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2,213,919

ADJUSTING MEANS FOR CUTTING STEELS AND PIERCING PUNCHES

Filed Aug. 7, 1939

3 Sheets-Sheet 1

Fig. 1.

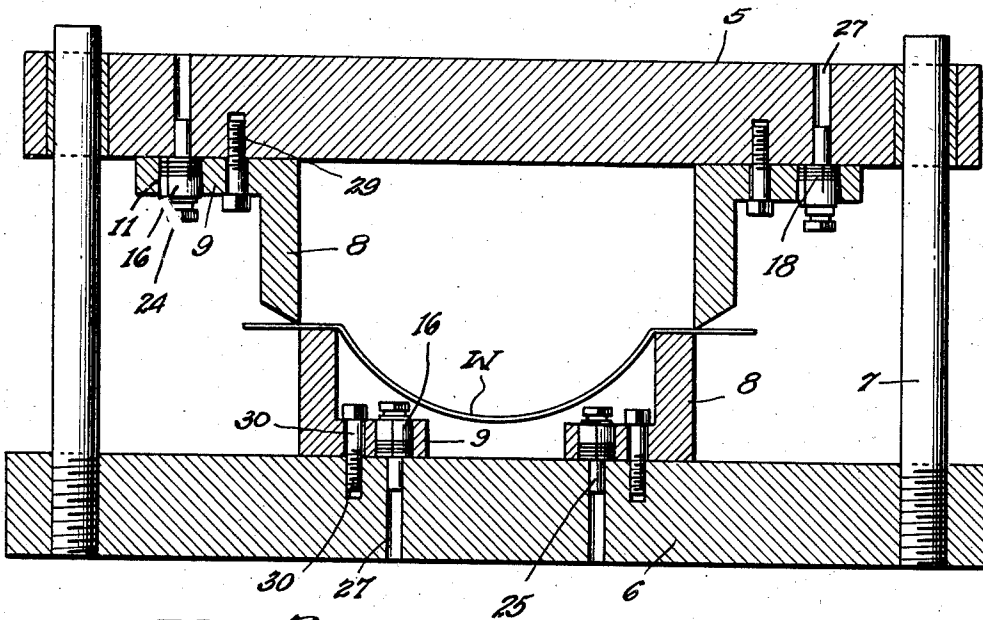


Fig. 2.

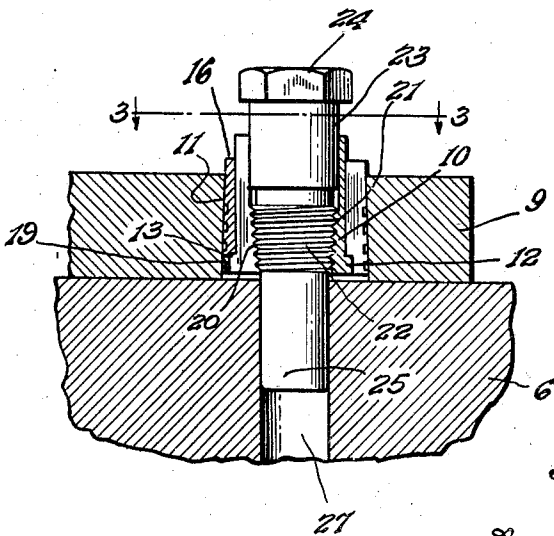
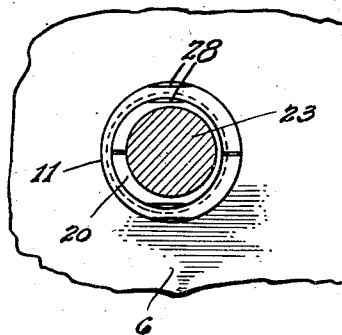


Fig. 3.



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Fig. 4.

