TALKS WITH WOOD-WORKERS.

A PAPER of some length, but of more than ordinary interest, on progress in the art of woodworking, has recently come under my notice. The writer, Mr. C. R. Tompkins, M. E., will be known, no doubt, to many readers, as a frequent and always able contributor to the trade press. The art of woodworking is believed to have been one of the earliest practiced by men, and its importance is shown by the fact of its continuing to exist under conditions of constant development.

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Previous to the introduction of the saw mill, the cutting of lumber into boards or planks, both in America and England, was performed by hand by the process known as pit-sawing. The log was placed upon a pair of saw-horses high enough to allow one man to stand beneath the log, while the other stood upon it, the two working a saw of sufficient length. Improved machines and appliances in woodworking have had to run the gauntlet of strong opposition, as has been the case with every new invention. When the first attempt was made to introduce the saw mill in England, the hand sawyers by their opposition practically placed a veto upon it. It is stated that in 1663 an enterprising company employed a Dutchman to erect a new saw mill in London, but that the enterprise had to be abandoned on account of the opposition of the hand sawyers. In 1767 a saw mill was erected and operated by a windmill at Limehouse, Eng., but it was soon destroyed by a mob. Another erected in the south of Scotland about the same time shared the same fate. Time, however, overcame prejudice, until to-day in England or America the saw mill is a feature of the age, until something better comes along.

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Next to the saw mill the most important machine that has been introduced, and one that has had more effect upon the progress of building than any other, is the planing machine, which dates from the invention of William Woodworth in 1826. Not only did the work of the planing machine of itself give a great impetus to the art of woodworking, but its introduction demonstrated that lumber could be dressed rapidly by the action of rotary cutters, leaving the inventors to apply the same principle to machines for other purposes.

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When the planing machine was introduced among British workmen the same spirit of opposition was manifested as against the saw mill. Excitement with journeymen carpenters ran high. They claimed that if machines of that kind were allowed to come into general use they would soon be thrown out of employment and their families would suffer for the necessaries of life. In some cities they refused to lay flooring that was planed and matched by machinery. But again time overcame prejudice.

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The moulding machine with its modern improvements has had much to do with progress in woodworking. Before the invention of this useful machine all mouldings were worked by hand, and only the plainest and simplest style of mouldings were used, but the demand for more artistic woodwork has brought the improved moulding machine into general use. But still the demand for artistic woodwork continued, and it has led to the invention of many other complicated and useful machines. Not only intricate carved work, but irregular-shape mouldings of the most elaborate kind, which were formerly worked only by hand, are now produced by special machines, which perform their work more accurately and in less time and more cheaply than hand labor. This change has demanded not only more accurate and skilfully-constructed woodworking machines, but a more skilful and intelligent class of woodworkers to operate them. In machine-stuck mouldings especially there is a great change as compared with those stuck at the present time and those of a few years ago. Architects and builders are more exacting than they were formerly. Once they were satisfied with mouldings provided they were of the correct shape and an even thickness, and if the surface required smoothing down by the liberal use of sandpaper, or sometimes the moderate use of a hand plane, no objection was heard. Even with the imperfect state of the art, the moulding machine was far preferable to the hand.

Probably no other branch of the art of woodworking has made more rapid advances than the manufacture of furniture by the use of machinery. It does not require a very old man to remember when most of the furniture was manufactured by hand, and the village cabinet maker, who was also an undertaker, was an important personage. When a young couple were married, the cabinet maker was called upon to furnish the necessary furniture for housekeeping, when baby was born, none but the cabinetmaker could furnish him with a suitable crib; and when death invaded the domicile, his services were again called into requisition to furnish a suitable casket and assist in consigning the body to its last resting-place. But the rapid progress in the art of woodworking has wrought a complete change. The village cabinet-shop has changed to the furniture store, and undertaking has become a distinct branch of business, the supplies in both cases being obtained from the factories, where machinery performs the work more cheaply and accurately than hand labor. It is within comparatively recent years that the makers of woodworking machinery have turned their attention to the construction of machinery specially adapted to the manufacture of furniture. Formerly it was thought that the same class of machines used in planing mills and sash and door factories were also adapted to the manufacture of furniture. The use of such machinery tended to reduce materially the cost of production, but the pressure of competition in the furniture trade created a demand for better facilities in order to increase the output, while reducing the cost of production.

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The whole history of woodworking machinery goes to illustrate very strongly the advancements of invention in mechanical lines. I suppose that a study of progress in invention in many other departments would show equal advances, but this much is sure, that the woodworking trades have been the means of drawing forth some of the cleverest inventive spirits of the age.

JAS.

BAND SAWS.

