran off and could not be found. Some days afterwards, as this person was going from home, what should he see in the centre of a narrow path between walls but his cat, with its back up, its eyeballs glaring, and a wicked expression in its countenance. Expecting to frighten off the creature, he slashed at it with his handkerchief, when it sprang at him with a fierce hiss, and seizing his hand in its mouth, held on so tightly that he was unable to beat it off. He hastened home, nearly fainting with the agony he endured, and not till the creature's body was cut from the head could the mangled hand be extricated.

SAGACITY OF A FOWL.—Mr. Kingdom, of Willhayne, relates the following in a Devon paper :—For some time past he has had a race of fowls which, instead of roosting in the house intended for that purpose, have persisted in taking for a nocturnable a fine Portugal laurel situate in his grounds. During the last few months a neighbour's hen has been in the habit of joining his fowls, and consequently roosting with them. The neighbour, after various vain attempts to keep the hen on his own premises, at length bethought himself of tying the hen's leg with a short string, in a similar manner to that in which a horse is "hobbled". But the bird (evidently endowed with much perseverance) overcame even this impediment, and soon resumed her old haunt. Shortly after her return in this "hobbled" condition the whole household was startled, just before dusk one evening, by a strange noise outside the house, and, on looking to see the cause, they found the cock belonging to the above mentioned brood of fowls walking up and down in an apparently very excited manner, and giving utterance to a shrill noise, which more resembled a rapid succession of crows than anything else. At length they went out to him, and he immediately fled, still screaming, towards the Portugal laurel, where, on following him, they found the unfortunate "hobbled" hen suspended by her string from one of the branches, and they cut her down just in time to save her life. Is not this display of sense in the male bird worthy of a higher name than instinct ?

INSTRUCTIONS TO NURSES FOR CARE OF THE SICK.

INTELLIGENT CRAVINGS OF THE SICK FOR PARTICULAR ARTICLES OF DIET.

In the diseases produced by bad food, such as scorbutic dysentery and diarrhœa, the patient's stomach often craves for and digests things some of which certainly would be laid down in no dietary that ever was invented for the sick, and especially not for such sick. These are pickles, jams, gingerbread, fat of bacon, suet, cheese, buttermilk. These cases, says Florence Nightingale, I have not seen by ones, nor by tens, but by hundreds. And the patient's stomach was right and the book was wrong. The articles craved for, in these cases, might have been principally arranged under the two heads of fat and vegetable acids.

There is often a marked difference between men and women in this matter of sick feeding. Women's digestion is generally slower.

SWEET THINGS.

In laying down rules of diet, by the amounts of "solid nutriment" in different kinds of food, it is constantly lost sight of what the patient requires to repair his waste, what he can take and what he cannot. You cannot diet a patient from a book ; you cannot make up the human body as you would make up a prescription, and say so many parts "carboniferous," and so many parts "nitrogenous" will constitute a perfect diet for the patient.

PATIENT'S "FANCIES" FOR FOOD.

The nurse's observation here will materially assist the doctor ; the patient's "fancies" will materially assist the nurse. For instance, sugar is one of the most nutritive of all articles, and is particularly recommended in some books. But the vast majority of all patients, young and old, male and female, rich and poor, hospital and private, dislike sweet things. A person may take to sweets when he is ill who dislikes them when he is well, and many fond of them when in health, will in sickness leave off every thing sweet, even to sugar in tea. Sweet puddings, sweet drinks, are their aversion. The furred tongue almost always likes what is sharp or pungent. Scorbutic (scurvy) patients are an exception ; they often crave for sweetmeats and jams.

ACID FRUITS.

The desire shown by the sick, and especially by those who are getting well, for acid fruits, as baked apples, cranberries, lemons, etc., should never be disregarded. The important use the acids of fruits play in the body is a long story ; so we can only insist upon the importance of regarding these "cravings" wherever found. Sometimes the physician has good reasons for not wishing them given, as the acid may neutralize or decompose some remedial agent employed ; but, as a rule, these fruits, properly prepared, may not only be given without injury, but with decided benefit. So, whenever a sick person "craves" such things, be sure to call the physician's attention to it, and ask if you can give them.

The question is often asked for the advantage of persons in health as well as the sick, at what *time* in the day fruit should be eaten ? In tropical countries, where fruit is the chief article of food, the rule appears to be that the *earlier* in the day it is taken the *better* it is, and the *later*, the *worse*. In hot weather, many wise people will eat none after noon, alleging that the digestion then declines in power with the decline of the day, and the fruit, instead of digesting, *decomposes*, owing to the presence of the saccharine matter. The *objection* to fruit and certain kinds of vegetables late in the day, be the explanation what it may, is certainly *justified* by an ample experience.

When "taken for tea," especially if the person feels somewhat exhausted from labor or the heat of the day, they often do not appear to *digest*, but decompose, irritating the stomach and bowels until rejected during the process popularly known as Cholera Morbus. Whenever this occurs, do not put it upon that scapegoat the "liver," and take another dose of purgative medicine ; but on yourself, for what you ate some hours before and under what circumstances. If you use your experience, another attack need not be feared for a long while. Many fruits and vegetables, such as melons and cucumbers, particularly if eaten immoderately, under such circumstances, acquire the reputation of being "unhealthy," instead of which the eater is unwise.

CALVES-FOOT JELLY.

Calves-foot jelly is another article of diet in great favor with nurses and friends of the sick. Even if it could be eaten solid it would not nourish. It is simply the height of folly to take one-eighth ounce of gelatine and make it into a certain bulk by dissolving it in water, and then to give it to the sick, as if the mere

bulk represented *nourishment*. It is not known that jelly does not nourish, that it has a tendency to produce diarrhæa, and to trust to it to repair the waste of a diseased constitution is simply to starve the sick u der the guise of feeding them. If one hundred spoonsfuls of jelly were given in the course of the day, you would have given one spoonful of gelatine, which spoonful has scarcely any nutritive power whatever.

And, nevertheless, gelatine contains a large quantity of nitrogen, which is one of the most important elements in nutrition. On the other hand, beef-tea may be chosen as an illustration of great nutrive power co-existing with a very small amount of solid nitrogenous matter.

Beef-Tea.

Dr. Christian says that "every one will be struck with the readiness with which certain classes of patients will often take diluted meat-juice and beef-tea repeatedly, when they refuse all other kinds of food." This is particularly remarkable in "cases of gastric fever in which," he says, "little or nothing else besides beef-tea or diluted meat-juice" has been taken for weeks or even months, "and yet a pint of beef-tea contains scarcely one fourth of an ounce of anything but water." The result is so striking that he asks, "What is its mode of action? Not simply nutritent; one-fourth of an ounce of the most nutritive material cannot nearly replace the daily wear and tear of the tissues in any circumstances. Possibly," he says, "it belongs to a new denomination of remedies."

Beef-Tea Added to Other Articles of Food.

It has been observed that a small quantity of beef-tea, *added* to other articles of nutrition, *augments* their power out of all proportion to the additional amount of solid matter.

Observation, not Chemistry, Must Decide Sick Diet.

The reason why jelly should be innutritious, and beef-tea nutritious, to the sick, is a secret yet undiscovered, but it clearly shows that careful *observation* of the sick is the only clue to the best dietary.

Chemistry has, as yet, afforded little insight into the dieting of the sick. All that chemistry can tell us is the amount of "carboniferous" or "nitrogenous" elements discoverable in different dietetic articles. In the great majority of cases, the stomach of the patient is guided by other principles of selection than merely the amount of carbon or nitrogen in the diet. No doubt in this, as in other things, nature has very definite rules for her guidance, but these rules can only be ascertained by the most careful observation at the bedside.

