Tests for Oils.

The testing of oils, in a simple mode, has always been a desideratum. Miss Kate Crane, in the *American Journal of Pharmacy*, gives an account of a series of experiments instituted by her, which tend to show that much reliance can be placed on the cohesion figures produced by dropping oils on the surface of clean water. In her experiments, a single drop of oil was allowed to fall from a burette held at a distance of four inches from the surface of a dish of clean water. The time required for the production of certain figures was carefully noted, as it appears that several oils will produce very similar figures ultimately, if sufficient time be given. Oil of turpentine spreads out instantly and begins intestine motions, and lastly forms a beautiful lacework. Oil of cinnamon forms a figure not more than half the size of the above. In a few seconds, small portions are detached and separate into distinct drops. Oil of nutmeg forms a large figure instantly, the edge showing a beaded line. Poppy seed oil spreads instantly to a large figure, retaining an unbroken form for a few seconds; then holes appear round the edge, and soon the whole surface is broken up with curved lines. Cod liver oil spreads into a large film; a little way from the edge small holes appear, and in a minute or two the surface is studded with them. These gradually enlarge, assume irregular shapes, and become separated by branching lines. As these oils give different figures, and behave differently when mixed with one another or with lard oil, this method may be of very great use in the preliminary testing of suspected oils.

A NEW DETACHABLE HORSESHOE.

The improved horseshoe represented in the annexed illustration is so constructed that it may be put on or removed from the hoof without requiring the labor of the blacksmith. When constructed of malleable iron, its cost need not be over half that of the ordinary shoe, while it is much more durable, there being no wearing out of the rim, if that portion be constructed, as it easily may be, of steel. The inventor suggests that the device is especially adapted for use in the army, and that it might be made in various sizes, and thus issued, nothing further than a rasp, in the hands of a cavalry soldier or artilleryman, being needed to fit the shoe to the horse's hoof.

The invention, as shown in section, in Fig. 3 of our engraving, is made in two parts, A and B, fastened together by dovetails, C, at the heel, and a screw, D, at the toe. The lower part has toe and heel calks, and the foot of the horse rests upon its upper side. The portion, B, forms a metallic rim around the hoof, covering the edge of the same, so that

Fig. 1

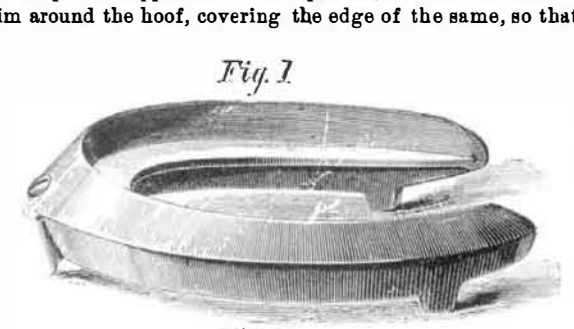


Fig. 2

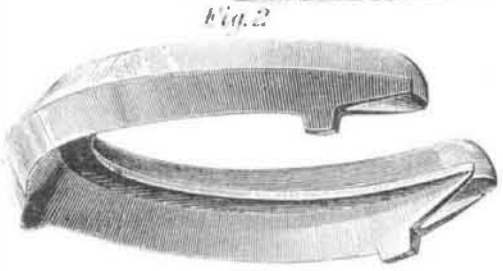
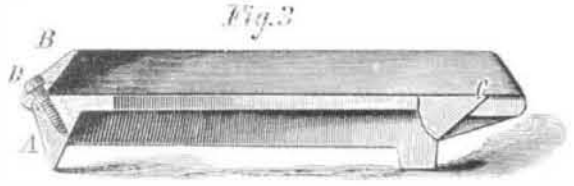


Fig. 3



when the parts are screwed together by screw, D, the shoe is firmly held. By placing a cloth or rubber cushion beneath the foot, the fit of the shoe may be tightened, and of course, by loosening the screw, the shoe may be easily removed.

Exterior views of the device, from above and from underneath, are given in Figs. 1 and 2. By its use, the horse's feet are left in their natural state, only requiring to be rasped off occasionally as the hoof grows. The shoes may be removed when the animal is turned out to pasture or when in the stall.

The inventor states that the entire shoe, ready for use, can be made for from twenty to thirty cents, and that, even if it be provided with a fancy polished rim of brass or othermetal, its cost will not be so great as that of the common shoe.

