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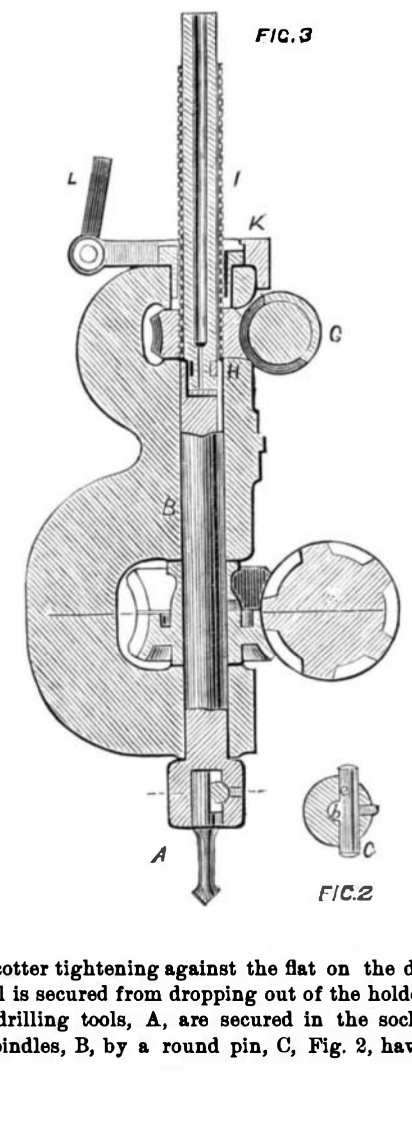
## MULTIPLE DRILLING MACHINE.

The advantage of drilling the rivet holes in wrought iron structures, instead of punching them, has long been recognized by engineers, and the same is true of steel, where the gain in tensilestrength is about 25·5 per cent. The illustration, extracted from the *Engineer*, shows a machine in the form especially adapted fortraveling over the upper or lower flanges of straight or hog-backed girders, and drilling through the whole of the plates at once, in the position they will permanently occupy. It is driven by a steam engine, self-contained, which is supplied with steam from a portable boiler alongside, connected by a strong flexible pipe.

The arrangement of working parts is such that the combination may also be regarded as bringing to bear six or more independent drilling machines upon one piece of work and under the eye and control of a single attendant. The whole of the spindles work normally in conjunction, being fed down together self-actingly, and also being run up quickly together out of their work by simply striking the feed belt on the group of pulleys at the left hand end of the machine; yet any one of them may be worked independently at pleasure, for, by giving the small handle of the feed clutch half a turn, the self-acting feed becomes disconnected and the spindle may be wound either up or down by hand, with a removable hand wheel, as shown on one of the spindles. The drilling heads are also independent in their adjustment upon the cross slide, to suit varying pitches of holes. They admit of being brought together within 3¾ inches. Yet it will be observed that the driving wheels, by the arrangement of passing each other alternately at a higher and lower level, admit of being kept nearly 6 inches in diameter, and thus the stress upon their teeth is so light that, with well formed teeth of gun metal, driven by a steel screw, the wear is not appreciable

The method of securing each drill in socket is designed to obtain the perfectly true running of the drills, so that the drill points find their centers without the aid of a center punch pop, and afterwards run truly through the work; and it enables any drill to be released by merely tapping one end of the small cotter, and this may be done without stopping the revolution of the spindle, as would have to be done in the case of an ordinary cotter, or a set screw fixing. This part of the invention is applicable to all drilling machines, and forms a very efficient way of driving and securing a drill. The shank of the drill is truly parallel, fitting into a bored parallel hole in the drill socket. It has a flat formed on one side which serves to drive the drill, which is detained by a one-sided cotter going through the socket; and by the taper




on the cotter tightening against the flat on the drill shank, the drill is secured from dropping out of the holder.

The drilling tools, A, are secured in the sockets of the drill spindles, B, by a round pin, C, Fig. 2, having an inclined flat formed upon it, which, when the pin is struck in one direction, tightens against a flat formed on the drill shank. By striking the pin on the opposite end, the fastening of course is loosened. D is the belt drum on the end of the driving screw, E; from this drum motion is imparted to the feed pulleys, F, Fig. 1, the middle one of which is a loose pulley, the inner is the feeding pulley, and the outer one is for running up the drills quickly out of their work.

