PRACTICAL MECHANISM.

BY JOSHUA ROSE.

SECOND SERIES—Number VII.

PATTERN MAKING.

From the appliances for turning work between the centers, we pass to those for holding work independent of the back center of the lathe by means of chucks, the name by which such appliances are generally known. Fig. 51 is a back view of a face plate, to which work may be held by screws; the usual method, however, is to screw to the face plate a disk of wood, and then to true the wood across the face and on the diameter. The work is then fixed to the new surface thus obtained. Many good purposes are served by the intervention of the disk of wood (or chuck, as it is usually termed) between the metal plate and the work. For instance, it is a guard which effectually prevents the turning tools from touching the metal of the face plate. It supports the work (being nearly of the same size) when required, and obviates the necessity of having more than three or four face plates of metal. Its surface is readily made to conform to the shape of the work, and furthermore it is very readily trued up. When we have to deal with large sizes, a mere disk of wood will not serve, as it will be too weak across the grain: and here it may be remarked that the work often supports the chuck, and therefore we should always, in fixing, make the grain of the work cross that of the chuck, because the centrifugal force due to the high velocity is so great that both the chuck and the work have before now been rent asunder by reason of the non-observance of this apparently small matter. When it is considered that the chuck has not sufficient strength across the grain, battens should be screwed on at the back; but a chuck so strengthened will require truing frequently on account of the strains to which its fibers will be subjected from the unequal expansion or contraction of its component parts. Fig. 52 shows the back of a chuck strengthened by the battens, A A A

Fig.51.

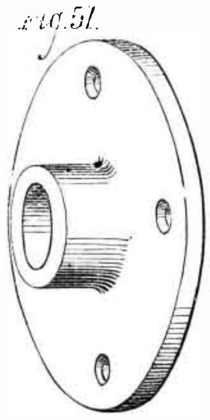
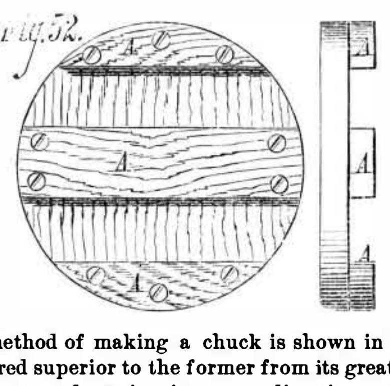
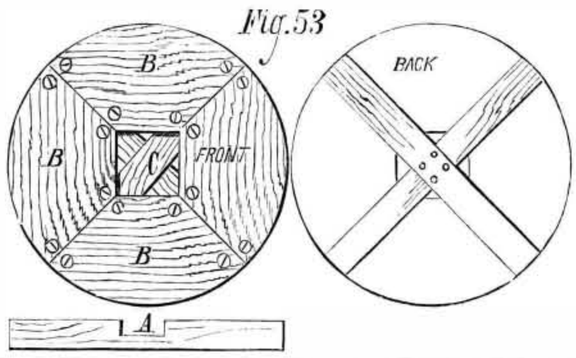


Fig.52.



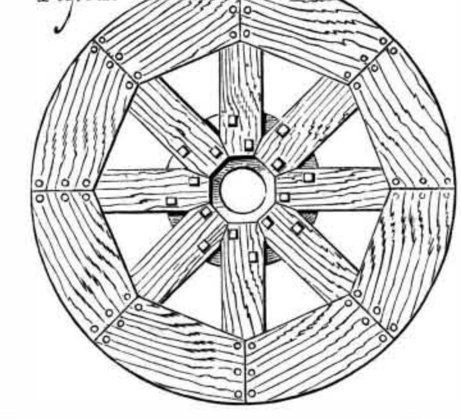
Another method of making a chuck is shown in Fig. 53. It is considered superior to the former from its greater ability to resist outward strains in every direction, while the strains to which it must necessarily be subject, from variations of temperature and humidity, are less than in the former. It will also be found that it can be trued with greater facility, especially on the diameter. as the turning tool will not be exposed to the end grain of the wood. To make one of these chucks about 2 feet in diameter, we proceed as follows: Procuring two bars for the back, say 4x2 inches and 2 feet long, we plane them all over; then in the middle of each we cut out the recess (shown at A in Fig. 53) to a depth equal to half the thickness, the width of the recess being equal to that of the bar; this process is termed half checking.