Transferring Prints and Leaf-Forms to Wood.—To transfer pictures to sycamore or white pine, you must first plane your wood perfectly smooth, and give a few coats of French polish: then take your picture, and damp it with a sponge soaked in spirits of wine; place the picture on the wood, and then place a piece of thickish cloth over the picture; then get a warm iron and rub gently over the cloth, being careful not to shift the picture. You must keep rubbing the iron backwards and forwards for ten or fifteen minutes, the take off your cloth and leave it for same hours. Then you must get some cold water and damp your fingers in it and rub on the paper. Great care must be taken in this, or you will disturb the impression. Keep damping your finger as you go on. When you have got it all off you can polish over. Any kind of picture will do with the exception of glazed ones. Ink pictures take off best. There is another method by which the effect of white leaves prettily grouped on a dark, softly granulated ground is produced. The leaf or pattern is fastened temporarily to the wood, which must of course, be nice and smooth, fit for varnishing. Then take take a brush of stiffish bristles filled with pigment. Bend back the brisles towards you, and away from your pattern, then let go suddenly. Some of the pigment will then be precipitated on the wood were not covered by the pattern. You proceed in this way till your judgement tells you the pattern is well defined, taking care to viguette or rllow the shading thus produced to fade away towards the edges. You may advantageously practice with a blacking-brush, using blacking thinned down with gum-water for the pigment on a sheet of paper, using a fern leaf or two for patterns.

To Fix a Coin to a Wall.—Privately notch the rim of a shilling, or any other coin, in so adrupt a manner that a sharp point of the silver may stick up. Take the coin in your hand, and clap it pretty sharply against the wall, at the same time press with your thumb the part you know to be sticking out. By so doing the coin will enter the wood and remain fixed.

CURIOUS FISH AT THE NEW YORK AQUARIUM.

(See page 56.)

In the accompanying illustrations are represented three remarkable creatures which have recently been added to the New York Aquarium. The first is the

Japanese Kingiyo,

a fish which, apart from its great beauty, possesses an exceptional interest in that it is one of the most curious results attained by the process of artificial selection carried on over a long period of time. The animal appears to belong to the carp species, and possesses the brilliant colour of the gold fish. The body, however, is almost oval, and the belly is very protuberant. Forming an exquisite contrast with the deep golden red of the body are the fins and tail, which seem to be pure, pearly white, silky membranes, edged with a delicate fringe. The tail at rest is canopy-shaped; but as the fish moves, it floats into the most graceful undulations, reminding one of a filmy cloud or curling smoke wreath. It is hardly possible to divine by what series of steps this wonderful finny creation was produced. No naturalist would hesitate an instant in classing it under a new species, were it discovered in a wild state; but the fact that it is an artificial production, obtained from monstrosities or sports of well known types, now forbids such classification, and at the same time renders the animal living evidence in favor of the evolutionary hypothesis as advocated by Darwin. There are but very few kingiyos in this country at the present time. Eighty-eight constituted the first lot brought from Japan not long since, but of these all but seven died during the voyage, or shortly after. The survivors were successfully carried to Baltimore, and during the last summer they spawned, the result being about fifty young fry, which exhibit all the peculiarities of the originals. It is the intention of the owner, when he has a sufficient stock, to donate them among persons who will take an interest in them and carefully raise them. Meanwhile Mr. W. S. Ward, the naturalist of the aquarium, has taken measures to apply and test the Oriental methods whereby this curious animal was produced; and the aid of the most improved piscicultural appliances will be invoked during a series of experiments intended to produces still more curious fish as the result of special culture. In our second engraving is represented the

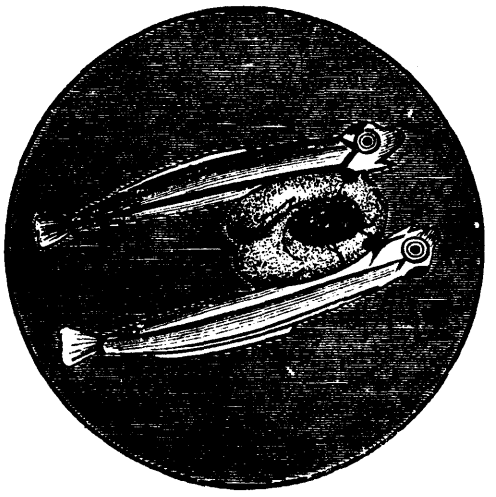
Alleghany Hell-Bender,

or *menopoma Alleghaniensis*, an exceedingly ugly half lizard, half fish, found in the Alleghany river and other tributaries of the Ohio. Mr. A. R. Grote records in the *American Journal of Science*, the interesting fact that this animal sheds a transparent membrane, which he believes to be the exterior layer of the skin. While observing one in the aquarium of the Buffalo Society of Natural Sciences, an almost complete skin, all the feet and toes being readily perceived, was seen floating in the water; and later the creature was discoverered in the act of swallowing his former covering, a practice which has also been observed in the toad. In a recent communication Mr. Grote describes this operation of shedding the skin, from which we learn that this thin and transparent membrane is first seen to loosen and separate from the entire surface of the body, appearing at this stage like an envelope or glove in which the animal is contained. By a number of wide gapings, during which the mouth is opened to the fullest extent, the skin is parted about the lips, and then commences to fold backward from the head. Convulsive and undulating movements with the body and fore legs are employed to extract these from the loose skin. The skin then readily falls backward, as the animal crawls forward and out of it, until the hind legs are reached, when the menopoma turns round upon itself, and, taking the skin in its mouth, pulls it over the legs and tail. The operation reminds of taking off clothes. The cast-off skin is retained in the mouth and finally swallowed. The operation is quickly performed. The visitor who watches the menopoma will observe a swaying motion of the body; this action is not yet fully accounted for, though it is possible that it is connected with the animal's desire to rid himself of his ugly skin.

A female hell-bender, opened on the 21st of August, last contained well developed eggs attached by a membrane to the ovary. These eggs are laid in a connected string, and are deposited along the muddy banks of the river. At this time there is a change in the external appearance of the creature. The tail broadens, and and there is a plaited extension of the skin along the sides of the body.

The menopoma furnishes a connecting link between the fish and lizards in the chain of evolution. On the fish side the

CURIOUS FISH AT THE NEW YORK AQUARIUM.



THE TWIN SALMON.

ACCIDENTS BY FIRE.

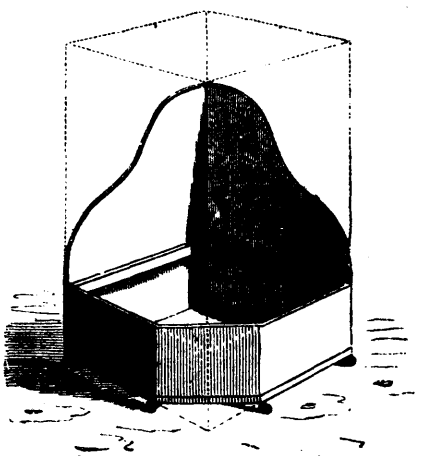


Fig. 1.—DIAGRAM OF CHAIR.

