

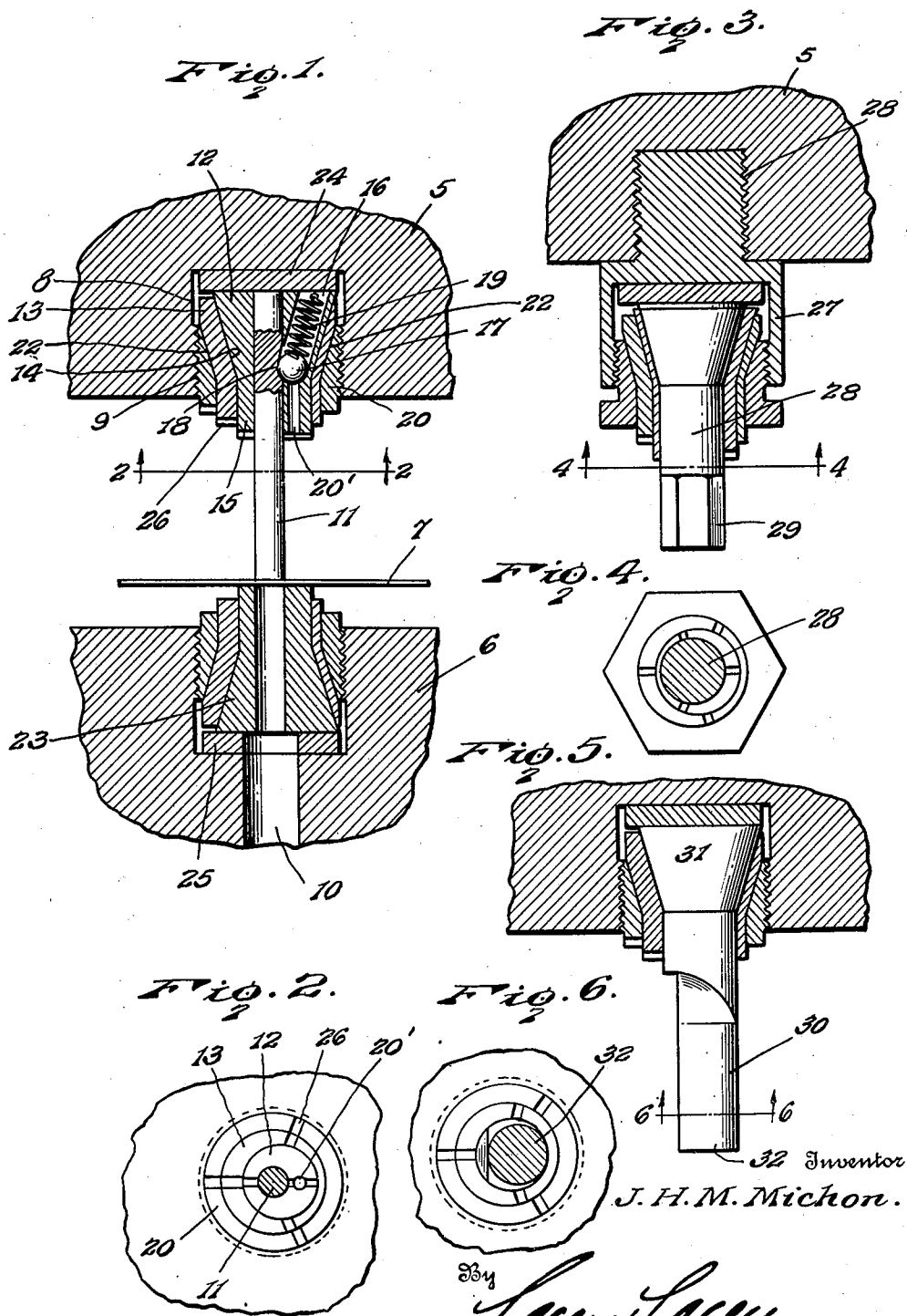
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ADJUSTING MECHANISM FOR PIERCING PUNCHES

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ADJUSTING MECHANISM FOR PIERCING PUNCHES

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This invention relates to piercing or punching tools and more particularly to means for adjusting the piercing punch and matrix laterally to cause them to properly align with each other and with the work.

The object of the invention is to provide a piercing punch, the coacting elements of which may be adjusted laterally in any desired direction with respect to the die shoes or support to meet various working conditions and securely held in a set position of adjustment.

