A PUNCH CENTERING DEVICE.

BY THOMAS C. HARRIS.

Every mechanic who has occasion to punch holes in iron with a hammer and hand-punch, realizes how difficult a matter it is to place the punch in the exact position that it should be, over the hole in the die or punch-block.

The piece to be perforated is necessarily between his eye and the hole in the die, and, of course, conceals the exact spot where the point of the punch should start.

As usually done, a blow or two on the punch will show him *about* where the proper place is, but the iron is bruised and a clean punched hole not often secured.

In the regulation punching press, where the punch rises and falls with the thrust of the machine, its point exactly entering the hole in the die or block to receive it, the result is often as good as a drilled hole, with clean and sharp edges when the disk of metal has been accurately sheared out.

A simple device to center a hand-punch over a punching block or die, and thereby secure accurate work, is shown in the sketch.

The forked casting has sharp points on its lower extremities, where they rest on the bench or floor. At its upper end the fork is expanded into a disk and carries a short piece of pipe or sleeve, which is swiveled to it and secured by a wing nut. This allows the sleeve to swing in any vertical angle and may be fixed by the wing nut.

A short rod passes through the sleeve and is secured in any desired position by a thumb-screw.

At its free end the rod terminates in a disk, with a ring bolt and wing nut, to embrace the hand-punch. As shown, the punch is held vertically, but it may be inclined at any angle to suit the work.

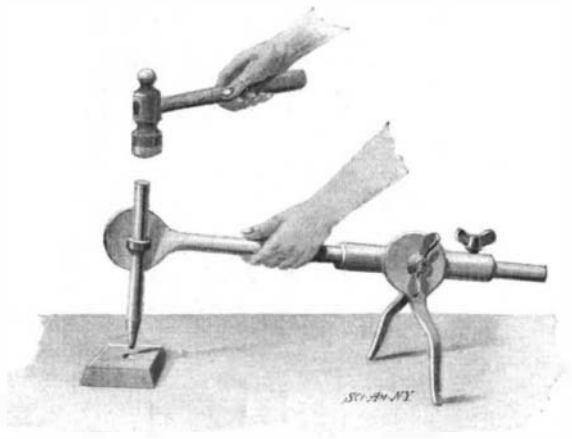
It is readily seen that with this device the point of the punch may be instantly placed in position, to exactly register over the hole in the die, and while in that position the free end of the apparatus may be lifted and the piece to be perforated placed in position.

The lifting of the punch causes the device to rise or swing on its two sharp extremities, without slipping, and the punch returns to its exact position as predetermined on. A blow or two of the hammer drives out a disk in the metal and a clean-cut hole is the result.

This arrangement may be used to punch holes in any stock not too heavy for a hammer and punch method, either in the shop or the field, and the system allows a very accurate spacing of holes.

In shops or places where a regular punching press is not available this device will be found practical and useful.

It was designed by the writer for his own use and is not patented.



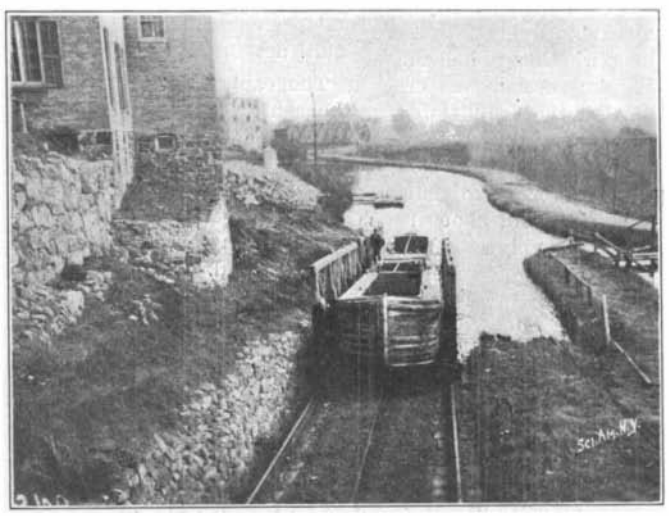
A PUNCH CENTERING DEVICE.

THE INCLINED PLANE OF THE MORRIS CANAL.