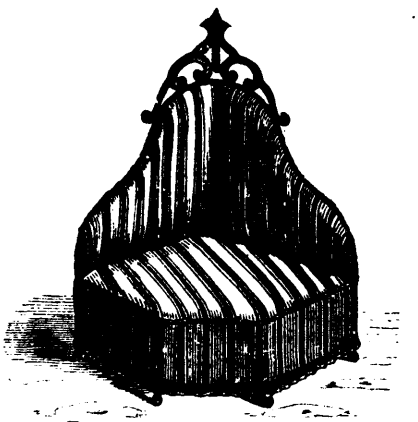
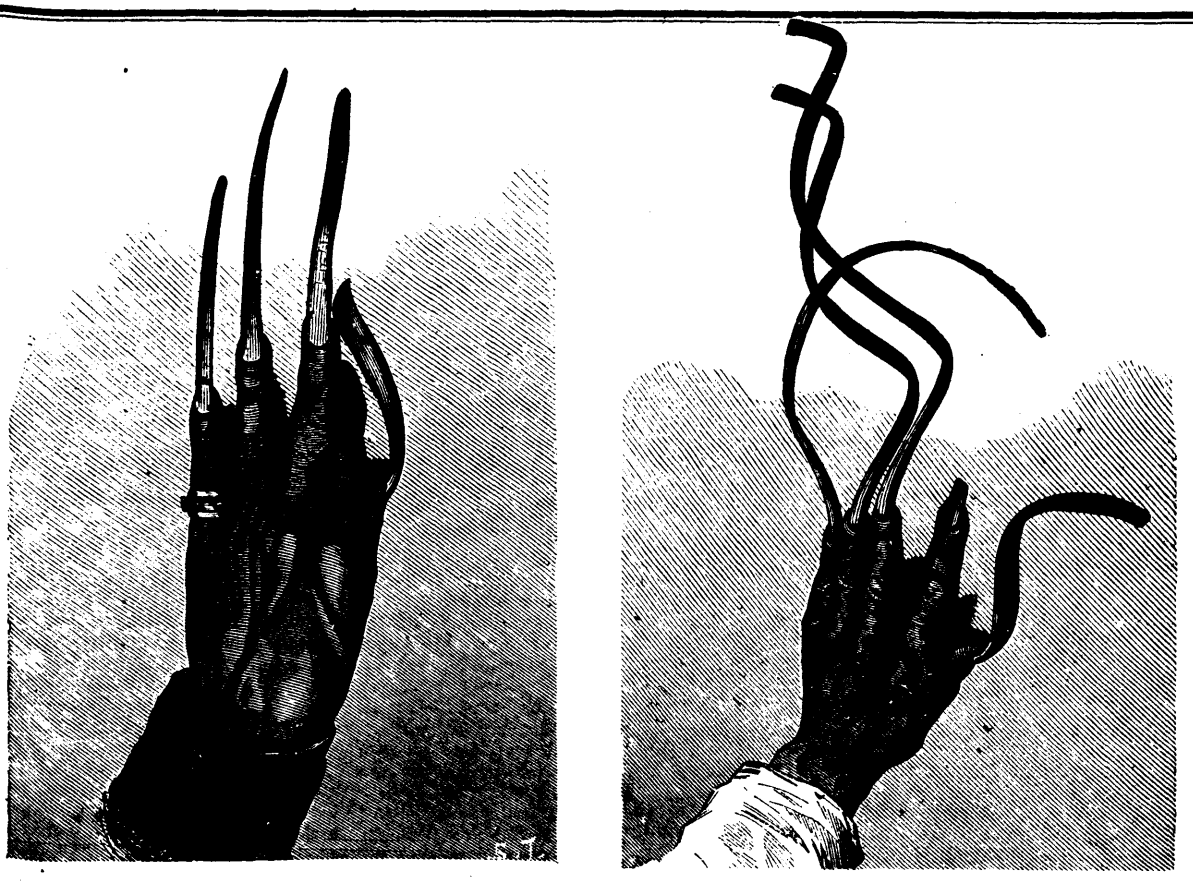
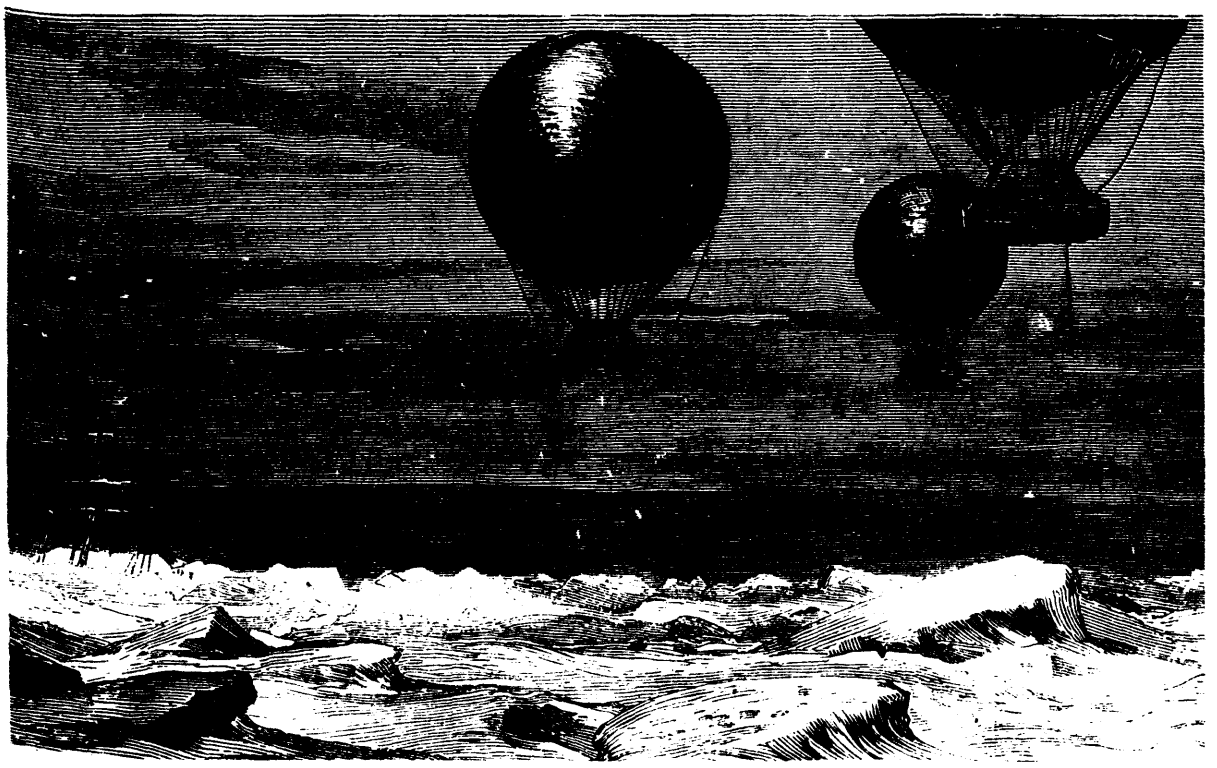


Fig. 2.—THE CHAIR COMPLETE.

A CHEAP EASY-CHAIR.



EXTRAORDINARY FINGER NAILS.



NORTH POLE BY BALLOONS.

menopoma is a higher development than the *lepidosiren* or legged fish, while it ranks lower in the scale than the amphibious axolotl.

THE TWIN SALMON,

or "salmonese twins," as some witty individual has termed them, are represented in our third engraving. The two fish were hatched from a single egg; the two bodies are attached to one sac, but each fish is perfect in itself. The connecting vesicle is filled with oil globules, arteries, and veins; and it was expected that a microscopic examination would discover a diaphragm separating the circulation into distinct systems. The closest scrutiny, however, fails to discover this wall, and the circulatory systems appear so intimately connected that the blood flows freely from one body to the other, impelled, however, by two hearts.

Mr. Mather is of the opinion that there is but little chance of their living after the absorption of the sac; for if they survive till that time, the abdomens will still be joined by the membrane of the sac, and being thus compelled to swim their sides, great difficulty will be experienced in obtaining food. In this instance, however, a careful system of artificial feeding will be adopted in case the pair reach an age when they will need such nourishment. From the extended observations of Mr. Mather, it appears that these deformities are quite frequent in the salmon family, which includes the trout; and in hatching one hundred thousand eggs, there may be from three to five hundred abnormal specimens, comprising crooked backs and twisted heads and tails; and in some instances two or even three heads are attached to one body.

We are indebted to Mr. W. S. Ward and to the *New York Aquarium Journal*, an excellent little paper published at the aquarium and devoted to popularizing scientific knowledge concerning the fish, for the engravings and facts presented.—*Scientific American.*

TO THE NORTH POLE IN BALLOONS.

(See page 57.)

This engraving is from a fancy sketch by Mr. Francis Morell, of Wimereux, Pas-de-Calais, France. Mr. Morell, who is an English boy of fifteen, writes to the London *Graphic*:—"I think if the *Alert* had been supplied with nine or ten balloons, and the requisites (which are very simple) for making hydrogen gas, her crews would, for many reasons, have had a better chance of reaching their destination. Ten miles an hour is a slow pace for a balloon in a gentle breeze, so that, supposing they travelled ten hours a day, their pace would have been accelerated to a hundred miles a day, instead of the one mile so painfully accomplished. Thus, if the wind were favourable, the Pole could be reached in a few days; if unfavourable, they could wait until it suited. The sledges would serve for cars, and could be covered in and provided with windows, so that fires might be lighted without endangering the gas reservoir. If any harm came to the balloon, the car could be cut away from it and used as a sledge; but it would be preferable for several balloons to travel together, so as to assist each other in emergencies either of want of food or fuel. The cars could also carry as much food, &c., as the sledges did during the late expedition, and from six to eight men in each. I believe that M. Giffard, the French engineer, has been able to make impermeable balloons, which retained their gas for more than a twelvemonth.

