

UNITED STATES PATENT OFFICE.

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PUNCHING-TOOL.

No. 803,470.

Specification of Letters Patent.

Patented Dec. 26, 1905.

Application filed August 31, 1905. Serial No. 276,601.

To all whom it may concern:

Be it known that I, THOMAS McGRATH, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Punching-Tools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the use of metal-punching machines as heretofore constructed difficulties have been encountered arising from the fact that the formation of the cutting edge of the punch is not adapted to certain classes of work. This has been especially found in punching copper and similar soft metals used in making electrical switchboards. In this work the metal must be punched with great care not only as to the line of the cut, but with reference to the surface surrounding the hole punched out, since if such surface be irregular the bushings positioned over the holes will be unevenly seated. Where hollow punches have been employed, the punchings of soft metals have become wedged within the hollow cutting edge and necessitated their removal with a tool. To obviate this, punches have had their center-finders spring-actuated, so as to force out the punching; but owing to the nature of the metal it either resists the spring action altogether or the latter fails to eject the punching until the ram is on its downward stroke, when the punching falls and interferes with the next succeeding operation of the machine.

One of the objects of my invention is to overcome this difficulty by forming the punch with a cutting edge which, while insuring a clean incision, will not retain the punching, and thus obviate the necessity for employing springs to eject the center-finder.

A further object of my invention is to obviate the tendency of the punch to upset due to its being weakened by the bore accommodating the center-finder.

A further object is to provide improved means for supporting the punch which will strengthen the latter and which will accommodate punches of varying sizes; and a further object is to associate with the construc-

tion attaining the foregoing purposes an improved spindle or center-finder which may be adjusted to meet the requirements of various kinds of work.

In the accompanying drawings, Figure 1 shows a vertical sectional view of a punch and complementary parts constructed in accordance with my invention. Fig. 2 is a view of the spindle removed.

Referring to the drawings, 1 designates the punch-holder designed to be carried by the ram of a power-operated machine, 2 the punch, and 3 the means for supporting the punch.

The holder 1 is bored centrally, as at 4, and is of cylindrical formation and threaded at its lower end, such thread being shown on a reduced portion 5.

The punch 2 is formed with a bore 6, designed to aline with but of less cross-sectional area than bore 4 of the holder.

7 designates the centering device employed for the usual purpose of being positioned at the point marking the center of the hole to be punched. This is shown in the form of a spindle accommodated by bore 6 of the punch suitably pointed at its outer end and having an elongated enlarged portion at its other end accommodated by bore 4 of the holder. By this construction the relatively small bore of the punch and the uniformity thereof avoid weakening the punch and the consequent danger of its upsetting, the larger portion or head being entirely within the holder and of such length that ample bearing-surface is provided, insuring accurate guiding of the center-finder. When the spindle falls by gravity in the upward movement of the ram, the top surface of the punch surrounding the bore 6 forms a stop with which the head contacts. The enlarged head of the spindle is formed by two nuts 8 8^a, adjustable on the threaded extremity of the spindle.

In operating a punching-machine it is essential to accuracy that when the punch is elevated out of engagement with the work its center-finder shall be just sufficiently above the work to permit the latter to be moved into the desired position and yet indicate readily to the operator the point at which it will touch when

the ram is lowered. In punching metals of varying thicknesses this extent of elevation of the center-finder must vary accordingly. To effect this purpose in a punching-machine embodying my invention, the operator removes the supporting means 3 to release the punch 2 and turns nut 8^a the desired extent upon the spindle and then tightens the binding-nut 8 into engagement with nut 8^a. The parts are then assembled and the device is ready for operation upon metal to which a permanent extent of projection of the spindle might render it worthless.

From the foregoing it will be seen that the nuts 8 and 8^a perform the two functions of rendering the spindle adjustable and forming an enlarged head entirely within the holder to insure ample bearing-surface and accurate guiding of the spindle.