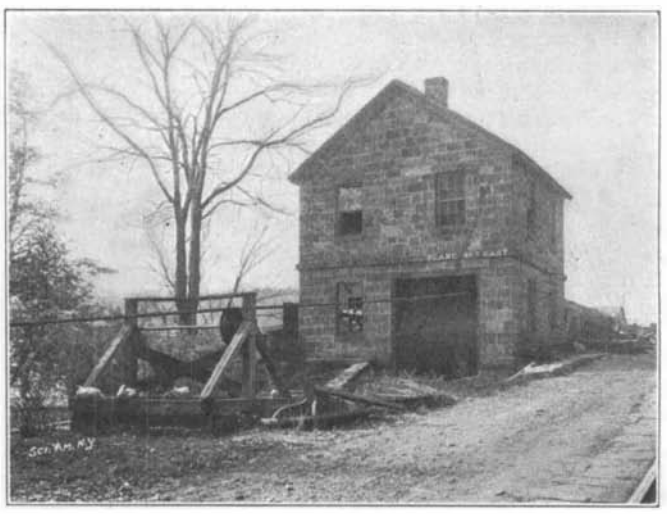
One of the most interesting historical transportation routes of this country is the old Morris Canal, in New Jersey, with its curious inclined plane for raising canalboats over considerable elevations. In the era before the introduction of railroads, considerations of the cost of construction and time of operation of locks naturally led engineers to seek for some more expeditious and cheaper means of overcoming elevations. This led to the occasional adoption, as in the Great Western Canal, England, of perpendicular lifts, and to the more extended use of inclined lifts or planes, the latter having proved to be at all times the more economical. Inclined planes seem to have been first used by the Chinese, but their modern application to canal systems is due to Mr. William Reynolds, who used them in 1792 on the Shropshire Canal, England. Subsequently, the system was carried into extended use throughout the canal system of England.

The Morris Canal was chartered in 1825; begun July, 1825; completed from the Delaware River to Newark in 1831; extended to Jersey City in 1836, and its planes and lock chambers were enlarged in 1841. Originally the dimensions of the canal were: bottom width, 20 feet; top width, 32 feet; depth of water, 4 feet; locks, 9 feet wide by 75 feet long. The planes were constructed on various plans, there being twenty summit and three lock planes in all. In 1845 the canal was enlarged to a bottom width of 25 feet, top width of 40 feet, and the depth was increased to 5 feet. The section boats, jointed in the middle, were first introduced in 1845. They carried cargoes of 45 gross tons. In 1850 and 1860 all the planes were altered to summit planes and adapted to wire rope haulage. The most remarkable of these is the one near Washington, New Jersey, which has a rise of 100 feet in a length of 1,600 feet. The summit of the canal is at Fort Morris, 41.34 miles from the Delaware River, and 60.80 miles from the Hudson River. The whole length of the canal is 102.14 miles. The boats, which are constructed in two sections to accommodate them to the changes of level of the planes and the canal levels, are jointed together by latches and steadying pins, the ends bearing against each other. Transverse bulkheads separate the two compartments of the boat, each of which is actually a boat in itself. While the average tonnage is about 65 tons, the planes can transfer boats of 100 tons weight. The trucks, like the boats, are divided into two sections, each section having eight wheels with double flanges on the wheels. They are provided with strong stanchions to which the boats are fastened with hawsers. The tracks on which the trucks travel are carried a short distance under the water of the lower bay and rise up the incline above the water level of the upper reach, then descend into the upper reach and run a few feet along the bottom. The grade of the inclines is in general about one to eleven. The planes are worked by reaction waterwheels, and the levers for regulating the supply of water and for the control of the brakes are in charge of a man who is located where he can see the whole of the plane. He is stationed in a building containing the waterwheels and other machinery, which is usually located midway between the top and bottom of the plane, and at the end of the flume. As indicating the relative economy of this system, it should be mentioned that the quantity of water needed for these wheels is less than one-twentieth of the amount expended in a series of locks of the same total height or lift. The wire cables are so arranged that as one winds upon the drum the other unwinds. The two ropes pass around submerged horizontal sheaves at the bottom and top of the plane. The car has a wire rope attached at both ends, the back rope to one section and the main rope to the other. To draw a car out of the lower reach and up the plane into the upper bay, the engineer turns the tubwheel, which lets the water into the reaction waterwheel, and the drum winds up the cable at one end and unwinds at the other, drawing the car up. In descending, the water is shut off from the wheel, and the car is allowed to descend by its own weight.