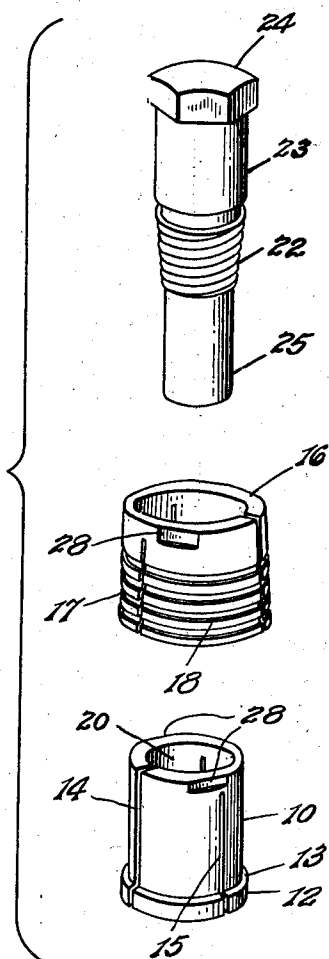


Fig. 8.

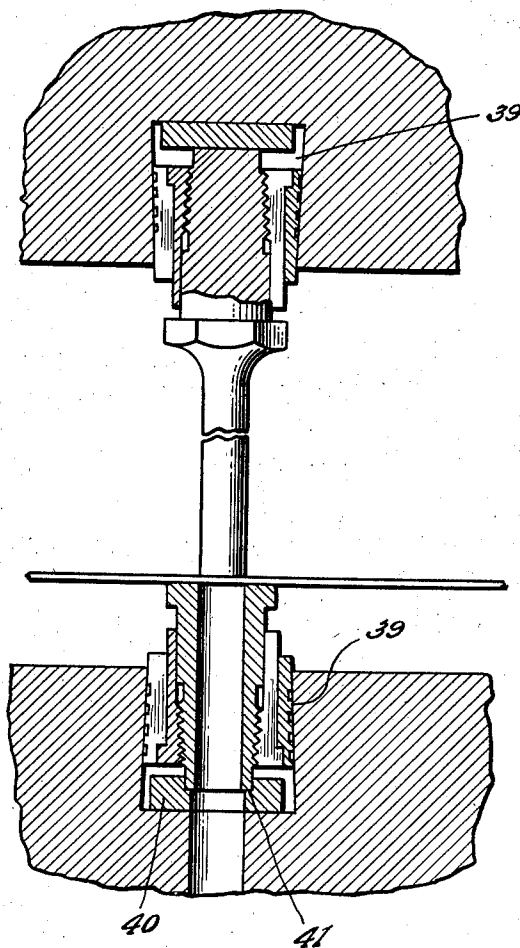
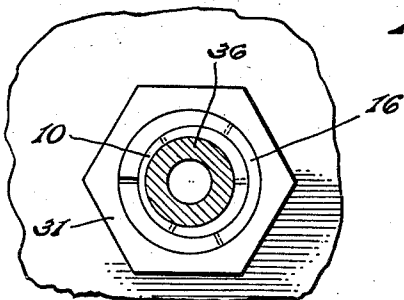


Fig. 7.



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Fig. 5.