A further object of the invention is to provide a tool-adjusting device including upper and lower sets of telescopic eccentric sleeves, the inner sleeve of the upper set being adapted to receive and support a piercing punch and the inner sleeve of the lower set a matrix or button so that by rotating or partially rotating said sleeves the desired lateral adjustment of the punch elements may be effected and in which position said punch elements will be securely locked against accidental displacement.

A further object is to form the inner sleeve of the upper set with an angularly disposed channel in which is seated a spring pressed tool retaining ball, means being provided to permit the release of said ball from engagement with the tool when it is desired to remove or replace the latter.

A still further object of the invention is generally to improve this class of devices so as to increase their utility, durability and efficiency.

In the accompanying drawing forming a part of this specification and in which similar numerals of reference indicate corresponding parts in all the figures of the drawing:

Figure 1 is a vertical sectional view of a piercing punch equipped with the improved adjusting mechanism,

Figure 2 is a transverse sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a vertical sectional view showing the eccentric sleeves seated within an adapter,

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a vertical sectional view illustrating another form of the invention, and

Figure 6 is a transverse sectional view taken on the line 6—6 of Figure 5.

The improved tool-adjusting mechanism forming the subject-matter of the present invention is principally designed for adjusting and aligning the upper and lower elements of piercing punches used on metal trimming and punching machines, and in Figure 1 of the drawing, there is illustrated a portion of such a machine in which 5

designates the punch plate, 6 the die shoe and 7 a sheet of metal or other work to be operated upon. The punch plate 5 and die shoe 6 are formed with openings 8, the walls of which are threaded for a portion of their length, as indicated at 9, there being a cylindrical recess 10 communicating with the opening in the die shoe and through which the waste metal incident to the punching operation is discharged. The mechanism for adjusting and supporting the piercing element 11 of the punch comprises inner and outer eccentric sleeves 12 and 13, each provided with a tapered portion 14 defining a reduced cylindrical extension 15. The inner eccentric sleeve 12 is provided with an angularly disposed channel 16 in which is seated a spring pressed retaining ball 17 adapted to yieldably engage a notch or seat 18 formed in one side of the piercing punch 11, there being a spring 19 seated in the channel and bearing against the ball for normally holding the ball with a portion thereof projecting within the bore of the inner eccentric sleeve, as best shown in Figure 1 of the drawing. Threaded in the opening 8 in the punch plate is a clamping collar or bushing 20 having its bore formed with an inclined or tapered face 22 conforming to the inclined or tapered portion 14 on the outer sleeve and which collar or bushing serves to clamp the sleeves against accidental rotation after adjustment of the piercing punch 11 has been effected. The adjusting mechanism mounted on the die shoe 6 is similar in construction to the mechanism on the punch plate, with the exception that the retaining ball is omitted and the inner eccentric sleeve 23 constitutes the matrix or button for coaction with the piercing punch. A wear plate 24 is fitted in the upper opening 8 to receive the impact of the piercing punch 11 during the operation thereof and a similar plate or disk 25 is disposed within the lower opening 8 and formed with a central opening registering with the discharge opening in the die shoe. The inner or exposed faces of the eccentric sleeves as well as the inner ends of the clamping collars or bushings are formed with indentations or notches 26 adapted to receive a screwdriver or other suitable tool to facilitate turning or adjusting said sleeves.

In order to adjust either the piercing tool 11 or matrix 23 laterally with respect to the die shoe to cause said elements to properly align with each other and with the work, it is merely necessary to insert a screwdriver or other suitable tool within the notches 26 and rotate said sleeves either to the right or left, as the case may be, 55

after which the clamping collar or bushing 20 is tightened which causes the inclined faces on said clamping collar and the sleeves to interengage and securely clamp the parts in a set position of adjustment. In order to remove the piercing punch 11, it is merely necessary to introduce a nail or a suitable pointed instrument within a vertical opening 20' in the inner sleeve and press upwardly against the retaining ball 17 which releases the ball from the socket 18 and permits ready withdrawal of the piercing tool. In replacing the piercing punch, the latter is forced upwardly within the inner sleeve; and when the pocket 18 registers with the ball, said ball will be automatically moved within the pocket by the action of the spring 16, as will be readily understood.