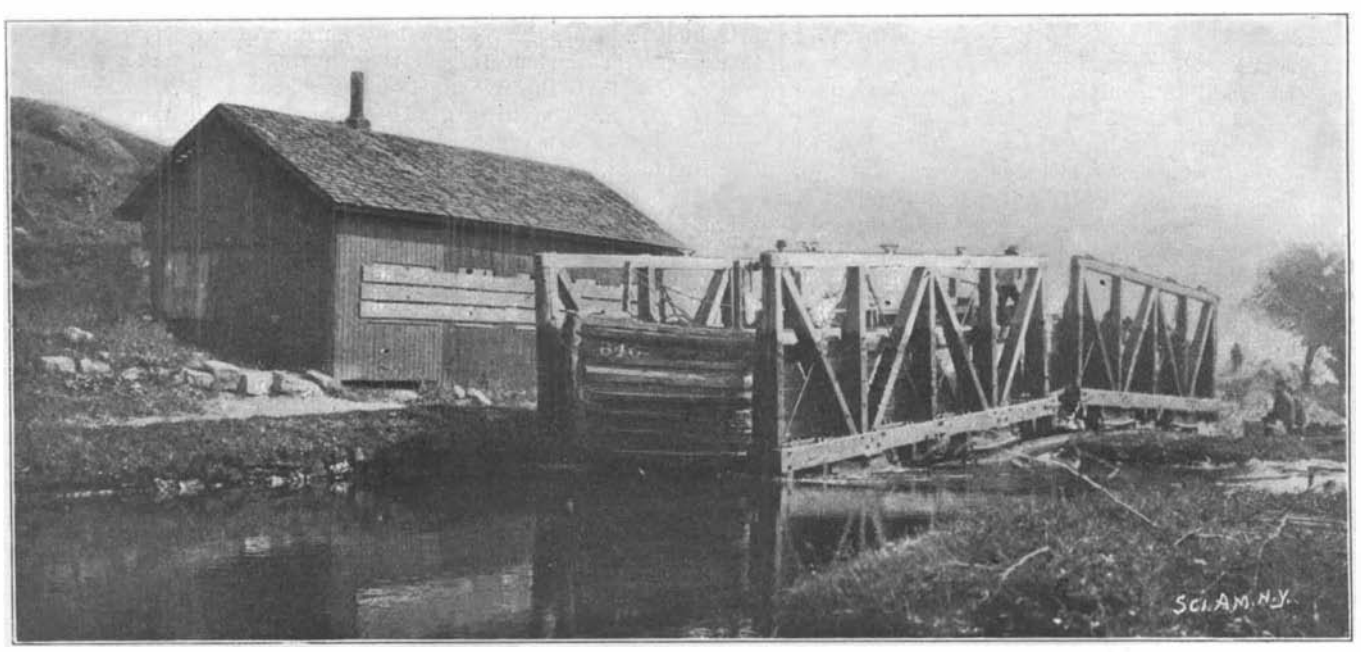
Although the system is an exceedingly old one, there is no doubt that this method of transfer was well adapted to the needs of the canal at the time it was built. There are certain undoubted advantages in the system as compared with the system of locks; for although one lock is more economical than a short plane, a single plane is more economical than a series of locks of the same total lift, the economy being chiefly in the items of water and time. While a plane entails more machinery, etc., it does not involve so much as to make it more expensive than five or six locks in series. In conclusion it must be remembered that what has been said applies merely to canals of small capacity such as this old Morris Canal. The system would not be applicable to a modern canal of large size and capacity.



Commencing the Ascent of a Plane.



Building Containing Waterwheel and Winding Drum.



At the Summit of an Inclined Plane—Car and Boat Entering Upper Reach.

THE INCLINED PLANES OF THE OLD MORRIS CANAL.

MAKING A PHOTOGRAPHIC LENS

Photography as a pastime holds the infatuated attention of thousands of people, old as well as young, to whom the possession of a camera is a necessity, awakening, as it does, a higher sense of the beautiful in nature and a growing love for the artistic as well as useful phases of photographic work. To take good pictures is a delight; to understand the chemistry of photography makes it fascinating; to watch the comparatively simple yet wonderfully interesting processes through which a piece of glass must pass before it is useful as a high-grade photographic lens