Fig.53



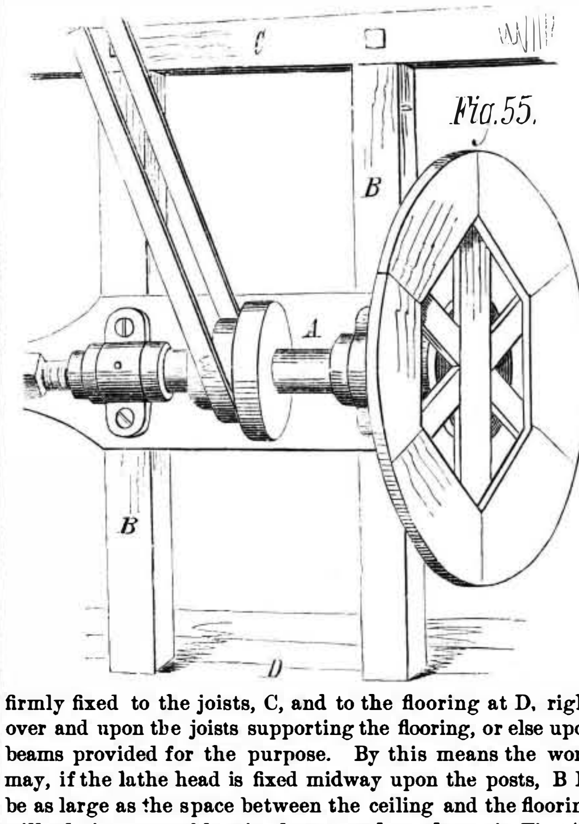
We next fasten these bars together by gluing and screwing them at the center, driving the screws tightly home while the glue is warm. Upon the cross thus formed, we superpose the segments shown in the front view of Fig. 53, at B B B; these may be of almost any thickness, say from $\frac{7}{8}$ to $1\frac{1}{4}$ inches. They should be planed on the back and should not extend to the center, but leave an open space (as shown in Fig. 53, at C) of about 4 or 5 inches. This opening can be filled, if desired, by screwing on a square piece. If the segments were carried to the center, they would be too weak to bear a screw near that point; and again in large chucks, we very seldom require to use the part about the center. Chucks of very large size, that is to say, from 4 feet upwards, will require more support than is afforded by the four arms of the cross. Three bars can be put together, so as to give six arms, which will answer probably for a 6 or 7 feet chuck. For still larger sizes, it is necessary to cast a strong circular plate to form the middle of the chuck, and to then bolt the requisite number of arms to it. This strength of the chuck will of course depend upon the number of arms and their depths; and unless the chuck is very substantial, a difficulty will be experienced in turning, on account of the tremor. A chuck having the middle of iron and the outside of wood, supported by arms, is shown in Fig. 54

Fig.54.



In shops where the size of the work necessitates the employment of chucks of so large a diameter, a special lathe is of great advantage, because a lathe having an elevated bed is so tremulous and shaky; while those having large solid heads are too cumbersome, and are not belted to run at a sufficiently high rate of speed. In such cases, the arrangement shown in Fig. 55 is an excellent one. A represents a lathe head bolted firmly to two uprights, B B, which are

Fig.55.



firmly fixed to the joists, C, and to the flooring at D, right over and upon the joists supporting the flooring, or else upon beams provided for the purpose. By this means the work may, if the lathe head is fixed midway upon the posts, B B, be as large as the space between the ceiling and the flooring will admit, a movable tripod rest, such as shown in Fig. 47, being employed for a tool rest.

Proportions of Bolts and Nuts.