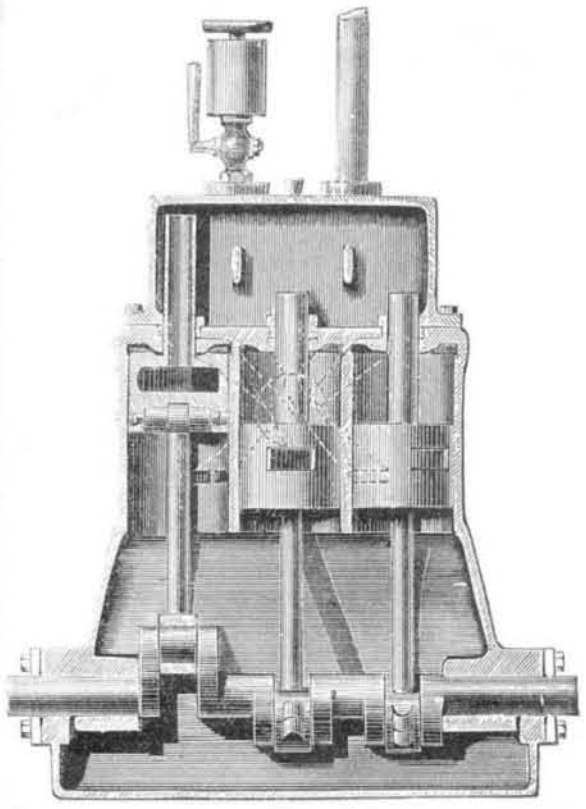
Patented through the Scientific American Patent Agency, August 25, 1874. For further particulars address the inventor, Mr. Luther W. Griswold, Marshalltown, Marshall county, Iowa.

A VALUABLE GIFT.—The Cincinnati *Gazette* states that Thomas H. Yeatman, Esq., has presented to the Young Men's Christian Association Free Library, of that city, a complete set of the volumes of the SCIENTIFIC AMERICAN. They comprise thirty bound volumes, and extend from 1859 to 1874 This is a rare and valuable gift.

WILLANS' THREE-CYLINDER ENGINE.

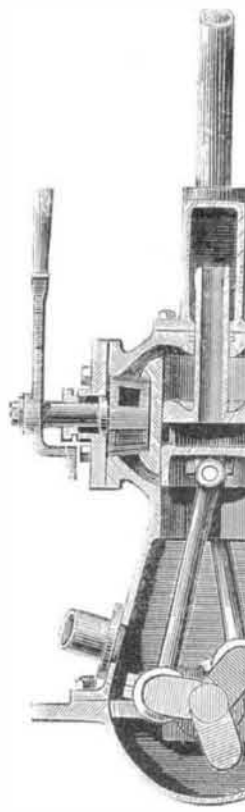
We illustrate herewith an ingenious and very neat arrangement of three cylinder engine, designed by Mr. P. W. Willans, of Greenwich, England, which is now in use for driving a fan, etc., at the works of Messrs. John Penn & Co., of

Fig. 1.



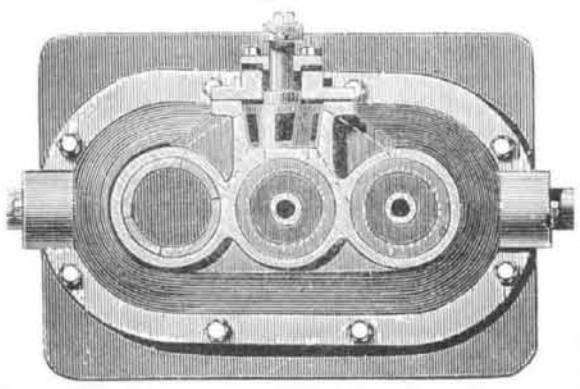
Greenwich, an establishment with which Mr. Willans is connected. In the engine in question three cylinders are used, and each cylinder is single-acting, receiving its steam upon the upper side only of the piston. The connecting rods are attached directly to the pistons, and actuate a three-throw crank shaft.

Fig. 2.