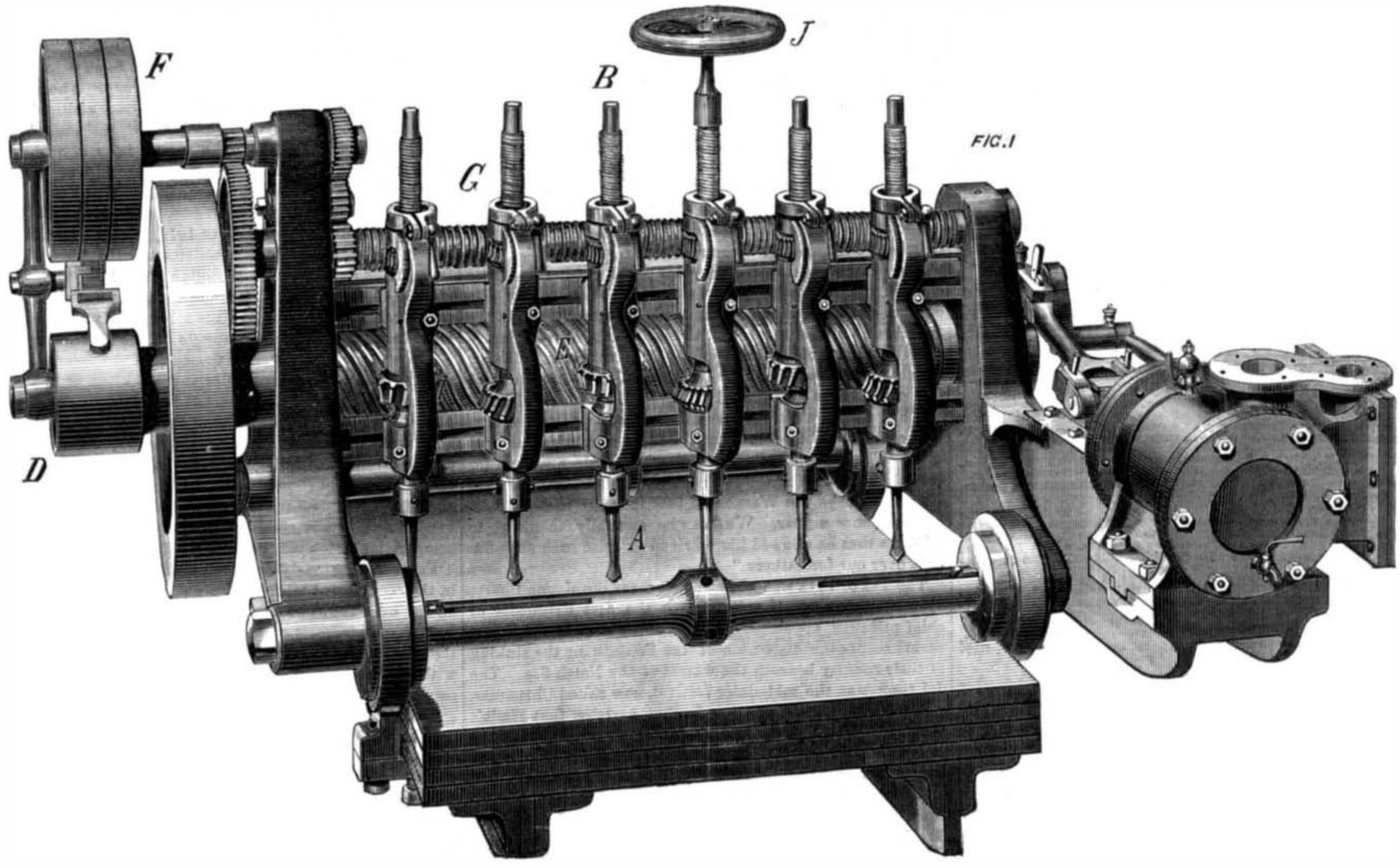
The feed and return motion are communicated to the spindle, B, by the screw, G, working into the worm wheels, H. The latter have an internal thread like a nut which works upon a feed screw, I, Fig. 3, whereby, when the screw is prevented from revolving, the spindles feed down; but if the screws are left free to revolve, they will turn with the nut or may be rotated by the handle as at J.

The means whereby the screws are set free or are prevented from revolving is shown at K, Fig. 3, where there is a small bush embraced by a friction brake which is gripped or slackened by means of the handle, I. By this arrangement the bush may be allowed to revolve or caused to stop at pleasure. The bush besides is fitted with a feather key taking into the feed screw: thus, when the brake, *t*, is on the bush, the feed screw cannot revolve, and the motion of the worm wheel operates upon it to wind it up or down. On the brake being released from the bush, the screw becomes free to turn round by hand, carrying round with it the bush and may then be made to wind the spindle, *c*, up or down, independently of the movement of the worm wheel.

### Petroleum as a Lubricant for Turning Tools.

Considerable comment has appeared of late in foreign mechanical journals relative to the use of petroleum as a means of facilitating the action of turning tools in operating upon very hard alloys. A writer in *Les Mondes* states that a mixture of 7 parts zinc, 4 copper, and 1 tin, resisted all tools even when the latter were tempered to extreme hardness. As soon, however, as the cutting edges were moistened with petroleum, the alloy immediately yielded and was turned without difficulty. It is also said that, by using a mixture of petroleum and turpentine, steel annealed to straw yellow can likewise be turned.

We know of no direct practical confirmation of this, but should be glad to hear from any of our readers who may test the suggestion. Meanwhile we shall experiment for ourselves, and note the results as soon as perfected.

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