EXTRAORDINARY FINGER NAILS.

(See page 57.)

The habit of wearing long nails is very prevalent among the elegant people of China and Indo-China. It is no rare thing to find, in the first of these countries, men and women whose nails measure one and a half inches. But it is chiefly in the peninsula beyond the Ganges, and principally in Siam, Annam and Cochin China, that human claws are seen of the most enormous and singular dimensions. The two engravings which accompany these are from nature, not at all exaggerated, and thus present a curious phenomenon which is well worthy of some attention.

The first hand, to the left, is armed with nails which measure no less than one to three inches, and which, as they gradually extend from the fingers, bend and twist until they assume the form of claws.

The second figure represents a Cochin Chinese dandy, whose nails measure from one to two feet. It is hard to say exactly how far this odd custom is spread in the country beyond the Ganges, but it is very certain that the exaggerated growth of finger nails passes in Indo-China both for a personal accomplishment and a sign of social superiority.

LADIES' FANCY WORK.

(See page 52.)

No. 1.—LAMP-SCREEN.

This little screen is intended to shade a night-lamp. The framework is of cane; this must be bought ready made. The screen is formed of two pieces of coloured sarcenet, with cretonne flowers cut out, and put on as an appliqué; these are sewn at the edges with chain or button-hole stitch, and the stalks are worked with stalk or cording-stitch. The two parts are sewn together for each of the three sections of screen, and are bound with ribbon; through the ribbon button-hole eyelets are worked to pass the cord through to fasten the screen to the frame.

No. 2.—GLASS BOX FOR TRINKETS.

MATERIALS: Pieces of window-glass; glue; white paper; sarcenet ribbon ¾ inch broad; sewing silk of the same colour.

Have the glass cut by a glazier to the size you desire the box to be. When cut, bind the separate parts with white paper firmly glued on; next cover the paper with ribbon, which must be glued on. When it has become firmly fixed, sew the separate parts together. Finish with a ruche of ribbon and bows at the corners. The back bows form the hinges; the front the fastenings of the box.

NOS. 3 AND 4.—WORK-BASKET: CONE-WORK.

The diagrams of sections of sides, top, and bottom of basket, will be found on the back of Supplement. The foundation is made of brown cardboard, or white cardboard covered with thin brown paper. Cones and fir-apples are needed; these should be carefully cleaned with a brush and water. The separate pedals are moistened with water, and sewn to the card with a needle and brown silk. The small cones forming the legs and top must be fastened on with gum. When the work is completed and quite dry, paint in over with good dark opal varnish. In the diagram for the top, spaces are left to put in photographs or pictures: these are edged with cord. The pictures may be omitted, and their places filled up with a sort of flower design, made with beech-nut shells, and acorns, if preferred. The lining may be of coloured paper or sarcenet.

NOS. 5, 6, 7 AND 8.—PAPER-FLOWERS.

No. 5 shows the group of flowers; No. 6 the tendril; 7 section of leaf; No. 8 section of flower. This pretty group of flowers will be found very useful at this time of the year, for ornamenting boxes; any little box that can be obtained at the linendrapers, may be covered with coloured paper, with the flowers (made in tissue), placed on the lid. This group may also be used for decorations. The colours for the flowers must be chosen according to taste. The tendril is made by cutting the paper into thin slips, winding it tightly round a steel knitting-pin, then drawing out the pin. The leaves and section of flowers are cut out with a sharp knife on a board. The veins are made by drawing a steel knitting-pin down them.

HOME-MADE EASY CHAIRS.

On page 56 we copy an illustration from the *American Agriculturist*, which, by the way, always has something in it excellent for the household, a very simple plan of making, we have no doubt, a very comfortable easy-chair. The illustrations are so clear that no description is necessary to accompany them.

PLAIN DIRECTIONS FOR ACCIDENTS AND EMERGENCIES.

ACCIDENTS BY FIRE.—(See page 56.)

When the clothing catches fire, throw the person down on the ground, as the flames will tend less to rise towards the mouth and nostrils. Then, without a moment's delay, roll the person in the carpet or hearth-rug, so as to stifle the flames, leaving only the head out for breathing. If no carpet or rug can be had, then take off your coat and use it instead. *Keep the flame as possible from the face, so as to prevent the entrance of the hot air into the lungs.* This can be done by beginning at the neck and shoulders with the wrapping.

INDIAN INK RUNNING.—If it is for drawing plans you may prevent it running by adding a little sugar to the Indian ink.

PRESERVATION OF LEATHER.—Equal parts of mutton fat and linseed oil, mixed with one-tenth their weight of Venice turpentine, and melted together in an earthern pipkin, will produce a "dubbin" which will be very efficacious in preserving leather when exposed to wet or snow, &c. It should be applied when the leather is quite dry warm.

PRE-HISTORIC CANADA.

(See pages 60, 61 and 64.)

In this week's issue of the CANADIAN ILLUSTRATED NEWS we have grouped sketches of various stone, flint, clay and bone articles which were used by a people, who, at one time, thickly populated various portions of the United States and Canada, as evinced by mounds of earth laid out for the purposes of defence or for enclosing villages. In some parts of the United States, these mounds have been raised several feet above the surrounding country, and cover several acres. A number of the mounds built by these people have been found in different parts of Canada, and although not so extensive as those in the United States, they have given to the antiquarian as a reward for searching them, some most interesting relics of the race which made them. The engravings we give are the two-thirds of actual size of the relics sketched, and are taken from a most complete and valuable collection belonging to Mr. Albert White, residing near Aylmer, Ont. Nearly all we show were collected by Mr. White from mounds of various sizes in the Township of Malahide, County of Elgin, which were built by this strange people generally known to us as the "Mound Builders." Seven of the relics which we show are generally, although erroneously, supposed to be of purely Indian origin. We have no account of the North American Indians making pottery, nor were they ever seen by the early colonists of the New World, fashioning from flint the arrow spear and lance heads; and when questioned by the colonists in regard to the makers, the Indians invariably disclaimed all direct knowledge of the people who manufactured the pottery and other articles, or erected the great mounds of earth; but, some of the tribes had a tradition among them that many hundreds of years before, the country was peopled with strange light-faced persons, but of their origin and disappearance they know nothing.