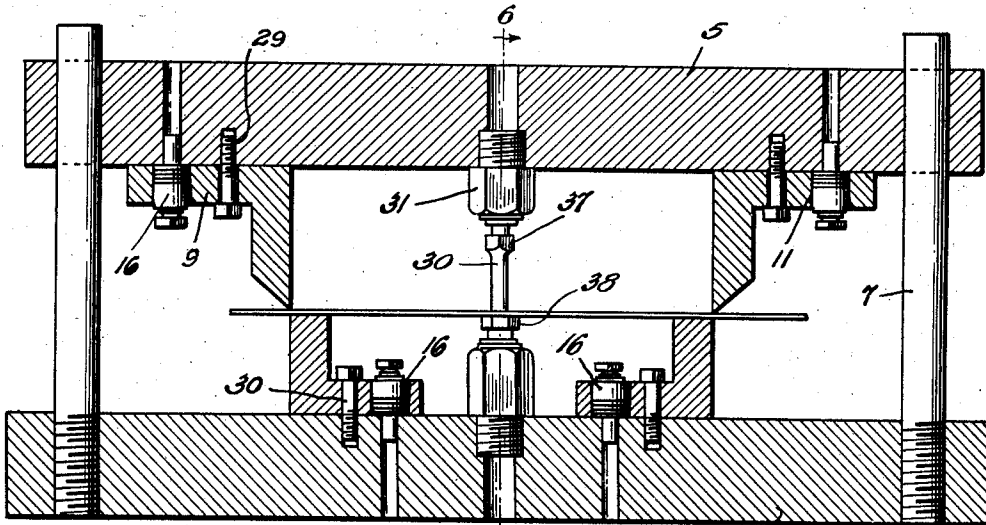
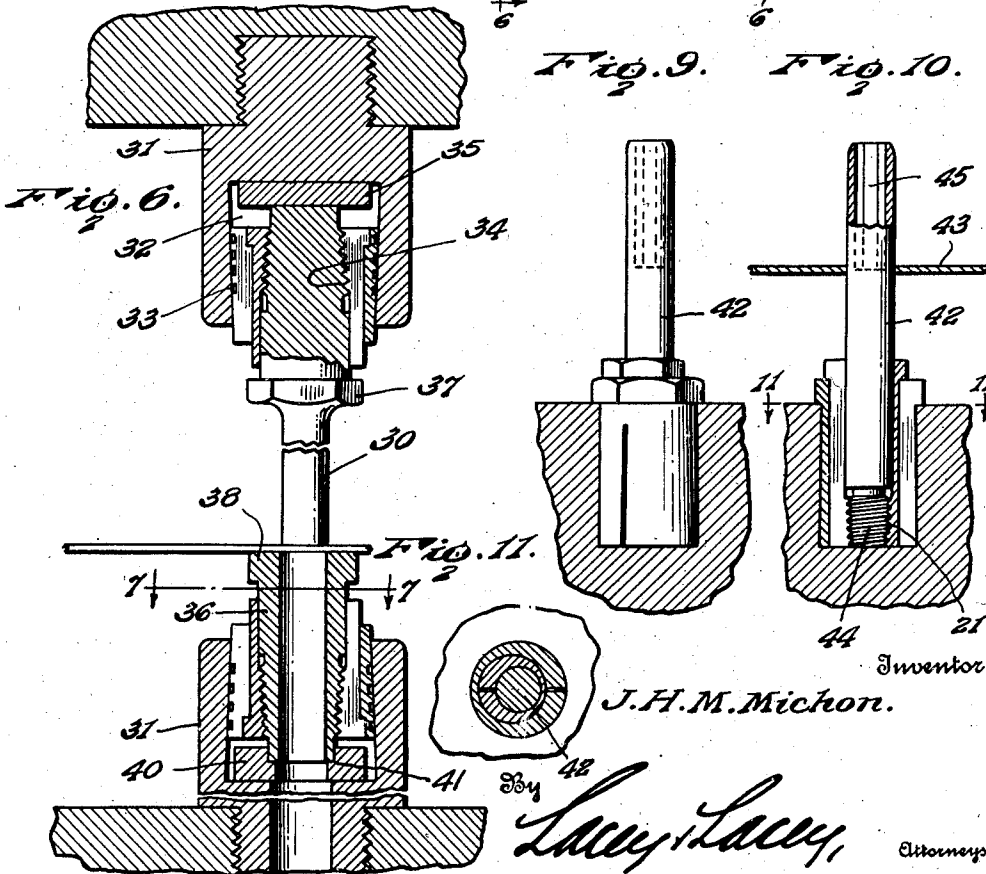


Fig. 9. Fig. 10.



UNITED STATES PATENT OFFICE

2,213,919

ADJUSTING MEANS FOR CUTTING STEELS
AND PIERCING PUNCHES

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14 Claims. (Cl. 164—118)

This invention relates to machines for blanking, trimming and punching sheet metal work and more specifically to means for effecting lateral adjustment of the cutting steels of the die shoes in any desired direction and locking said steels in a set position.

In the operation of sheet metal blanking, piercing and trimming machines considerable difficulty has heretofore been experienced in properly positioning the cutting steels on the die shoe inasmuch as they are made of tempered metal and whenever an adjustment of the cutting steel is necessary new openings have to be formed in both the cutting steel and die shoe to allow for dowering or adjustment, thereby not only necessitating extra time and labor on the part of the mechanic and additional expense incident thereto but also materially slowing up production.