In reply to several of our correspondents, we give below a table of the standard sizes for the heads of bolts and of nuts, including the pitches of the threads and size of tapping holes:

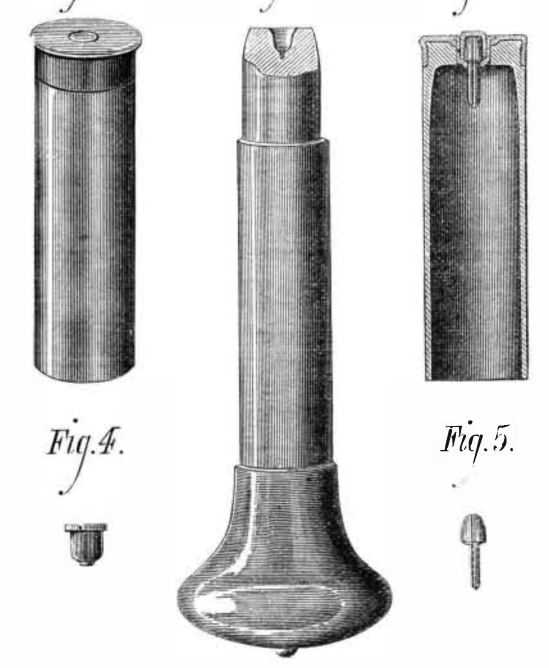
Diameter of bolt.	Threads per inch.	Size of tapping hole.	Size across facets of head or nut.	Depth of head or nut.
$\frac{1}{4}$	20	0185	$\frac{1}{2}$	$\frac{1}{4}$
$\frac{3}{16}$	18	0·240	$\frac{19}{32}$	$\frac{5}{16}$
$\frac{3}{8}$	16	0·294	$\frac{11}{16}$	$\frac{3}{8}$
$\frac{7}{16}$	14	0·344	$\frac{25}{32}$	$\frac{7}{16}$
$\frac{1}{2}$	13	0·400	$\frac{7}{8}$	$\frac{1}{2}$
$\frac{9}{16}$	12	0·454	$\frac{31}{32}$	$\frac{9}{16}$
$\frac{5}{8}$	11	0·507	$1\frac{1}{16}$	$\frac{5}{8}$
$\frac{3}{4}$	10	0·620	$1\frac{1}{4}$	$\frac{3}{4}$
$\frac{7}{8}$	9	0·731	$1\frac{7}{16}$	$\frac{7}{8}$
1	8	0·837	$1\frac{5}{8}$	1
$1\frac{1}{8}$	7	0·940	$1\frac{13}{16}$	$1\frac{1}{8}$
$1\frac{1}{4}$	7	1·065	2	$1\frac{1}{4}$
$1\frac{3}{8}$	6	1·160	$2\frac{3}{16}$	$1\frac{3}{8}$
$1\frac{1}{2}$	6	1·284	$2\frac{3}{8}$	$1\frac{1}{2}$
$1\frac{5}{8}$	$5\frac{1}{2}$	1·389	$2\frac{9}{16}$	$1\frac{5}{8}$
$1\frac{3}{4}$	5	1·490	$2\frac{3}{4}$	$1\frac{3}{4}$
$1\frac{7}{8}$	5	1·615	$2\frac{15}{16}$	$1\frac{7}{8}$
2	$4\frac{1}{2}$	1·712	$3\frac{1}{8}$	2
$2\frac{1}{4}$	$4\frac{1}{2}$	1·962	$3\frac{1}{2}$	$2\frac{1}{4}$
$2\frac{1}{2}$	4	2·175	$3\frac{7}{8}$	$2\frac{1}{2}$
$2\frac{3}{4}$	4	2·425	$4\frac{1}{4}$	$2\frac{3}{4}$
3	$3\frac{1}{2}$	2·628	$4\frac{5}{8}$	3
$3\frac{1}{4}$	$3\frac{1}{2}$	2·878	5	$3\frac{1}{4}$
$3\frac{1}{2}$	$3\frac{1}{4}$	3·100	$5\frac{3}{8}$	$3\frac{1}{2}$
$3\frac{3}{4}$	3	3·317	$5\frac{3}{4}$	$3\frac{3}{4}$
4	3	3·566	$6\frac{1}{8}$	4

For cast iron work, the tapping holes may, for sizes of 1 inch and less, be drilled to well clear the given sizes.