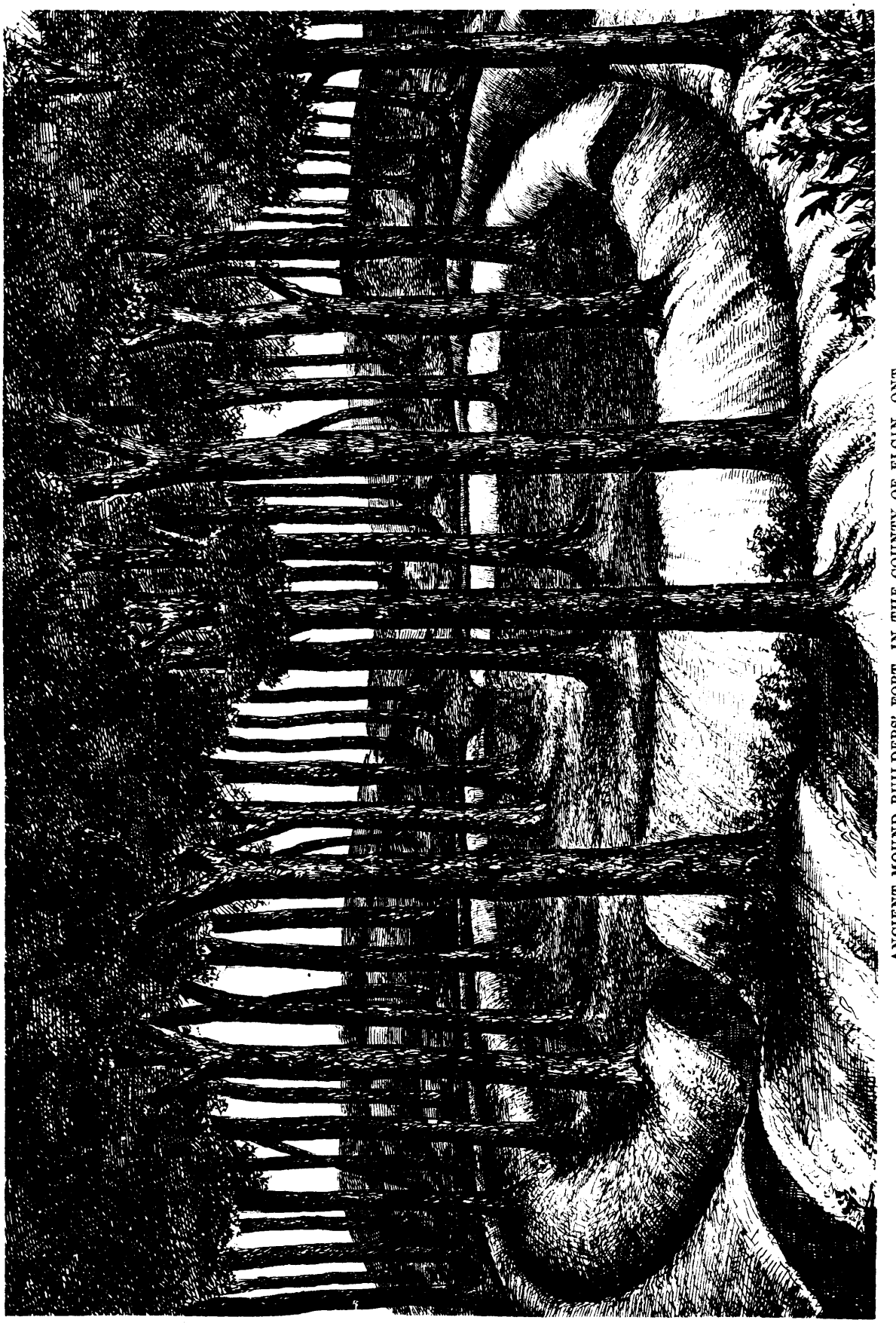
There is strong evidence in the County of Elgin, and especially so in the Township of Malahide, that this people once lived here in populous villages, flourished for a time and then passed way. A few years since, as Mr. John Gillet, of Aylmer, in the county named, was clearing up a piece of land covered with pine and oak, measuring in scores of instances three and four feet in diameter, he discovered in extracting the roots, and ploughing the land, upwards of seventy-five moundswhich consisted of ashes and charcoal in which were found many hundred strangely formed pipes and thousands of fragments of well-burned pottery, such as numbers 9, 10, 11, 12, 15 and 16, rudely ornamented with various designs, and the fragments readily showed that they were part of cups, jugs, bowls, and other articles, and where the piece of pottery permitted it, it was ornamented on the inside as well as on the outside. The material of which the pottery was formed is a light clay on the outside, and what seems to be ground quartz mixed with dark clay on the inside, both being about a quarter of an inch in thickness. In some instances, this pottery is finely glazed and shows a degree of workmanship which it does not seem possible that the Indians, if they had ever fashioned it, could have lost all knowledge of the art of making at the time the discoveries of the New World first met them. Mr. Gillett counted forty of these mounds of ashes we have mentioned which at one time must have been upwards of forty feet in diameter. A battle had probably been fought here and the villages burned by the enemies, for on ploughing the earth it was found to be thickly strewn with large flint spear heads, such as numbers 13 and 14, and the smaller arrow heads, such as numbers 4, 8 and 34, which were so fashioned that upon piercing a person and the shaft of the arrow being withdrawn, the flint head, possibly poisoned, remained in the flesh to do its deadly work. The mounds of ashes indicated that the buildings had been regularly laid out in streets, and the depth of ashes and amount of charcoal gave evidence that the structure had been far more substantially built than the Indians were ever known to make their tents or bark huts, and the age of the trees which were growing on the mounds would show that several hundred years, if not upwards of a thousand, had passed since this strange people had their village burned. In this vicinity have also been found hundreds of round smooth stones notched on the sides, as indicated by number 17, which some authors in writing of them, have claimed as having been used in warfare, the pre-historic races throwing them from slings; other authors claim, and we think with good reason, that they were used as weights, around which cords were tied to hold fishing nets in a proper position. Number 1 is a large, dark blue stone, axe-like, which weighs three and a half pounds and was probably used to break the bones for the marrow of the wild animals which were killed in the chase. A few years since, on the farm of Mr. Chute, in the Township of Malahide which borders on Lake Erie, the waves washed away a portion of the bank and disclosed a cave-like hollow which contained the bones, and in many cases almost the entire skeleton of scores of different animals, and from the size of the bones they must have belonged to species long since extinct. The large marrow bones, in some cases, showed distinctly that they had been cracked and broken for the marrow. This was a place, no doubt, where the ancients of this vicinity, according to a curious custom, deposited the bones after the flesh had been picked from them. Number 39, which is part of the jaw-bone of some wild animal, was taken from this bone-cave. Numbers 5, 6, 7, 26, 27, 28, 29 and 33 are specimens of spear and arrow heads which are formed of white and blue flint; some of these are polished and show that no ordinary skill was used in making them, and the difference in the style of the work, as shown in numbers 24 and 34, give evidence of the skill displayed by different work men. Number 26 has a saw-like edge which, upon entering the flesh and being pulled out, must have left a very painful wound. Numbers 22, 28, 29 and 32 are half-formed arrow and spear heads which, for some reason, the ancient workmen threw aside before they were finished. Numbers 18 and 23 are made of a dark slate, and the two were probably used for the same purpose, but different writers do not agree as to what they were used for. Some are inclined to think they were rude ornaments, while others advance the idea that they were used for fashioning bow strings, the coral of the raw-hide being drawn through the small circular holes, which are a trifle larger on one side, until the strip assumed a round shape. Some writers thinkthey were used to make fish-nets, the wild prepared flax being drawn through the holes, at the same time twisted in to cord. Numbers 36, 37and 38 were undoubtedly used as needles in making clothing. Number 30, the edge of which is shown by number 31, is a curiously shaped arrow head; it is nicely polished, and being such a queer shape, the maker must have designed it for a particular purpose. Number 20, the edge of which is shown by number 21, is a beautifully formed and finely polished stone-hammer which, it is thought, was used to brain the large game when wounded, and numbers 2 and 3 were probably used in taking the skin from the slain animals. Number 25 is a fragment of a stone-knife, the edge of it still being sharp.

Little by little, the strange story of the lives of the ancient mound builders is being unfolded by the archæologists, and considering the great advance made within the last quarter of a century in this direction we may hope that during the next decade the mystery surrounding the origin, every-day life and final disappearance of the Mound Builders may be unlocked and thrown open to the world by those who are searching the pre-historic obscurity surrounding primitive man in the United States and Canada.