The punch is shown in cylindrical form, having its inner end 9 flush with the adjacent face of the holder, such meeting surfaces being sufficient in extent to insure the strength of the punch and compensate for the slight degree to which the latter may have been weakened by the bore 6. Near the inner end 9 the punch is reduced in diameter, as at 10, a beveled portion 12 being intermediate the portions 9 10. The remainder of the punch may be of any desired size, and obviously punches of varying diameters at their cutting edges may be of uniform size at the portions 9 10.

At its cutting extremity 13 the punch is of peculiar formation. It is a right cylinder, the end or face of which is slightly concaved, the greatest depth of the concavity being such with relation to the diameter as to present a slight gradual curve from the center to the periphery. The cutting edge thus formed is ample for the purpose for which I have designed it; but the formation of the concavity is such that there is no tendency of the punching to cling within the edges, as the concavity does not permit of the punching bending beyond a slight extent. In consequence of this construction I am enabled to omit springs for forcing outward the spindle 7, since the latter falls by gravity as the ram is raised.

The supporting means 3 is shown in the form of a nut having its inner face a counterpart of the formation presented by the extremity of the holder and the adjacent portions of the punch—that is, it is internally threaded to accommodate the holder and beneath such threaded portion it is of varying diameters corresponding to portions 9 10 of the punch. The portion in which the punch is held may be of varying sizes to conform to punches for various kinds of work.

I claim as my invention—

1. The combination with a holder having a bore, of a punch having a bore of uniform diameter extending throughout the length of

the punch and designed to register with, but of less diameter than, the bore of said holder, whereby the top surface of said punch forms a stop at the bottom of the bore of the holder, a gravitating center-finder comprising a spindle having a body portion of uniform diameter accommodated by the bore of said punch and an adjusting device forming an elongated enlarged head on the upper extremity of said center-finder, said adjusting device being accommodated by the bore of said holder and designed to contact with said stop, and means for securing said punch to said holder.

2. The combination with a holder having a bore, of a punch having a bore of uniform diameter extending throughout the length of the punch and designed to register with, but of less diameter than, the bore of said holder, whereby the top surface of said punch forms a stop at the bottom of the bore of the holder, a gravitating center-finder consisting of a spindle having a body portion of uniform diameter accommodated by the bore of said punch said spindle having its upper portion threaded, adjusting-nuts carried by the threaded portion of said spindle and forming an enlarged head thereof accommodated by the bore of said holder and designed to contact with said stop, and means for securing said punch to said holder.

3. The combination with the punch having a bore of uniform diameter and having its contact extremity provided with a cutting edge and a concavity of uniform curvature inclosed by said edge, said punch having a shoulder at its inner end, of a holder having a bore designed to register with, but of greater diameter than, the bore of said punch, said holder having a threaded portion, a spindle accommodated by the bore of said punch and having an enlarged extremity accommodated by the bore of said holder, and a nut engaging the threaded portion of said holder and designed to inclose said punch and having an internal seat or stop for the shoulder of said punch.

4. The combination with the punch having a bore of uniform diameter and having its contact extremity provided with a cutting edge and a concavity of uniform curvature inclosed by said edge, said punch having a shoulder at its inner end, of a holder having a bore designed to register with, but of greater diameter than, the bore of said punch, said holder having a threaded portion with the lower face of which the top of said punch is designed to contact whereby said top forms a stop at the bottom of the bore of said holder, a spindle having a body portion of uniform diameter accommodated by the bore of said punch and having its upper portion threaded, adjusting-nuts carried by the threaded portion of said spindle and forming an enlarged

head thereof accommodated by the bore of
said holder and designed to contact with said
stop, and a nut engaging the threaded por-
tion of said holder and designed to inclose
5 said punch and having an internal seat for the
shoulder of said punch.

In testimony whereof I have signed this

specification in the presence of two subscribing
witnesses.

THOMAS McGRATH.

Witnesses:

FREDERICK S. STILL,
GRAFTON L. MCGILL.