Sept. 1, 1925. 1,551,663

A. C. HOUGH

PUNCH AND GUIDE THEREFOR

Filed Aug. 1, 1924 3 Sheets-Sheet 1

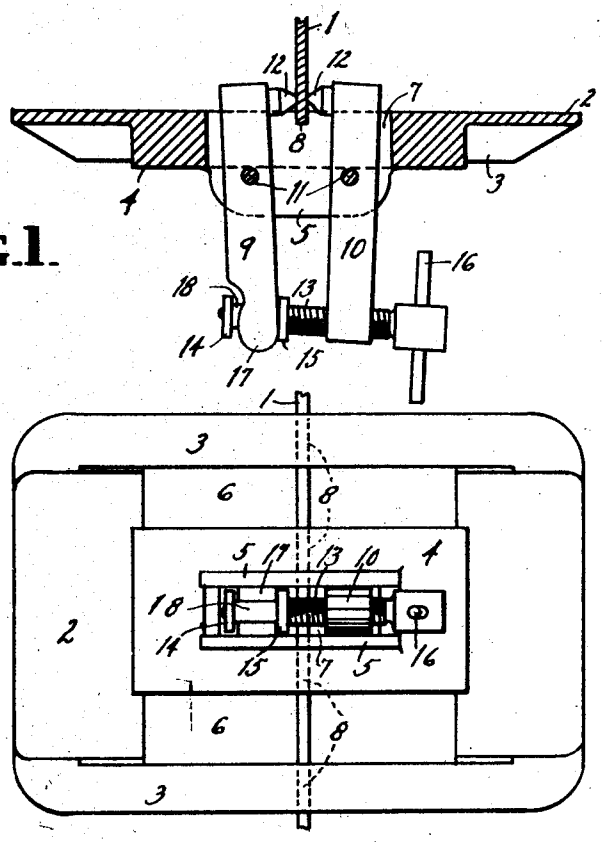

FIG. 1.

FIG. 2.

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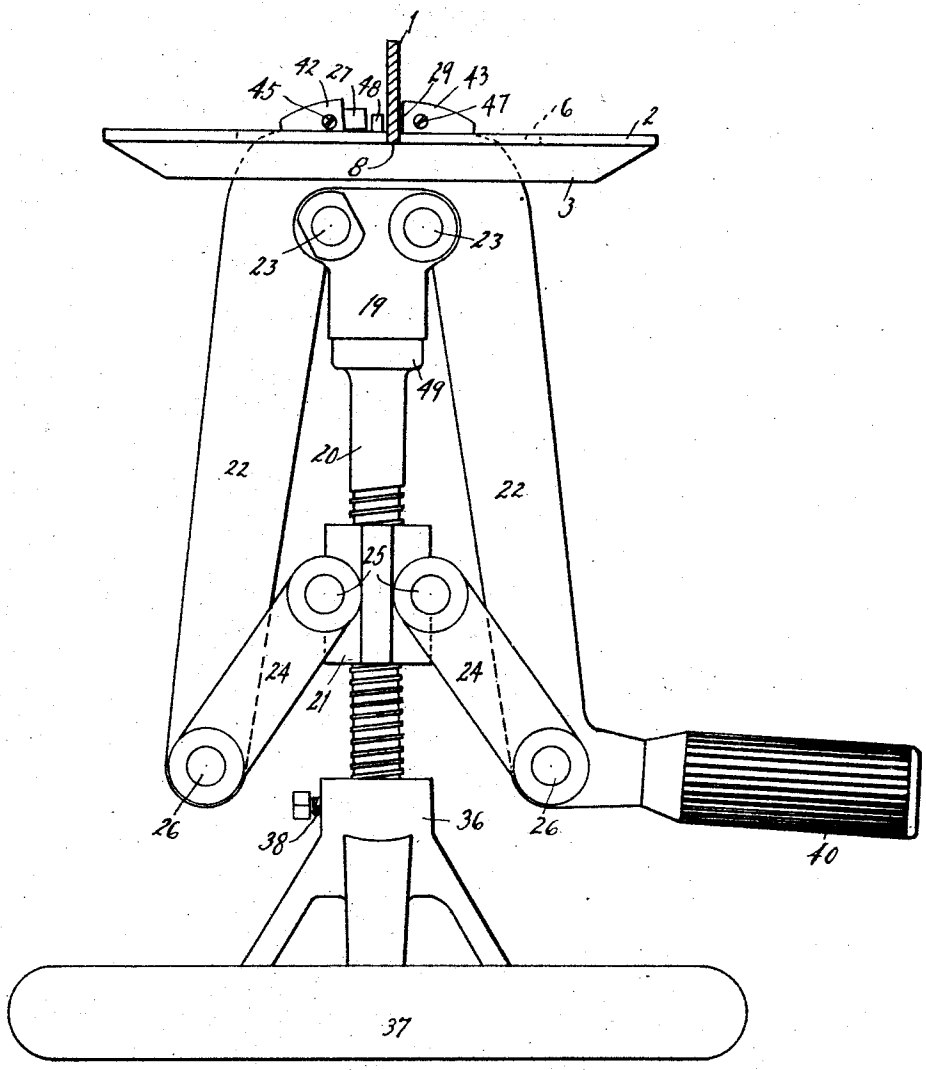

FIG. 3.