THE two thousandth locomotive was recently completed at the London & Northwestern Railway Company's works at Crewe, England. The occasion was celebrated by giving a holiday and a day's pay to all the workmen, some 6,000 in number, and a banquet, which was attended by the directors of the company, at which were exhibited specimens of the different classes of engines used on the road.

IMPROVED ANVIL FOR PAPER CARTRIDGE SHELLS.

The invention herewith illustrated is a new anvil for paper cartridge shells, by means of which it appears that a



large number of charges may be fired from one and the same shell without injury thereto. We are informed that a single shell has been used in firing forty-two shots, and that one hundred and four caps exploded on a shell have not caused any deterioration. Each cartridge case, therefore, lasting for so many charges, the sportsman can, with a limited number of them, change his charges to suit different kinds of game, and thus be relieved from transporting a large number of cartridges of varying sizes. Fig. 1 is a perspective view of the ordinary paper shell. Fig. 2 is a sectional view of the same with the improved anvil attached. Fig. 3 is a device for disengaging old caps. Fig. 4 is the cup or socket of the shell in which the anvil and firing cup is held, and Fig. 5 is a detached view of the anvil. The anvil is of brass, iron, or steel, in a single piece. Its head is somewhat larger than its stem, and is made slightly conical in form, to receive thereupon the cap for the explosion of the charge contained in the shell. There is a narrow groove made across the head of the anvil and continued down one side and to the end of the stem. Through this groove the fire is conveyed in a straight line to the charge, causing the same to explode without injuring the case. The groove, it will be observed, extends entirely across the top of the anvil head, so that a large surface for the passage of the flame is afforded. The device shown in Fig. 3 may be made of wood or any other suitable material. Its stem is small enough to be inserted readily in the paper shell, and at the end there is a socket, the bottom of which receives the point of the anvil, keeping it in a central position while it is being pushed outward from the shell. This disengages the old cap and leaves the anvil ready for a new one.

From a certificate submitted by the inventor and signed by several well known professional sportsmen, the statement of the inventor is confirmed that forty-two shots have been fired from two cartridge cases, and that the latter are still intact, also that one hundred and four caps have been exploded on the shell without causing any deterioration.

Patented March 14, 1876. The patent is for sale. For further particulars, apply to the patentee, Mr. J. Saget, 198 Chartres street, New Orleans, La.

American University Boat Races.

The first university race ever rowed in America in eight-oared shells took place between representative crews from Yale and Harvard on the Connecticut river, at Springfield, Mass. June 30, 1876. Length of course, 4 miles. Won by the Yale crew in 22 minutes and 2 seconds, Harvard coming in 31 seconds, or 13 lengths, astern. The number of strokes made per minute of the respective crews is given by the New York *Herald* as follows:

Minutes.	Yale.	Harvard.	Minutes.	Yale.	Harvard.
1	34	35	12	33	37
2	34	$35\frac{1}{2}$	13	33	—
3	34	35	14	33	40
4	33	35	15	33	36
5	33	35	16	33	37
6	33	—	17	32	40
7	33	—	18	33	—
8	33	35	19	33	—
9	33	—	20	33	$35\frac{1}{2}$
10	34	36	21	33	—
11	32	—	22	—	—

The average age of the Yale crew was 23·7 years, hight 69·3 inches, chest 40·2 inches, weight 158·8 lbs. The average age of the Harvard crew was 21·2 years, hight 68·8 inches, chest 39·7 inches, weight 159·14 lbs.

MESSRS. OGDEN & CARPENTER, of 409 East 33d street, New York city, state that the steam jet plan, to assist combustion, described by us on page 18, current volume, has been in use at their establishment for more than four years with success.