Each piston serves as a steam valve and controls the supply of steam to one or the other of two remaining cylinders. There is a steam chamber in each piston and a port in its side (see Figs. 1 and 2). Steam is supplied from the boiler by means of a hollow rod passing through the top of the

Fig. 3.



cylinder into a steam chest. When the piston has reached about three fourths of its downward stroke, the steam port in it overlaps a port formed in the side of its cylinder, and steam then passes to the top of another of the cylinders; when, on the other hand, the piston has reached about one half its return stroke, it uncovers the port in the side of its cylinder and allows the steam to escape, from the cylinder into which it was previously admitted, into a casing round the crank shaft, from which the exhaust steam is taken either to a condenser or to the air, as the case may be.

In an engine which is required to run only one way round, the port in the side of each cylinder passes direct to the top of one of the other cylinders; but where it is desired to reverse the engine, as in the one illustrated, the ports to the top of each cylinder and those to the sides of each cylinder meet in a three-way cock (see Fig. 2); and this cock, by connecting the port in the side of any one cylinder with that to the top of either one or other of the other cylinders, reverses the engine. It will be seen that the wear upon the connecting rods and crank shaft bearings is always in one direction, namely, downwards, so that no moderate amount of wear affects the working of the engine, and the whole machine is perfectly noiseless. The tubes through the tops of the cylinders, besides forming guides for the pistons, allow a great number of revolutions to be made without any loss of power in stopping and setting in motion again, the amount of dead weight in motion being small; and the pressure upon the three tubes keeps them in equilibrium, but still maintains a constant pressure upon all the bearings. All the lubrication is done through a steam lubricator on the steam chest (Fig. 1), and whatever oil is wasted in the cylinder passes down to the bottom of the casing, and lubricates the lower ends of the connecting rods as they pass round. The upper ends of the connecting rods receive their lubrication direct from the steam chamber in the piston by way of small holes drilled through the bottom of the chamber. As the stroke of the engine is so large in proportion to the width of the steam ports, the latter are opened and closed very quickly, and there is little or no back pressure in the cylinders. By some slight modifications the engine may be made compound, and the crank shaft may, if necessary, be kept outside. A plan of the arrangement is shown in Fig. 3. When there is a casing round the axle, the feed water may be heated by being pumped through pipes passing through that casing.

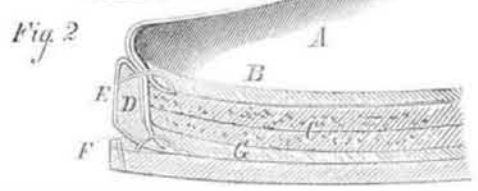
We have examined the engine at work at Messrs. Penn's (says *Engineering*, to which we are indebted for the engravings), and have found it work with admirable steadiness at very high speeds. Some indicator diagrams have also been taken from this engine, showing a very good distribution of the steam. The whole arrangement is, as will be seen, very simple and compact, and there appears to be a wide field for the application of such an engine.

IMPROVED CORK-SOLED BOOTS.

Represented in the annexed engraving is a novel plan for making boots and shoes with cork soles, which, judging from some completed articles which the inventor has submit-

Fig. 1

Fig. 2



ted to us, is an invention both valuable and timely. A very thick but very light sole is provided, which effectually keeps out the cold and wet of winter, and in summer shields the foot from the excessive heat of the sun-baked pavements. The device is as easily repaired as the common sole, and its use in bad or rainy weather would obviate the wearing of overshoes, to most persons a disagreeable necessity

In Fig. 1 a view of the finished boot is given, from which it will be seen that there is no detraction from the neat appearance of the covering. In Fig. 2, a sectional view of the sole shows the mode of attachment of the various portions of the same. The upper, A, is attached to the inner insole, B, by a seam. C is the cork, which is made in two layers, superposed, this construction preventing dampness passing through, however thin the material itself may be. Around the edges of the cork is placed a band of sole leather, D, covered with fine calfskin, E. This cover and the upper edge of the band are sewn in with the upper to the inner insole. By a second seam the upper, the lower edge of band, D, the cover, E, and the welt, F, are attached to the middle sole, G. The upper is taken up in both seams, giving great strength and firmness to the sole. The outer or main sole is secured to the welt by a third seam in the ordinary manner.

Patented through the Scientific American Patent Agency, June 16, 1874, by Mr. E. A. Brooks, of 1,196 Broadway, New York city, who may be addressed for further particulars.