The primary object of the invention, therefore, is to provide a comparatively simple and inexpensive device by means of which the cutting steel may be instantly moved to the desired position of lateral adjustment with respect to the die shoe and positively locked in a set position without the necessity of making extra dowel openings in either the cutting steel or die shoe.

A further object of the invention is to provide a dowel pin and adjusting means therefor which can be readily converted into a punch for piercing holes in the work simultaneously with the blanking or trimming operation or independently thereof as desired.

A further object is to provide a device of the character described which not only performs the function of adjusting and locking the cutting steel in a set position on the punch plate or die shoe but is so constructed as to receive and accommodate other working tools, such as a gage pin for accurately aligning the work.

A further object is to provide a dowel pin adapted to fit in an opening in the die shoe and having inner and outer eccentric sleeves associated therewith and seated in the cutting steel to effect lateral adjustment thereof, the dowel pin being provided with a tapered threaded portion which coacts with a correspondingly tapered threaded portion on the inner eccentric sleeve whereby, when the dowel pin is rotated, the sleeves will be clamped in engagement with the cutting steel and securely hold said cutting steel in a set position of adjustment.

A further object is to provide an adapter designed to receive the inner and outer eccentric

sleeves when the dowel pin is removed and the device used as a piercing punch, one member of the punch having a threaded portion engaging the threads on one eccentric sleeve and the other member or matrix of the punch being provided with a similar tapered threaded portion for engagement with another eccentric sleeve so that by adjusting said eccentric sleeves, either or both of the punch elements may be adjusted laterally to accurately align the punch elements with the work and in which position they may be securely locked against accidental displacement.

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

Figure 1 is a vertical sectional view of a metal working machine showing several of the adjustable dowels embodying the present invention in position on the cutting steels thereof,

Figure 2 is an enlarged vertical sectional view of one of the adjustable dowels and its associated parts,

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 2,

Figure 4 is a perspective view of the different elements comprising the device detached and disposed one above the other in position to be assembled,

Figure 5 is a vertical sectional view of a metal working machine showing the position and arrangement of the piercing punch,

Figure 6 is a vertical sectional view taken on the line 6—6 of Figure 5,

Figure 7 is a transverse sectional view taken on the line 7—7 of Figure 6,

Figure 8 is a vertical sectional view of a modified form of the piercing punch,

Figure 9 is a side elevation showing the device used for supporting a gage pin,

Figure 10 is a vertical sectional view of Figure 9, and

Figure 11 is a transverse sectional view taken on the line 11—11 of Figure 10.

The improved device forming the subject-matter of the present invention is shown in connection with a metal piercing and trimming machine of conventional construction in which 5 designates the punch plate, 6 the die shoe and 7 vertical pins for guiding the punch plate during the cutting operation. Disposed on the lower

face of the punch plate 5 and the upper face of the die shoe 6 are cutting steels 8 for engagement with a sheet metal blank or other work indicated by the letter W, said cutting steels being provided with laterally extending attaching arms 9, in which are mounted the cutting steel adjusting mechanism which will now be described.