In Figure 3 of the drawing, there is illustrated a modified form of the device in which an adapter 27 is employed for supporting the eccentric sleeves, said adapter being provided with a reduced threaded extension 28 which engages a threaded opening in the punch plate, as shown. This form of the device is particularly adapted for cutting hexagonal or other angular openings in the work and to this end the lower end of the piercing punch 28 is formed with a plurality of angular faces, indicated at 29.

In Figure 5 of the drawing, there is illustrated a further modified form of the invention in which the inner eccentric sleeve is dispensed with, the piercing punch 30 being provided with a tapered head 31 and the lower or working end 32 of the piercing punch being disposed eccentric to the longitudinal axis of said head.

From the foregoing description, it is thought that the construction and operation of the device will be readily understood by those skilled in the art and further description thereof is deemed unnecessary.

Having thus described the invention, what is claimed as new is:

1. The combination with spaced supports having threaded openings therein, of upper and lower sets of telescopic eccentric sleeves fitting in said openings, the inner sleeve of the lower set constituting a matrix, a tool fitted within the inner sleeve of the upper set and provided on one side thereof with a seat, a retaining ball mounted in the inner sleeve of the upper set and adapted to enter the seat in said tool, there being an opening formed in the lower end of said inner sleeve and communicating with the retaining ball, means for turning the sleeves to effect lateral adjustment of the matrix and tool respectively, and bushings threaded in said openings for clamping said sleeves to hold the tool and matrix in a set position of adjustment.

2. A piercing punch comprising upper and lower sets of telescopic eccentric sleeves, said sleeves being provided with tapered portions defining cylindrical extensions, the inner sleeve of the lower set constituting a matrix, a tool fitted within the inner sleeve of the upper set, means for turning the sleeves to effect lateral adjustment of the matrix and tool respectively, and means for clamping the tapered portions of said sleeves to hold the tool and matrix in a set position of adjustment.

3. The combination with spaced supports having threaded openings therein, of upper and lower sets of telescopic eccentric sleeves fitted in said openings, the inner sleeve of the lower set constituting a matrix and all of said sleeves being provided with tapered portions, means for turning the sleeves to effect lateral adjustment of the matrix and tool respectively, and bushings threaded in said openings and provided with tapered portions for clamping said sleeves to hold the tool and matrix in a set position of adjustment.

4. The combination with spaced supports having threaded openings therein, of upper and lower sets of telescopic eccentric sleeves disposed within said openings, the inner sleeve of the lower set constituting a matrix and both of said inner sleeves being provided with enlarged tapered heads and both of the outer sleeves being provided with correspondingly tapered portions, a tool fitting within the inner sleeve of the upper set, means for turning said sleeves to effect lateral adjustment of the matrix and tool respectively, and clamping collars threaded in said openings and having their inner faces provided with tapered portions for engagement with the tapered portions on the adjacent sleeves.

5. The combination with spaced supports having threaded openings therein, of upper and lower sets of telescopic eccentric sleeves seated in said openings, the inner sleeve of the lower set constituting a matrix, wear plates interposed between the inner sleeves and the adjacent walls of said openings, one of said wear plates being formed with a recess registering with the matrix, said sets of inner and outer sleeves being provided with tapered portions defining cylindrical extensions projecting beyond the adjacent supports and having their projected ends formed with tool-receiving notches, and clamping collars threaded in said openings and provided with tapered portions bearing against the tapered portions of the adjacent sleeves.

6. The combination with a support, of an adapter carried by the support, inner and outer telescopic eccentric sleeves disposed within the adapter and provided with tapered portions, said adapter being formed with interior threads, a working tool fitted within the inner sleeve, means for turning said sleeves to effect lateral adjustment of the working tool, and a clamping collar engaging the threads on the adapter and provided with a tapered portion adapted to engage the tapered portion on the adjacent sleeve for locking both of said sleeves in a set position of adjustment.

7. The combination with a support having a threaded opening therein, of an eccentric sleeve fitted within said opening and provided with a tapered portion, a working tool fitted within said eccentric sleeve and provided with a tapered head engaging the tapered portion of the sleeve, the working end of said tool being eccentric to the longitudinal axis of the tapered head thereof, and a clamping collar threaded in said opening and provided with a tapered portion for engagement with the tapered portion on the sleeve.

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