sorry I can give so few data regarding an event of which I am as certain as of my own existence. The clear but peculiar skies of that region in summer may account for the distinctness of the view.

Washington, D.C. RICHARD COVINGTON.

PRACTICAL MECHANISM.

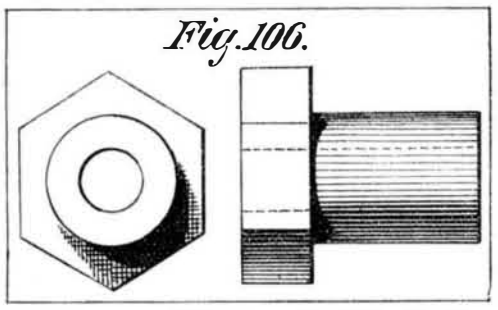
BY JOSHUA ROSE.

SECOND SERIES—Number XV.

PATTERN MAKING.

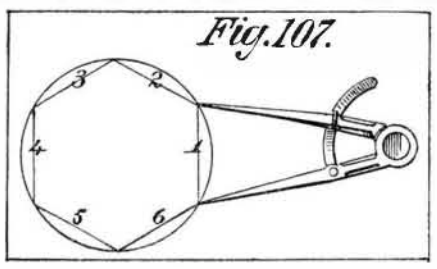
Our second example, Fig. 106, is a design for another kind of gland, such as is often fitted to glands for pump rods and spindles. For the small sizes, the glands are usually cast

Fig. 106.



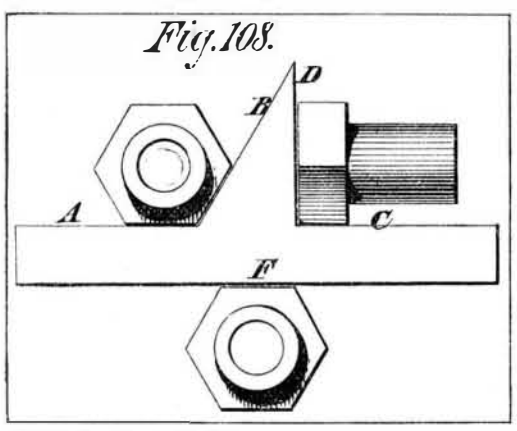
solid, and the hole is drilled out in the lathe, in which case, providing the gland is not very deep, it would be molded vertically, with the head in the nowel, and would be turned out of the solid piece of wood in the style of our previous example, treating for the moment the hexagonal part as a flange, whose diameter must be turned to the size of the hexagon across the corners. After the turning is done, we mark the hexagon as follows. We set a pair of compasses as nearly as possible to the radius of the turned piece that is to form the hexagon, and divide that piece off into six divisions, in the manner shown in Fig. 107; for the radius of a circle will divide its circumference into six equal parts. So that, if the compasses are correctly set, one trial will be sufficient; but if not, we must readjust the compasses and go arouud again. Then, from these points, we square lines, as shown in Fig. 107, at 1, 2, 3, 4, 5, 6; and then, with the paring

Fig. 107.



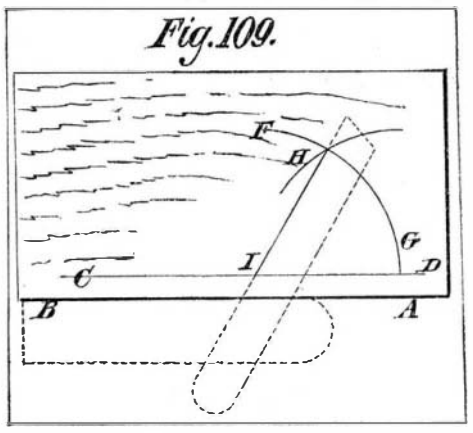
chisel, we pare off the sides to the lines. It is not necessary to actually draw the hexagon on the circumference by joining the lines of division on the top of the flange; for a straight edge, being applied as the paring proceeds, will be all that is necessary to produce a true hexagon. Nevertheless it is possible that error may have crept in, though we have performed the above operation with the greatest of care; it is therefore imperative upon us to apply correcting tests to our work, such as a pair of calipers to try if each pair of the opposite sides are parallel, also the bevel to verify if each angle of the figure contains 120°. Hexagon shapes are so common that a special hexagon gage is very useful; and such a gage, of the most approved form, is shown in Fig. 108, together with its method of application, the edges, A B, being to try the hexagon, and C D to square

Fig. 108.