The adjusting mechanism comprises a longitudinally split inner eccentric sleeve 10 adapted to fit within a tapered socket or opening 11 formed in the arm 9 of the adjacent cutting steel, said inner sleeve having its lower end provided with a lateral reinforcing flange 12 defining a shoulder 13. The eccentric sleeve 10 is provided with a longitudinal kerf 14 extending entirely through the sleeve and one or more auxiliary kerfs 15 which terminate short of the upper end of the sleeve and serve to impart the desired resiliency to said sleeve for the purpose hereinafter referred to. Fitting over the inner sleeve 10 is an outer longitudinally split eccentric sleeve 16, the exterior walls of which are inclined or tapered upwardly, as indicated at 17, and preferably grooved or otherwise roughened at 18 so as to insure good contact with the corresponding tapered walls of the socket 11 in the cutting steel. The inner wall of the outer eccentric sleeve 16 is disposed parallel with the outer wall of the inner sleeve 10 and formed in the inner wall of said outer sleeve 16 near the bottom thereof is a groove 19 adapted to receive the flange 12. The inner wall of the inner sleeve 10 at the lower end thereof is provided with a downwardly tapered bore 20, the walls of which are threaded at 21 for engagement with a correspondingly tapered threaded portion 22 on a work-engaging tool, indicated at 23. This work-engaging tool may be in the form of a punch, gage pin or dowel pin and when the device is used for adjusting the cutting steel the work-engaging tool will take the form of a dowel pin, as best shown in Figures 1 and 2 of the drawings. The dowel pin 23 is provided at its upper end with a hexagonal head 24 and at its lower end with a smooth cylindrical extension 25 which fits within a cylindrical bore or opening 27, said opening 27 being formed in both the punch plate and die shoe to receive the ends of the adjacent dowel pins. The upper ends of the inner and outer eccentric sleeves are provided with flattened portions 28 to permit the same to be conveniently gripped with a wrench or other suitable tool for the purpose of adjusting the eccentrics to vary the movement or throw of the cutting steel. The upper cutting steels 8 have screws 29 extending loosely therethrough and threaded into the punch plate 5 while the lower steels have similar screws 30 threaded into the die shoe for the purpose of temporarily holding said cutting steels in position thereon.

In operation, the inner and outer sleeves are telescoped one within the other and then slightly compressed with a suitable tool and inserted within the opening 11 in the cutting steel, the expansion of said sleeves serving to force the outer sleeve in engagement with the walls of the opening 11 as soon as the compression on the sleeves is removed. The dowel pin 23 is then inserted within the inner sleeve so that the threads 21 and 22 interengage. In order to effect lateral adjustment of the cutting steels 8, it is merely necessary to grasp the flat faces 28 of the eccentric sleeves and turn them either to the right or left, as the case may be, which will impart a corresponding lateral movement to the

cutting steels and thus permit a nicety of adjustment of said steels. After the desired adjustment of the cutting steels has been effected, the angular head 24 of the dowel pin is rotated with a wrench or other suitable tool which causes the shoulder 13 to bear against the adjacent wall of the groove 19 in the outer eccentric sleeve and force the inner sleeve upwardly thereby securely wedging the outer sleeve against the walls of the opening in the cutting steel and securely holding said cutting steel in any desired set position of adjustment. After adjustment of the cutting steels has been effected, the screws 29 may be tightened, if desired. Owing to the eccentric disposition of the inner and outer sleeves, a comparatively wide range of adjustment for the cutting steels may be instantly obtained without the necessity of boring extra holes in the punch plate and die shoe, and, as previously stated, the clamping action between the dowel pin and eccentric sleeves will positively hold the cutting steel in adjusted position.

In Figure 5 of the drawings, there is shown a piercing punch 30 applied to a metal trimming machine. In this form of the device, an adapter 31 is threaded into both the punch plate 5 and die shoe 6, said adapter being provided with a socket 32, the inner walls of which are slightly tapered or wedge shaped, as indicated at 33. The inner and outer sleeves 10 and 16 are inserted within the socket 32 of the adapter in the manner previously described and instead of employing the dowel pin 23 a piercing punch 30 is used in lieu thereof. The upper end of the piercing punch 30 is provided with tapered threads 34 for engagement with the correspondingly tapered threaded portion on the inner sleeve 10. Seated within the adapter and bearing against the adjacent end of the threaded portion of the punch is a bearing plate 35 designed to take the impact of the punch when the latter is in operation. The adapter 31 on the die shoe 6 is of similar construction with the exception that instead of using the punching element 30 a button or matrix 36 is threaded within the inner eccentric sleeve for coaction with said punch element, as will be readily understood. By adjusting the eccentric sleeves within the upper and lower adapters 31, the punch elements may be shifted laterally to accurately align the same and in which position they will be securely held by rotating the angular head 37 of the piercing punch and the angular head 38 of the button or matrix respectively. If desired, instead of employing the adapters 31, tapered openings or sockets 39 may be formed in the punch plate and die shoe, respectively, and the different parts constituting the piercing punch inserted directly within said openings, as best shown in Figure 8 of the drawings.