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FIG. 4.

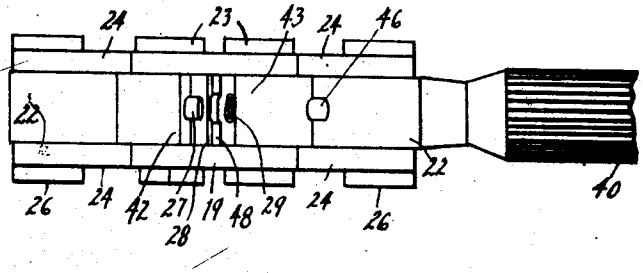
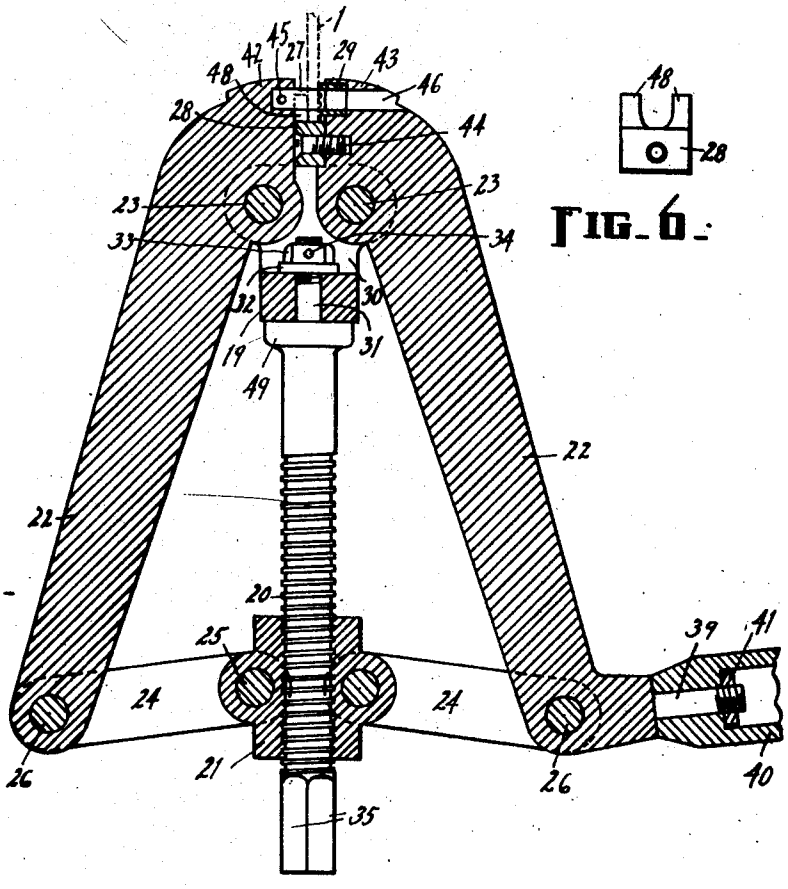


FIG. 6.

FIG. 5.



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UNITED STATES PATENT OFFICE.

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PUNCH AND GUIDE THEREFOR.

Application filed August 1, 1924. Serial No. 729,628.

To all whom it may concern:

Be it known that I, AZEL C. HOUGH, a citizen of the United States of America, and a resident of Janesville, in the county of Rock and State of Wisconsin, have invented a new and useful Punch and Guide Therefor, of which the following is a specification.

My invention relates to improvements in tools or implements for punching holes in metal strips, such as the forwardly-projecting ribs of steel window sashes, and in general consists of a slotted guide provided with means for attaching the same to the work, and a toggle-joint punch which is adapted to have its jaws inserted in the guide, after the latter has been attached to the work, and then to be operated by means of a hand-wheel to punch the hole in said work, both said guide and punch being of special and peculiar construction, and as hereinafter set forth in detail.

The primary object of my invention is to provide what may be termed a set of implements for expeditiously and economically punching holes by hand in strips of metal, the same being especially adapted for punching holes in the forwardly-projecting parts or ribs of steel window sashes in order that brackets for shades may be readily fastened to such sashes.

This punch and guide are strong and durable, comparatively simple both in construction and operation convenient to use, and require little or no skill on the part of the person using the same.

Another object is to produce a punch guide which can be easily and quickly attached to and detached from the work, and with the aid and at one setting of which two holes can be punched at a predetermined distance apart.

The guide and jaws of the punch are so constructed that, when the latter are inserted in the former, a firm and substantial support and guide are afforded for the jaws, and side-sway or vibration of the punch are eliminated. This is an important feature, especially when holes are punched in steel window sash, because then danger of breaking or cracking the glass of the window is thereby removed.