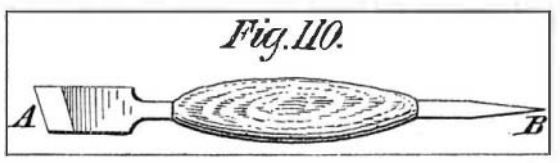
the edge to the face, and the edge, E, being used as a straight edge. If, however, we have not such a gage, we may set the bevel square, shown in Fig. 23, in the following manner: Take a piece of board planed on one side and on one edge, and let A B, in Fig. 109, represent the planed edge, from which we mark with the gage the line, C D. Then taking any point, such as I, in the line, C D, as a center, at a convenient distance we describe with a pair of compasses the arc, F G. We then take the compasses, and, without shifting their points at all, we rest one point on the intersection of the lines, C D and F G, and then mark the arc, H. If then we draw a line from the intersection of the arc, F G, and the arc, H, to the center, I, upon which the arc, F G, has struck, the lines, H I, I C, form the angle required; and we may apply the stock of the bevel square to the planed edge, A B, and set the blade to the line, I H, as denoted by the dotted lines. The bevel being set, we test the work as it proceeds, first cutting down one hexagonal side and then applying the bevel to gage the angle of the others; and as the diametrically opposite sides are finished, we apply the calipers. The lines of division upon all good pattern work are made very fine, in fact merely distinguishable; and the instrument by which they are drawn is shown

Fig. 109.



in Fig. 110. It is called a cutting scriber, and the end at A is beveled off at both sides, like a skew chisel, forming a knife edge. The end, B, is ground to a point, and both ends

Fig. 110.



are finished on an oilstone. The point end is for drawing lines along the grain, while the cutting edge, A, is for drawing lines across the grain of the wood. The wooden handle in the center is to enable the operator to hold it more firmly. It sometimes happens that the size of the hexagon is given across the flat sides instead of over the angle; and when that is so, we proceed as follows: We describe upon a piece of board, as in Fig. 111, a circle of a diameter equal to the given distance between the flat sides. We then take a hexagon gage, or else set the bevel square to an angle of 120°: and applying it to the planed edge of the board, we draw the line, C D, in Fig. 111, in which figure, A is the circle of the size of the flat sides of the hexagon, and B E are the planed edges of the board. We next reverse the bevel; and from the opposite edge of the board we strike the line, F D, cutting C D at the point, D, where both the lines cut the circumference of the circle, A. Then from the center of the circle, A, we draw the circle, G, intersecting the point, D. The diameter of G will be the size of the hexagon across the corners.

If the gland is a long one, it will be better to make it in

Fig. 111.

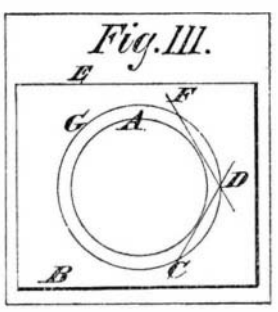
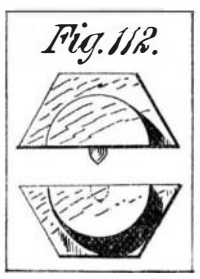


Fig. 112.



halves, letting it part across two corners, as shown in Fig. 112. When a gland of this kind is made in halves, the corners at the parting are liable, from their weakness, to chip off, and it is therefore proper to make it of hard wood.

Water Supply for Towns.

The subject of water supply is one that is now engaging the attention of the authorities in many large towns. The extended drought in the Eastern States during the past summer has revived in this vicinity the enquiry for advice as to the best means of providing an inexhaustible supply of water.

The city of Orange, N. J., and the adjoining town of Montclair, both rapidly growing places, have during the past summer been exceedingly short of water, to the inconvenience of many of the citizens. Montclair lies at the foot of Orange Mountain, and the city of Orange scarcely one mile from the base of the same mountain, on which inexhaustible springs are found by digging only a few feet. It occurs to us that the above places, as well as many other towns, similarly situated in the vicinity of mountains, might readily be supplied in the manner in which the city of Dubuque, Iowa, has recently (by accident) acquired a novel and practical water system. Sometime ago, in one of the bluffs, a lead-mining company met obstruction from water; and to obtain relief the bluff was tunneled, when it was found that a copious fountain had been struck, which ran to waste for several years. But the water was most excellent, the supply exceedingly liberal, and the head so elevated that the idea of utilizing it was seized by a company, the property purchased, and a system perfected which gives the cheapest and best water supply known in the country.

Origin of Wire Rope.