Disposed within the lower adapter shown in Figure 6 and within the socket or opening 39 shown in Figure 8 are impact plates 40 each provided with a central bore defining an annular shoulder 41 against which the lower end of the button or matrix is adapted to rest. The eccentric sleeves 10 and 16 may also be used to advantage for supporting a gage pin, and in Figures 9 and 10 of the drawings, there is shown a gage pin 42 disposed within the inner eccentric sleeve and projecting vertically therefrom for engagement with the work, indicated at 43. The lower end of the gage pin 42 is provided with a terminal tapered threaded portion 44 adapted to engage the correspondingly tapered threaded portion 21 on the inner eccentric sleeve. The upper end of

the gage pin 42 is provided with an angular socket 45 adapted to receive a wrench or other suitable tool for the purpose of rotating the same and locking the pin in a set position after the desired adjustment has been effected. These gage pins 42 may be positioned either against the peripheral edge of a metal blank or extend through openings in the blank for the purpose of holding the blank in the desired position when operating thereon.

It will here be noted that the inner and outer eccentric sleeves are employed in all forms of the device, the construction of said sleeves being such as to allow the use of any kind of working tool and in all cases the rotation or partial rotation of the eccentric sleeves serve to effect lateral adjustment of said working tool and in which position the tool may be securely locked by rotating the same, as hereinbefore described.

By the use of the mechanism herein described, the necessity for forming new or extra openings in either the cutting steel or die shoes to allow for doweling or adjustment is entirely obviated and consequently production is materially increased.

It will, of course, be understood that the devices may be made in different sizes and shapes and used in connection with any style or type of metal working machines without departing from the spirit of the invention.

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

1. The combination with relatively stationary and movable members, of an adjusting device including inner and outer eccentric sleeves mounted on one of said members for adjusting the movable member laterally with respect to the stationary member, and a working tool fitted within the inner sleeve for engagement with the stationary member and provided with means for clamping the sleeves against the movable member and holding said movable member in a set position of adjustment when said tool is rotated.

2. The combination with relatively stationary and movable members, of an adjusting device including inner and outer expansible eccentric sleeves mounted in an opening in one of said members for adjusting the movable member laterally with respect to the stationary member, a work-engaging tool fitted within the inner sleeve and engaging a socket in the other member, and means on said working tool for expanding the outer sleeve in engagement with the walls of said opening and holding the movable member in a set position of adjustment when said tool is rotated.

3. The combination with relatively stationary and movable members, of an adjusting device including inner and outer eccentric sleeves adapted to fit within a tapered opening in the movable member, the outer sleeve being tapered and the inner sleeve provided with interior threads, and a working tool fitting within the inner sleeve and having tapered exterior threads adapted to engage the interior threads of the inner sleeve for expanding the outer sleeve in engagement with the walls of the opening for holding the movable member in a set position of adjustment.

4. The combination with relatively stationary and movable members provided with openings, of an adjusting device including inner and outer expansible eccentric sleeves fitting within the opening of one of the members, one of said sleeves being upwardly tapered and provided at its lower end with a groove and the other sleeve being

formed with a shoulder for engagement with the groove and having its bore tapered and threaded, and a working tool fitting within the inner sleeve and the opening in the other member, said working tool being provided with tapered threads engaging the threads on the inner sleeve for expanding said sleeves against the walls of the opening in the adjacent member for locking the movable member in a set position of adjustment.

5. The combination with relatively stationary and movable members, of an adjusting device including inner and outer longitudinally split eccentric sleeves adapted to fit within a tapered opening in the movable member, the inner wall of the inner sleeve being provided with a thickened tapered portion having threads thereon and the outer sleeve being upwardly tapered, each sleeve being provided at its upper end with a tool-engaging surface, and a working tool threaded in the inner sleeve and engaging an opening in the other member, said working tool when rotated serving to clamp the sleeves in contact with the walls of the opening in the movable member and hold said movable member in a set position of adjustment.