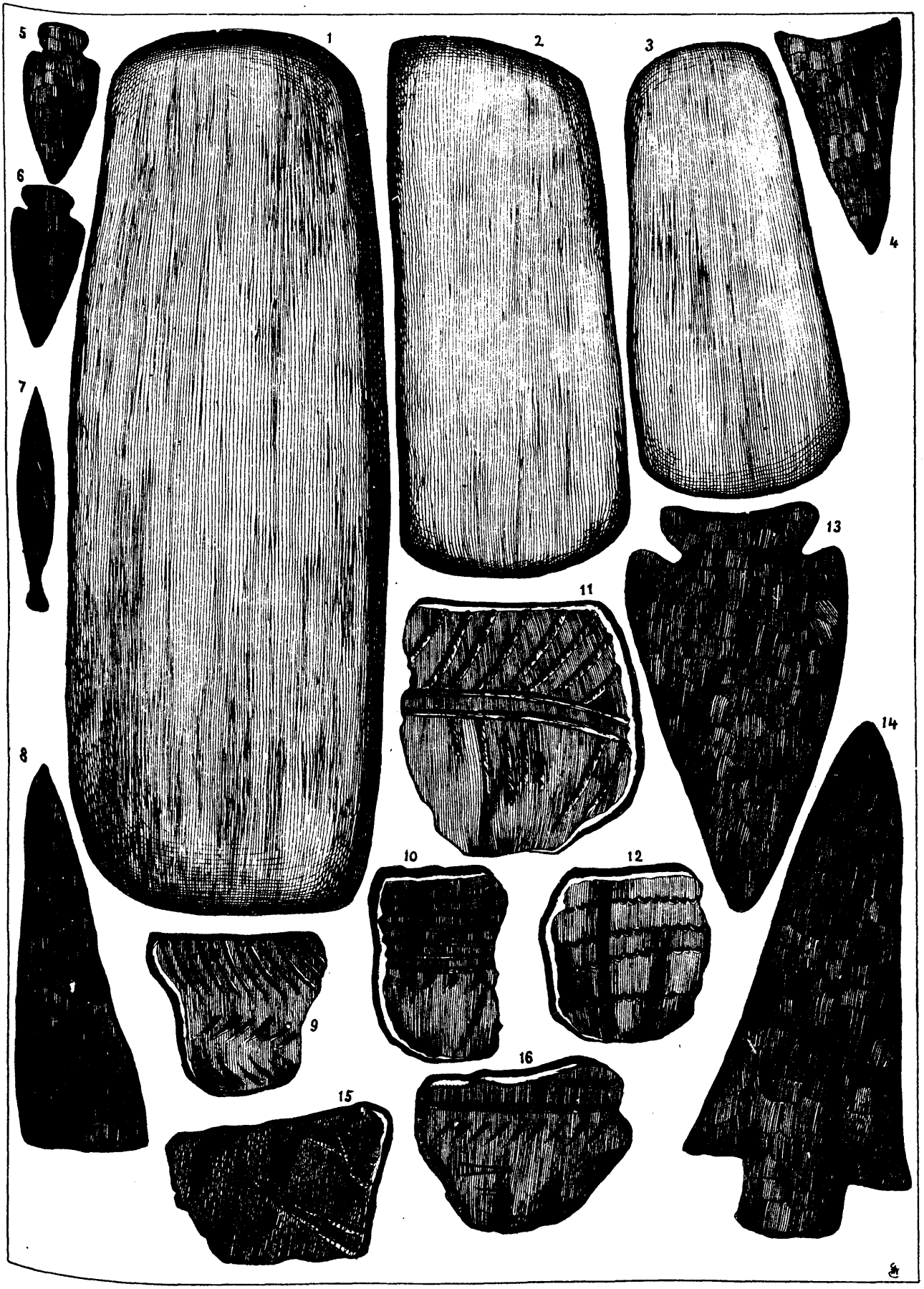
THE ELECTRIC PEN.

(See page 45.)

One of the most recent, as well as the most ingenious, applications of electricity in the direction of saving labor, and examples of which were exhibited at Phildelphia, is the electric pen, promises to, some extent, to supersede lithography, as by its aid duplicates of writings, and even of drawings in fac-simile, can be made with facility and rapidity. The pen consists of a metallic tube, in the centre of which a fine needle is reciprocated by means of a small electro-magnetic engine placed on top of the pen. The current to this engine is through two fine wires connected with an electric battery. The battery is placed on the table or anywhere near the writer, and occupies but little space, and the pen, in spite of its top-heavy appearance, is easily manipulated from the circumstance that it has to be held vertically, as a drawing pen is, or should be. The writing is performed rather slowly, that is, at about half the usual rate, but there is no difficulty in producing the writing, as we are able to testify from a trial of the instrument at the office of the company, at No. 9, New Broad-street, City. The pen being held in an upright position, and moved over the paper, the rapidly succeeding thrusts of the needle cause the surface of the paper to become punctured with the characters the hand has traced. After the writing is finished, nothing but a faint line appears on the paper, but, on holding it up to the light the writing is clearly visible. This sheet, which is called the stencil, is then placed over a sheet of plain paper in a frame, which when closed, binds the two around their edges. An inked roller is then passed over it, and the ink penetrating the holes in the stencil transmits the written matter to the clean sheet, the line being composed of a series of very fine dots. In this way, and by placing a number



ANCIENT MOUND BUILDERS' FORT, IN THE COUNTY OF ELGIN, ONT.



PRE-HISTORIC REMAINS.

of sheets in succession under the stencil, about 500 copies or more in fac-simile may be taken, each copy being very clear and distinct.

The pen is seen in end view at Fig. 1, Fig. 2 being a side view. The current A enters the engine by the binding screw B, and thence passes by the wire B C into the coil A^1, which altogether with B^1 forms an electro-magnet. On leaving A^1 it traverses the wire D E, and enters the coil B^1, and on leaving the latter passes through F G H to the screw L, and thence to the platinum point K, and when the latter is in contact with the other platinum point M attached to the spring N M O, it returns by the binding screw P to the battery. Q R is a small flywheel revolving with as little friction as possible on the axis S T. This axis also works an eccentric at W, to which is attached a brass rod, and to the latter the neeedle, which on the revolution of the wheel works with a vertical motion in the tube X Y. Across the flywheel in the direction of its diameter, there is a slip of soft iron Q R, which plays the part of an armature to the electro-magnet A^1 B^1. On the axis of the flywheel at Z there is a cam, which in certain positions of the wheel presses against the spring N M O, and so separates the platinum points M K, and at the same time interrupts the current. When the wheel has revolved half round, the cam no longer presses against the spring, and the current passes. This will be more readily seen from Fig. 2 in which the axis of the wheel passes through the centre of the cam Z in a direction perpindicular to the plane of the paper. In the figures the wires connecting the different parts are shown separated somewhat from the machine in order that their direction may be clearly seen, but in the instrument they are pressed close against the framework.

The tube in which the needle works can be screwed to a slight extent up or down so as to allow of the very small length of needle projecting beyond the end of the tube being regulated. A small stand is provided in which the pen can be placed when not in use. By turning the screw at L, the pressure which the cam exerts on the spring can be regulated. A zinc and carbon battery of two cells is used to produce the current, the fluids being dilute sulphuric acid in the glass cell and a solution of potassium bichromate in sulphuric acid in the porous cell. The battery is very conveniently arranged in an iron stand, provision being made for raising the elements out of the fluid when the pen is not in use. Altogether the arrangement is very ingenious and not less ingenious than practical.—*The Engineer.*

FLORAL CULTURE.

Heliotropium.—Nat. Ord. Boraginaceæ. *Linn.—Pentandria Monogynia.*—A well known genus of profuse flowering and delicious fragrant plants, splendid for bedding or ribboning, and for baskets or pot culture; seeds sown in Spring make fine plants for summer and autumn decoration; light rich soil. *Half-hardy perrennials.*

Humea.—Nat. Ord. Compositæ. *Linn.—Polyadelphia Polygamia Æqualis.*—A remarkably handsome plant, invaluable for decorative purposes, whether in the hall, the conservatory, or dispersed in pots about the lawn, pleasure grounds, terraces, planted in the centres of beds or mixed borders; its majestic and graceful appearance renders it a most effeetive and striking object; in any position it stands unrivalled as a garden ornament. Besides, the leaves are remarkably fragrant when slightly rubbed. With proper care it may be grown 8 ft. high and 4 ft. in diameter; succeeds best in light, rich soil. *Half-hardy biennial.*

Humea elegans, *red;* from New South Wales; 8 ft.

Humea purpurea.—The flowers of this splendid novelty are of a deeper purplish red, and the habit of the plant is dwarfer than the older sort. For the formation of groups in the flower garden it will prove a very valuable acquisition, and produce a most striking effect.