Mr. Andrew Smith, C. E., of London, in the year 1828, first applied wire rope as a substitute for catgut, in aid of another invention of his for metallic shutters. The rats have destroyed the strength of the catgut line by eating it; the position of the sheave or pulley was so placed and so narrow in the groove that none but a small substance could be applied to that particular case. Necessity, after all, was the the mother of invention. Time rolled on, and the author watched anxiously the working of this experimental metallic cord; four years were spent in experimenting, in order to test its strength in comparison with hempen rope and chain, as regarded weight, size, strength, price, durability, and economy. This required time, patience, and a heavy outlay of capital. On January 12, 1835, the first patent was obtained by Mr. Smith, and in 1839 he had obtained his fourth patent.

Stick to a Legitimate Business.

Well directed energy and enterprise are the life of American progress; but if there is one lesson taught more plainly than others by the great failures of late, it is that safety lies in sticking to a legitimate business. No man—manufacturer, trader, or banker—has any moral right to be so energetic and enterprising as to take from his legitimate business the capital which it requires to meet any emergency.

Apologies are sometimes made, for firms who have failed, by recurring to the important experiments they have aided, and the unnumbered fields of enterprise where they have freely scattered their money. We are told that individual losses sustained by those failures will be as nothing compared with the benefits conferred on the community by their liberality in contributing to every public work. There is little force in such reasoning. A man's relations to a creditor are vastly different from his relations to what is called the public. The demands of the one are definite, the claims of the other are just what the ambition of the man may make them.

The histories of honorably successful business men unite to exalt the importance of sticking to a legitimate business; and it is most instructive to see that, in the greater portion of the failures, the real cause of disaster was the branching out beyond a legitimate business, in the taking hold of this and that tempting offer, and, for the sake of some great gain, venturing where they did not know the ground, and could not know the pitfall.

The Inventor of Gas Lights.

The inventor of gas lights is said to have been a Frenchman, Philippe Le Bon, an engineer of roads and bridges, who in 1782 adopted the idea of using, for the purpose of illumination, the gases distilled during the combustion of wood. He labored for a long time in the attempt to perfect his crude invention, and it was not until 1799 that he confided his discovery to the Institute. In September, 1800, he took out a patent, and in 1801 he published a memoir containing the result of his researches. Le Bon commenced by distilling wood, in order to obtain from it gas, oil, pitch, and pyroligneous acid; but his work indicated the possibility of obtaining gas by distillation from fatty or oily substances. From 1799 to 1802, Le Bon made numerous experiments. He established at Havre his first thermo-lamps; but the gas which he obtained, being a mixture of carburetted hydrogen and oxide of carbon, and but imperfectly freed from its impurities, gave only a feeble light and involved an insupportable odor, and the result was that but little favor was shown to the new discovery; the inventor eventually died, ruined by his experiments. The English soon put in practice the crude ideas of Le Bon In 1804, one Winsor patented and claimed the credit of inventing the process of lighting by gas; in 1805 several shops in Birmingham were illuminated by gas manufactured by the process of Winsor and Murdock; among those who used this new light was Watt, the inventor of the steam engine. In 1816 the first use was made of gas in London, and it was not until 1818 that this invention, really of French origin, was applied in France.

How the Centennial Revives Business.

Much has been said by the press throughout the country about the visitors to the Centennial, and the advantages to be derived by the Exhibition. But the *American Builder* advances an idea which we have not seen alluded to elsewhere:

Every merchant and most well-to-do farmers and mechanics have visited some one of our large cities. But never before did they bring their wives and daughters. This last is the marked feature of the travel this year. For the first time, in a number of cases, the wife, mother, and daughters have passed the borders of their native States. To them the crowded car, the well lighted hotel, the thronged streets, the new customs, are a revelation. They will carry back to their homes new wants and desires. Insensibly, perhaps, there will be a change in household and personal habits. The furniture of the parlor and sleeping room will have additions and changes. Clothing once esteemed as tasteful will be replaced by other styles, not more expensive, but of different shades and shapes. The mechanic or the farmer will have new and enlarged ideas of his power as a part of our political and economical forces. This increased knowledge is one of the principal reasons why such expositions are encouraged; and it is to play no unimportant part in the present marked revival of business activity.

To electrotype insects, ferns, etc., immerse the object in a solution of nitrate of silver in wood naphtha. When partially dried, the object should be treated with ammonia, the result being a double salt easily reduced. After thorough drying, expose the article to the vapor of mercury, when the surface becomes completely metallized in a few minutes. It may then be placed in the bath and metal deposited in the usual way.

BRASS cooking pans should be cleaned inside with vinegar and brick, then rinsed, thoroughly dried at the fire, and wiped with a clean cloth. White enameled pans require only a little soda and warm water to keep them clean and free from grease.