SAWS may be divided into four general classes—reciprocating, circular, cylindrical, and band or ribbon. The office of a saw is to sever by removing or wasting material, hence the thinner a saw can be had the more economy of power and materials. There is certain limit of thinness beyond which a Mulay saw cannot go without bending, as long as it has a thrust instead of a pulling cut. The sash (or gang) saw can be made thinner than a thrust-cut Mulay, on account of being strained from both ends. The circular saw commences to limber out and wave at too high velocities, and (except for veneer cutting) must be thinner at the centre than at the circumference, to give clearance and to prevent binding and heating. Some economy of kerf and power is gained by the "double circular" mill, when two small circulars running in opposite directions, one cutting *from the top and the other from the bottom of the log*, in the same plane, are used instead of one large one. Something partly answering the purpose of straining is gained by the "side guides" of the circular saw, but still they waste stuff and power. As the cylinder saw never comes into competition with the Mulay, sash, circular or band saw, it may be left out of the present consideration.

The band saw has the advantage which the sash saw has over the Mulay, in being strained; and that which the circular has over both the Mulay and frame saw, in having a continuous instead of a reversing motion. The latter property makes it steady, running like the circular, and the former permits of its being thinner than the circular, and making, in consequence, less kerf, and taking less power to run it. It has the additional advantage over the circular, that it will cut other than in straight lines or flat planes.

The circular should not be used for work thicker than one-third the saw diameter. A 20in. square cant hence necessitates a 60in. circular, with a thickness of ¼in., and a kerf of 5-16, or two 30in. saws, 3-16in. thick, cutting out a ¼in. kerf. If we are cutting 1in. stuff with single saw we need nearly 21-16in. of wood to make a 16-16 board, which looks very much like 5-16=thirty-one and a quarter per cent. kerf, compared with the board, or 5-21=23 8 per cent. of the entire square cant wasted.

Using the double mill and thinner saws, we find about 5-4in. of wood necessary to the production of a 4 4in. board, being 25ft. of kerf for every 100ft. of board, or twenty per cent of the log turned into sawdust.

A band saw to effect this same work need be but 1 16 in. thick, and cut a kerf of but 3 32in. This means that an inch (32-32in.) board takes but 35-32in. of wood to cut it, being 3-32 as much kerf as board, and 3 35 in., or 8½ per cent. of the log wasted in sawdust. In other words, the band saw cuts 3-32in. kerf to the single circular's 10-32in., which looks as though it made to 3, or 333⅓ per cent. as much in kerf as the band (and consequently in power). A 20in. cant which is 320 16in. thick, will cut about 320-21=fifteen 1 in. boards if a circular be used, but if a band saw be used it would cut about 640-35 or eighteen 1in. boards. The band saw is hence 3-15=twenty per cent. more economical as regards products. If the same saws were set to cut ½in. stuff out of a 20in. squared log, the circular would take 8-16+5-15=13-16=26-32 of wood to cut a ½in. board, and the band would take 16-32+3-32=19-32 of stuff to cut out the same. The circular would hence take 26-19 as much stuff for a given product as the band, its excess of stuff required being 5-18 or 26.3 per cent., 20in. square cant would cut 320-13 or about twenty-four ½in. boards with the circular, while with the band it would cut about 63-19=thirty-three. Producing ½in. stuff the band would turn out 33-24=129 per cent. as much stuff as the circular.

It will be seen that in re-sawing the band presents special advantages in economy of stuff and power. As regards quality the band saw should scratch less stuff than the circular. The band offers for some timber cutting the best advantages of the circular in smooth and continuous action, and that of the scroll (or "jig" in capacity to saw at an angle, curve or bevel. Polytechnische Revue.

HIGH SPEED ENGINES.

WE are very apt to think only of our own particular branch of engineering, says the Tradesman, when discussing any problem pertaining to it and this seems particularly so in the case of the high speed stationary engine. In stationary practice we see in first class engine rooms the high speed engines guarded with particular care and the room as free from dust and dirt as it can be made, so as to give all the bearings as little grit or foreign matter as possible. And on a 12 x 18in. high speed engine for sample, running perhaps 300 revolutions per minute, we think it wonderful that it runs and keeps cool, think the piston speed enormous, and hardly dare breathe while near it for fear of a hot box. Yet in locomotive practice we have speeds exceeding this in many instances, and have the engine without any foundation, so to speak, the main boxes never in line (going up and down over the frogs and crossings) and Jersey sand blowing around the engine until the running parts are almost white as snow, yet the engine runs, and gives comparatively little trouble. So that it seems foolish to brag so much about our high speed stationaries, when if run under the same conditions as the locomotives, they would be apt to give unending trouble.

On the other hand, it is very probable that if a locomotive was pinned down to a foundation it would do little better, as the freedom of motion to all its parts must be in a measure responsible for their running; all, the swinging and shaking absorbing jars which might be noticed materially if on a solid foundation.

THE GEAR BUSINESS.

THE gear business has grown to be quite extensive, so much so that one of the firms in this line has decided to secure a patent on bevel gears with plain surfaces for the flanks of the gear teeth. It may be that this firm has a special curve of their own to run with a straight flank tooth, but if they will look into the theory of the matter they will find that there is only one form that will work properly with a straight flank, and that form is determined by the flanks themselves, without any discovery being needed from any source.—Journal of Commerce.