Iberis.—Nat. Ord. Cruciferæ. *Linn.—Tetradinamia Siliculosa.*—Profuse blooming pretty little plants, especially adapted for rockeries, old stumps, or rustic baskets; they come into flower amongst the earliest Spring plants, and for a long time continue a dense mass of beauty. Succeed in any garden soil. *Hardy perennials.*

Iberis, sempervirens, pure *white;* from Candia; ½ ft.

Ice Plant.—Nat. Ord. Mesembryanthemeæ.—*Linn.—Icosandria Siliculosa.*—A pretty little trailing plant, much used for garnishing, the leaves of which are covered with crystalline globules, thus giving it the appearance of being coated with ice; very effective for rock-work, or mixing with other plants in the conservatory or flower garden. *Half-hardy annual.*

Icé Plant, (*Mesembryanthemum crystallium*) from Greece, trailer.

Lophospermum.** Nat. Ord. Scrophulariaed.—*Linn. Didynamia Angiospermia.*—An exceedingly beautiful and highly ornamental genus of climbers, with handsome, showy, foxglove like flowers; very effective for conservatory or garden decoration, and may be used with advantage for hanging baskets; light, rich soil. *Half-hardy annuals.*

Lophospermum scandens, *rosy purple*, very fine trellis plant; from Mexico.

Erinus, deep *blue*. flowers in profusion, beautiful dwarf bedder; half-hardy annuals; ½ ft.

Lupinus.—Nat. Ord. Leguminosæ. *Linn.—Monadelphia Decandria.*—A splendid genus of the most ornamental, beautiful and free flowering of garden plants, with long graceful spikes of bloom; colors rich and varied. Many of the varieties are of a stately, robust growth, which makes them exceedingly valuable for mixed flower and shrubbery borders, while the dwarf varieries make neat, trim bedding plants.

Cruikshankii, *blue*, *white* and *yellow;* from Peru; hardy annual; 3 ft.

EXPERIMENTAL AMUSEMENTS.

Another Process.—Drop sulphuric acid into a saturated solution of muriate of lime; in this case also an opaque mass is produced. Another process—Pour a saturated solution of caustic potass into a saturated solution of sulphate of magnesia (epsom salt), a nearly solid mass is again produced.

Chemical Miracle.—If a saturated solution of muriate of lime be mixed with a saturated solution of carbonate of potass (both transparent liquids), the result is the formation of an opaque and almost solid mass. If a little nitric acid be added to the product, the solid mass will be changed to a transparent liquid.

The Exploding Taper.—If the light of a taper be blown out, and the taper be let down into a glass containing oxygen gas, while the snuff (which should be a thick one) remains red-hot, it rekindles instanly with an explosion. When the taper is relighted, it continues to burn with a rapidity and brilliancy of flame, and an evolution of light truly wonderful.

The Candle Invisibly Extinguished.—Place a lighted candle in the bottom of a jar which has its open part uppermost (the jar being filled with atmospheric air); take then a jar filld with carbonic acid gas, and invert it over the jar in which the candle is placed; the effect is very striking; the invisible fluid descends like water, and extinguishes the flame. The whole, to spectators who have no idea of substance without sensible matter, having the appearance of magic.

The Movable Metallic Tree.—Mix together about equal parts of saturated solutions of silver and mercury in nitric acid, diluted with a little distilled water, in this mixture suspend five or six drachms of pure mercury, contained in a piece of fine linen rag doubled. The metallic solutions will soon penetrate to the mercury inclosed in the cloth, and clusters of beautiful needle-shaped crystals will begin to be formed around it, and adhere to the nucleus of mercury. When the aborization ceases to increase, the bag loaded with beautiful crystals may be taken out of the vessel where it was formed, by means of the thread by which it is suspended, and hung under a glass jar, where it may be preserved as long as may be thought proper.

To Tell the Hour by a Suspended Shilling.—Sling a shilling at the end of a piece of thread by means of a sloop; then, resting the elbow on a table, hold the other end of the thread betwixt the fore finger and thumb, observing to let it pass across the ball of the thumb, and thus suspend the shilling into an empty goblet. The hand must be perfectly steady, and if it should be found difficult to keep it in an immovable posture, the attempt must be given up. However, supposing the shilling to be properly suspended, you will find that when it has recovered its equilibrium, it will, for a moment, remain stationary. It will then, of its own accord, and without the least agency from the person holding it, assume the action of a pendulum, vibrating from side to side of the glass, and after a few moments strike the hour nearest to the time of day or night. It is necessary to observe that the thread should lie over the pulse of the thumb, and this in some measure will account for the vibration of the shilling; but to the proper number its vibration ceases, it acquires a kind of rotatory motion, and at last becomes stationary as before.

KEEPING APPLES.

The main element of success is a low and uniform temperature just above freezing. The house cellar is the farmer's fruit-room in winter, and if properly managed, answers the purpose very perfectly. But there is a great deal of carlessness in guarding cellars against extreme zero nights, and the apples and vegetables are frequently frozen before the owner suspects any danger. Banking the under-pining with a thick mat of leaves, straw, old hay, or evergreen boughs, will keep out the frost. These are within reach of every farmer, and are easily kept in place with boards or poles. But some cellars are very moist, and the temperature is likely to be too high rather than too low. This can be remedied by having a window that can be shut or opened at pleasure. By consulting a thermometer, which costs but a trifle, it is quite easy to keep the temperature in the cellar between 32 and 40 degrees, which is even enough for all practical purposes. The apples keep better in barrels, or in small tight packages, than in open piles or shelves, because they do not feel the change so soon. For the same reason some wrap each apple in paper, or pack them in sawdust or land plaster. This requires a considerable labour, but nice fresh apples in May and June are worth working for. In dry cork sawdust they keep sufficiently well without wrappers. If this is not available, dry hard-wood sawdust should be used in preference to pine or other resinous woods. These affect the odor, and sometimes the taste of the apples. If no packing is used, the barrels should be overhaulded once a month, and if any decayed apples are found, they should be carefully removed. Keep the apples headed. Look at the thermometer every night and morning. If too warm, let in more cold air, if too cold, shut the window entirely. It takes but a moment to regulate the temperature. By this simple process we have never failed to keep winter apples in good condition until spring.—*American Agriculturalist.*

FEEDING LAYING HENS ON INDIAN CORN.

The abundant use of Indian corn or maize for laying hens has long been known to be productive of an over-fat condition, leading to a diminished egg supply. The evil is very well demonstrated in the following extract from the *Albany Country Gentleman*, U.S., which we reproduce with one or two slight verbal alterations :—

When hens are fed on Indian corn in winter, or where they are allowed access to it in unlimited quantity, as they are on a great majority of stock farms, if they are not fat at first, they soon become excessively so, and so remain all winter, laying few eggs—the number of which, however, is determined by the condition, whether the winter is a warm and open one, or cold, close, and snowy. Now the assumption is that it depends more on the temperature than the food whether hens lay or refuse to lay in the winter season. This I am not disposed to agree to, believing that egg production depends much more on food than on temperature ; and even going so far as to say that, while hens feed exclusively on Indian corn, but in every other way cared for and housed in the best manner, will lay scarcely at all, other hens neglected in every way, except that a sufficiency of the right kind of food is supplied, will continue to lay without much interruption the winter through. And the explanation seems to be an easy one when we look at the constituents of the average egg. It contains : Shell, 2 per cent.; yolk, 30 per cent. ; and white, 68 per cent. Maize-fed hens are almost always bursting with fat; and in addition to this condition, they have an abundant store, or reserve, of half-formed yolk of eggs— that portion formed before the egg enters the oviduct or egg passage, while the white and shell are secreted as the egg passes through. Now, fat and yolks of eggs are readily made up of the starch and oil of their food (corn), but from where is to come the 70 per cent. of shell, membrane, and white, of which the larger share of the egg is composed ? The white is almost purely albumen and water, and so is the membrane lining of the shell, and the shell itself is carbonate of lime ; but corn contains scarcely any of either, and there is no known alchemy of nature that will change starch into albumen, or create carbonate of lime where its constituted elements do not exist. Corn fed hens, then, do not lay in winter, and especially when the snow covers the ground, because there is nothing in their food that furnishes material for the white and shell of the egg, but abundant material for fat and rudimentary yolks. As soon as there is a thaw, or when spring comes, corn-fed hens commence laying, and continue to do so, simply because they are able to supplement this food by grass.

