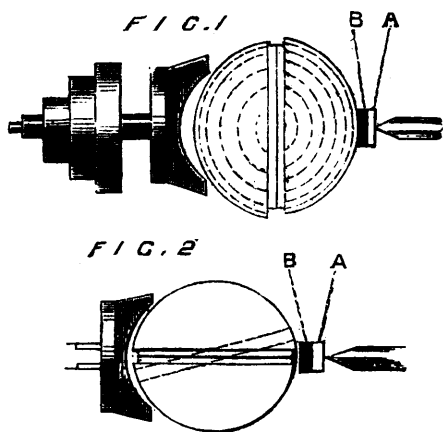


### HOW TO TURN A BALL.

By A. FORREST, in the *American Machinist*.

The turning of a perfectly spherical form in a common hand-lathe, is a feat that few have accomplished who have tried it. Approximate accuracy may be attained by almost any hand-lathe workman. By means of the accompanying diagrams, I will explain a method by which balls of wood, bone, ivory, brass, and other material admitting of hand-tool work, may be readily formed with perfect accuracy.

Fig. 1 shows spindle of common lathe, with cone pulley, face-plate, and back-centre, with piece in place to undergo the first operation. The first process consists in blocking out the material to be used into "blanks," as nearly spherical as possible by the eye alone. When the blanks are prepared, a block of some firm, hard wood is fastened on the face-plate and formed into a concave chuck. The convexity of the chuck must have a radius considerably less than the ball to be turned, as shown. When the chuck is truly and accurately formed, the "blank" is placed in it, in position shown in Fig. 1, and the back-centre is brought against it, by which it is forced to a holding position in the chuck; a small metal disc (a) being placed between the "blank" and point of back centre. Next turn a groove around the centre of the "blank," defining the desired diameter of the finished sphere, and, with a pencil, make a line in the centre of the



groove. When this is done, and the "blank" is turned into position, shown in Fig. 2, the pencil line becomes a guide by which to produce the spherical form by means of the tool. The surface may be taken off, to the line, on such portion of the blank as is not embraced in the chuck, and covered by the metal disc a; the blank is then reversed or changed ends with, and the other portion turned off to the line. When this is done, only the two ends before covered by the discs will be left. These are readily turned off by placing the ball back to its first position, as in Fig. 1.

If great accuracy is required, the ball should be first formed by the method described, a trifle larger than the finished ball is to be, and the process repeated, which will produce a form sufficiently accurate for a billiard-ball; provided care is taken to true up the chuck where it bears on the surface of the work, which may be done in a moment by a light handling of the tool.

It would seem as though this method of turning balls would be successfully practical, yet trial will prove how, that so far as described it is impractical, from this fact: In the very best make of hand-lathes, it will be found that the true axis of the spindle produced will fall below, above, or to one side of the point of back-centre, which, if the point is held by back-centre will cause the grip of the chuck to be relieved first on one side, and then on the other.

### PUBLIC APATHY ABOUT HYGIENE.

Nothing is more discouraging to the benevolent physician than the apathy of the mass of people on these matters. Said a professor, while examining for his degree a student who showed lack of mental activity and great indifference:—"I can stand your ignorance, but not your stupidity." One of the most eminent physicians in a neighbouring State, during an epidemic of typhoid, carefully pointed out to the families he attended while sick the cause of their disease, and yet the great majority ne-

glected to lift a finger to remove the cause, and would even try to deny the most obvious facts. Coming to treat a fatal case of typhoid, a physician went to the pump, examined the water, observed a putrescent odour therein; the well was examined, and a paillful of decayed earth worms was found to be the infecting cause which sent a vigorous young man to his premature grave. On the hills of Berkshire, in one of the most airy and apparently healthy localities, a family was suddenly prostrated with typhoid. Neighbours and friends that came to aid were suddenly seized by exposure, and the pest spread throughout the town. The cause was found in infected water. A family on State street in this city suddenly were infected, and no cause could be assigned until inspection of the well found a quantity of bones with portions of decayed tissues thereon, which children had thrown in while at play.

In the hill towns and rural districts generally typhoid and diphtheria prevail, as well as in the crowded city. The cause is always to be looked for in the careless sanitary habits of the people. The want of cleanliness and ventilation in the cellars, the decaying potatoes, apples and cabbages, old rotten cider barrels and soap and grease tubs, piles of filthy dirt—rags mingled with ashes on which rats and cats have nightly battles, the damp air, and oftentimes collections of water, and a temperature favorable to decomposition—all these are conditions prolific in the formation of infecting poisons, and for increasing the incomes of physicians. "I will not give you," said an applicant for vaccination, "a dollar for that service; it is not worth it!" "Then," replied the doctor, "you will give me fifty for attendance on you for small-pox." Soon after the doctor, indeed, received within one dollar and a half of that amount from the executor of a fool who died according to his folly. Prevention is cheaper as well as better than cure—or death. The medical profession receive more compensation for treating diseases than for their services in prevention. Let the public invert the order, co-operate with them in enforcing sanitary regulations, and public health and longevity will be better secured.—*Springfield Republican*.

Mr. Rawlinson, the chief engineering inspector of the Local Government Board of England, has recently published a series of ten sheets of detailed drawings, which are intended to aid local surveyors in preparing plans and specifications for sewerage and water supply.

Under the Public Health Acts of England, a city can borrow money from the Government, for the purpose of constructing drainage, sewerage, or water supply works, provided the plans are approved by the Local Government Board. It is evident that the sheets of drawings above referred to must be of great practical value to those who prepare the plans which are to be submitted for criticism. Upon the plans *The Building News* remarks:—"Engineering in many of its branches is beginning to become an exact science. No engineer can now question or theorize about the right forms and sizes for sewers, nor the sections of man-holes or flushing chambers. Gradients and out-falls are pretty much the only varying factors, but these admit of only one or two forms, so that the science of sewerage can now be reduced to a few easily understood rules."

We are by no means satisfied that "the science of sewerage" has become so well settled and unquestionable as this extract would imply, and especially when the proper size of sewers is in question, but there can be no doubt of the interest and value of these drawings of Mr. Rawlinson, who has had more experience in such work than any engineer, living or dead, and we are doing our own engineers a service by calling their attention to these plans. The sheets can be obtained at 2s. each, from Harrison & Sons, Pall Mall, or Knight & Co., Fleet street, London.

A FILE OF NOVEL CONSTRUCTION.—Mr. J. Kirkwood, of Edinburgh, Scotland, has recently invented a new file for soft metals and wood. It is formed of about two hundred separate pieces of steel, connected by an iron bar, which is passed through and binds them together with a screw. The advantage claimed for the file is that filings of soft metals or wood can be got rid of by simply loosening the screw, and thereby separating the plates, this being done with very little delay or inconvenience. Each file will, it is said, last three years, outwearing 30 dozen ordinary files. The cost of the latter would be £36 (\$180), and the saving that would be effected by using the new file would be £32 (\$160). Mr. Kirkwood's file is said to be capable of performing quicker and better work than the out files in ordinary use.