6. An adjusting device including inner and outer eccentric sleeves one of which is provided with an interior tapered threaded portion, and a working tool having a correspondingly tapered threaded portion engageable with said threaded portion on the sleeve for locking said sleeves in engagement with a support when said tool is rotated.

7. An adjusting device comprising a support having a socket therein, inner and outer expansible eccentric sleeves fitting within the socket, and a working tool fitted within the inner sleeve and provided with means for clamping said sleeves against the wall of the socket when said tool is rotated.

8. An adjusting device comprising inner and outer telescopic eccentric sleeves, said sleeves being longitudinally split and provided with wrench-engaging surfaces, the outer sleeve being downwardly tapered and provided with an interior groove and the inner sleeve being formed with a lateral flange defining a shoulder for engagement with the adjacent wall of the groove, the inner wall of the inner sleeve at the lower end thereof being provided with inclined threads, and a working tool fitting within the inner sleeve and provided with a tapered threaded portion adapted to engage the threads on the inner sleeve when said tool is rotated.

9. The combination with spaced supports, of an adapter carried by each support, inner and outer expansible eccentric sleeves fitting within each adapter, the inner sleeves having their inner walls tapered and threaded, a working tool having a correspondingly tapered threaded portion for engagement with the threads of the inner sleeve of one adapter, and a working tool having a threaded tapered portion engaging the tapered threads on the inner sleeve of the other adapter whereby to permit the working end of one tool to be adjusted laterally with respect to the working end of the other tool and securely locked in a set position of adjustment.

10. The combination with a support having an opening therein, of an adjusting device including longitudinally split inner and outer telescopic sleeves having their upper ends provided with angular wrench-engaging faces, the inner wall of the inner sleeve being provided with a tapered threaded portion, and a gage having a corre-

spondingly tapered threaded portion adapted to engage the threads on the inner sleeve for expanding said sleeves in engagement with the walls of the opening in the support.

- 5 11. An adjusting device comprising inner and outer expandible telescopic sleeves adapted to fit within an opening in a support, the inner sleeve being provided with a tapered portion formed with threads for engagement with a threaded portion
10 on a working tool whereby when the tool is inserted within the inner sleeve and rotated said sleeves will be expanded against the walls of the opening in the support.

12. The combination with a plurality of working tools each having a tapered threaded portion, of an adjusting device including inner and outer expandible eccentric sleeves adapted to fit within a tapered opening in a support, the inner wall of the inner sleeve being provided with a tapered threaded portion adapted to selectively and interchangeably engage the threads on any one of the working tools whereby when a selected working tool is inserted within the inner sleeve and rotated said sleeves will be clamped against the tapered walls of the opening in the support.
25

13. The combination with a plurality of working tools, each provided with a tapered threaded portion, inner and outer expandible eccentric sleeves adapted to fit within a tapered opening in a support, said sleeves being provided with interengaging stop shoulders, the outer sleeve being

exteriorly upwardly tapered and the inner sleeve formed with an interior tapered threaded portion adapted to engage the threads on a selected working tool whereby when a tool is inserted within the inner sleeve and rotated the shoulders will interengage and force the outer sleeve upwardly within the tapered opening and in clamping engagement with the walls thereof.
5

14. In a metal trimming machine, the combination with a punch plate and die shoe each having an opening formed therein, of cutting steels adjustably mounted on said punch plate and die shoe, respectively, and provided with openings, the walls of which are tapered, expandible eccentric telescopic sleeves fitting within the openings in the cutting steel for adjusting the cutting steels laterally with respect to the punch plate and die shoe, the outer sleeves being tapered and the inner sleeves formed with tapered threaded portions, and dowel pins having their lower ends fitted in the openings in the punch plate and die shoe, respectively, and their intermediate portions formed with tapered threads adapted to engage the tapered threads on the adjacent inner sleeve whereby when the dowel pins are inserted in the inner sleeves and rotated said sleeves will be forced into frictional engagement with the tapered walls of the openings and hold the cutting steels in a set position of adjustment.
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