LUMINOUS WRITING.—Fix a small piece of phosphorus in a quill, and write with it on paper ; if the paper be then placed in a dark room, the writing will appear beautifully luminous.

ANCIENT MOUND BUILDER'S FORT.

(See page 60.)

We give, this month, an illustration of an ancient Fort in the western part of the County of Elgin. This fort was first discovered by white men upwards of fifty years ago. This singular earthwork is situated in the midst of a dense piece of woods, and unmistakable signs show that it was built by a people far in advance of the Indians, as we have known them. From north to south the enclosure measures 300 feet, and from east to west 280 feet, and the double embankments encircling it measure 30 feet across. A careful examination shows that the earth was not thrown up around the trees, but that the trees commenced to grow after the embankments were made, which proves the Fort was made long before white men had made their appearance on this continent.

DOMESTIC.

LUMINOUS WRITING.—Place a small piece of solid phosphorus in a quill, and write with it upon paper. If the writing be then taken into a dark room it will appear beautifully luminous.

TO OBTAIN FIRE FROM WATER.—A small quantity of potassium thrown on to the surface of a little water in a basin will immediately produce a beautiful rose-coloured flame.

WATERPROOF PAPER.—A nice waterproof paper, transparent and impervious to grease, is obtained by soaking good paper in an aqueous solution of shellac or borax. It resembles parchment in some respects. If the aqueous solution is covered with aniline colors, very handsome paper for artificial flowers is produced.

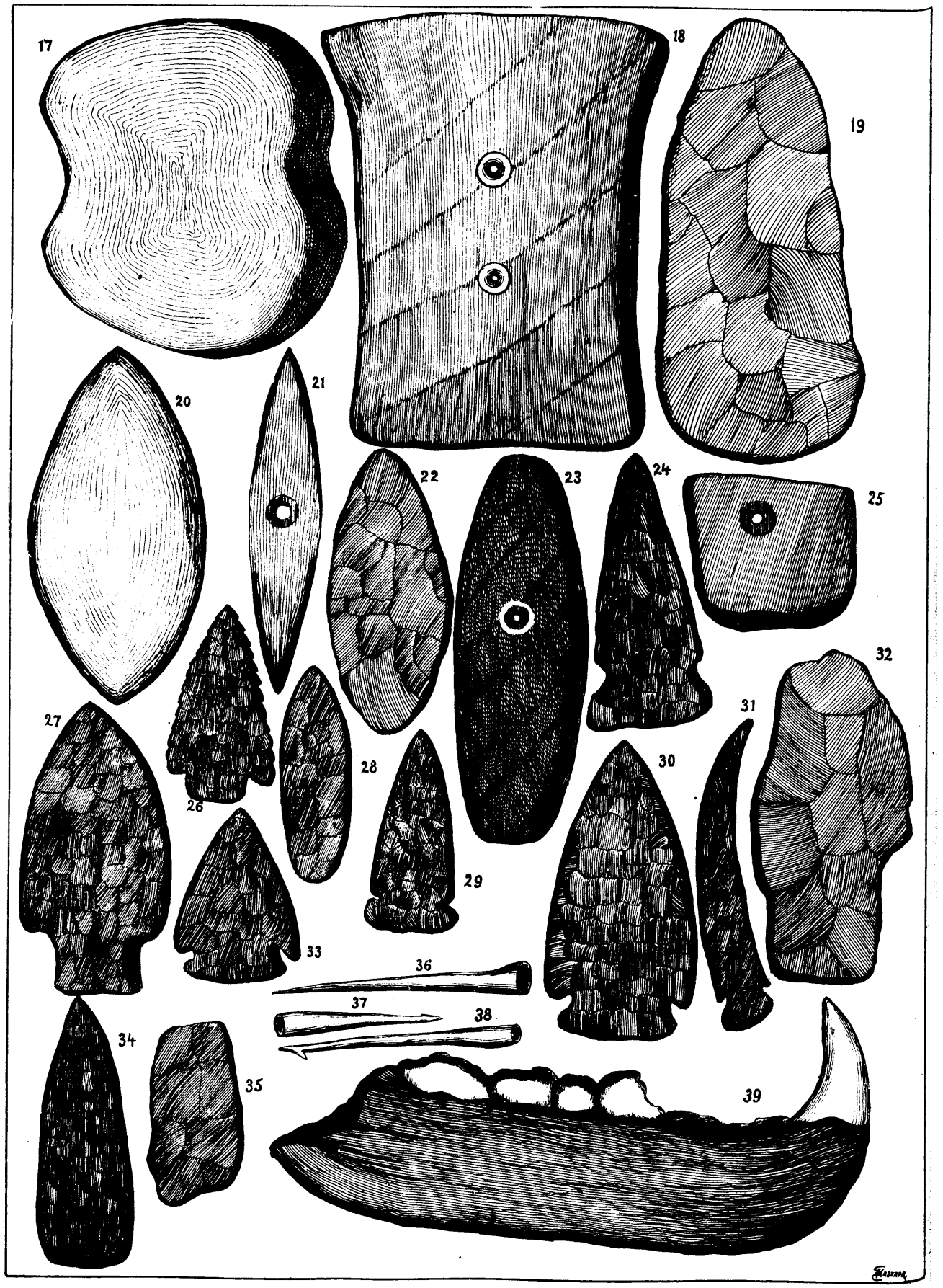
CARE OF THE TEETH.—The worst of all bad habits is that of picking the teeth with a pin, and nothing is so predisposing to toothache. If such a habit must be indulged in, use a quill. Add, lastly, be it observed that the future perfection of the teeth depends upon the attention bestowed upon them in youth. Parents cannot be too strongly impressed with the importance of this advice ; nor can youth be too frequently reminded of any carelessness or neglect to themselves.

IT is hardly possible to introduce successfully an improvement in machinery of any class without the aid of a good engraving. It is only serves to show at a glance the valuable features of the machine, more effectually than the longest verbal description can do, but it also constitutes the very best method of advertising an invention, its attractive appearance securing the attention of the reader, while a column of reading matter, without illustration, might be overlooked.

PRESERVE AUTUMN LEAVES.—Press the leaves between sheets of paper until they are dry. Then paint them over both sides with a light coat of linseed oil and spread them out on waste paper to dry, which will require two or three weeks, turning the leaves over once or twice to prevent their adhering to the paper. The use of wax to preserve leaves requires so great a degree of heat as to change their color, and the application of varnish renders them brittle, but with the oil they retain their flexibility and color for a year or more.

EXTRACTION OF A LIVING INSECT FROM THE EAR. — The *Archives Médicales Belges* relates the following case : A little girl, three years old, put an insect, "*bête du bon Dieu*," into her ear. Sharp cries, agitation and convulsive symptoms, ensued ; injections of water were made without result. The physician then conceived the idea of asphyxiating the insect by means of chloroform, he dropped four drops chloroform upon a small piece of cotton which he introduced into the ear. Immediately the child ceased crying, and complained no further of any disagreeable sensation ; the insect had become asphyxiated ; an injection of warm water brought it away dead, and no further trouble ensued.

PRESERVING EGGS.—A correspondent of the English *Mechanic* says regarding preserving eggs : "I beg to say that, in the year 1871-2, I preserved eggs so perfectly that, after a lapse of six months, they were mistaken when brought to table for fresh-laid eggs, and I believe they would have kept equally good for twelve months. My mode of preservation was to varnish the eggs as soon as possible with a thin copal varnish, taking care that the whole of the shell was covered with the varnish. I subsequently found that by painting the eggs with fresh albumen, beaten up with a little salt, they were preserved equally well, and for as long a period. After varnishing or painting with albumen, I lay the eggs upon rough blotting-paper, as I found that, when allowed to rest till dry upon a plate or on the table, the albumen stuck so fast to the table or plate as to take away a chip out of the shell. This is entirely obviated by the use of the blotting-paper. I pack the eggs in boxes of dry bran."



PRE-HISTORIC REMAINS.