A further object is to insure accuracy in perforating the holes, not only as to the distance apart of the holes, but also as to their distance in from the front edge of the work.

Still another object is to produce a punch, of the character described above, with which a gradual but positive pressure is brought to bear on the jaws of the punch by turning a hand-wheel.

When the punch and guide are used for perforating steel window sash ribs for the purpose of having attached thereto shade brackets, said punch and guide are disposed horizontally, because it is the vertical ribs of such sashes that are perforated, but the implements may be used and operated in a vertical position, or in a diagonal position, in connection with other kinds of work.

Other objects and advantages will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a central, longitudinal section through a guide which embodies a practical form of that element of my invention, looking down; Fig. 2, a front elevation of said guide; Fig. 3, a top plan of a punch which embodies a practical form of that element of said invention; Fig. 4, an elevation of the jaw end of said punch, the hand-wheel being omitted, and a portion of the handle being broken off; Fig. 5, a central, longitudinal section through said punch, looking down, said hand-wheel being again omitted, and a portion of said handle being again broken off, and, Fig. 6, a left-hand side elevation of one of the punch members.

Similar reference characters designate similar parts throughout the several views.

In the first three views, in full lines, and in Fig. 5, in broken lines, is represented, at 1, a fragmentary portion of the rib of the right-hand side of a steel window sash, and the punch and guide will be described in their application thereto and operation thereon, but, as hereinbefore explained, the range of application and operation is by no means limited to work of this character.

Referring first more particularly to Figs. 1 and 2, it will be seen that the guide comprises a plate 2 which has on the front side adjacent to the longitudinal edges thereof flanges 3—3 and an intermediate, rectangular block or boss 4 provided with for-

wardly-extending ears or lugs 5—5; that said plate has therein upper and under slots 6, and an intermediate slot 7 which extends clear through said plate from front to back; and that in the back side of the plate is a groove 8. Other parts and members of the guide consist of arms 9 and 10, each of which is pivotally connected at 11 with the lugs 5, and is provided with a gripping post 12, and a screw 13 tapped into and through the arm 10, and provided with a collar 14 and a washer 15, the head of said screw having a handle 16.

The slot 7 is in the longitudinal center of the plate 2 and parallel with the slots 6, and extends through the boss 4. The inner faces of the lugs 5 are flush with the upper and under, longitudinal sides of the slot 7. The under side of the upper flange 3 and the upper side of the boss 4 are flush with the longitudinal sides of the upper slot 6, and the upper side of the lower flange 3 and the under side of said boss are flush with the longitudinal sides of the lower slot 6. The groove 8 is in the transverse center of the back side of the plate 2, at right-angles to the slots 6 and 7, and its continuity is interrupted by said slots. The front edge portion of the rib 1 is received in the groove 8. The pivots 11 are on opposite sides of and equidistant from the transverse, vertical plane in which the groove 8 is located.

The arms 9 and 10 project through the slot 7 behind the plate 2, and the gripping posts 12 are set in adjacent sides of and project from said arms in position to engage the rib 1. The arms 9 and 10 also project forwardly beyond the lugs 5, and the front end of the arm 9 is bifurcated at 17 to receive a part 18 of the screw 13, which part is unthreaded and of less diameter than the threaded portion of said screw. The collar 14 is secured to the outer end of the part 18 outside of the bifurcated terminal 17, while the washer 15 is mounted on said part inside of said terminal. It will now be seen that, when the screw 13 is rotated in one direction, the forward terminals of the arms 9 and 10 are forced apart and the rear terminals of said arms with the gripping posts 12 are forced toward each other, and that, when said screw is rotated in the opposite direction, said arms are actuated toward each other at their front ends and away from each other at their rear ends.

To attach the guide to the rib 1, place the plate 2 against the forward edge of said rib, with such edge in the groove 8, while the gripping posts 12 are widely separated, and rotate the screw 13 in the direction to cause said posts to approach each other and tightly grip said rib—see Figs. 1, 2, and 3. The guide, before being secured to the rib 1 in the manner just explained, is located at the proper height on said rib to enable the holes subsequently to be punched therein to be in the desired positions. To detach the guide from the rib 1, simply rotate the screw 13 in the opposite direction far enough to cause the gripping posts 12 to be carried out of engagement with said rib, and withdraw said guide.

When the guide is attached to the rib 1, the positions of the holes to be punched are in the horizontal planes of the longitudinal centers of the slots 6, as will presently be more clearly apparent.

The punch, as illustrated in Figs. 3, 4, and 5, will next be described.

This punch comprises a head 19, an externally screw-threaded spindle 20, an internally screw-threaded sleeve 21 mounted on the screw-threaded part of said spindle, two arms 22 pivotally connected adjacent to ther rear ends, at 23—23, with said head, two pairs of links 24 each having one terminal pivotally connected at 25 with said sleeve and the other terminal pivotally connected at 26 with one of said arms at the forward end thereof, a punch pin 27, a stop 28, and a punch bushing 29. The links 24 in each pair are on opposite sides of said sleeve 21 and the arms 22.

The head 19 has a slot 30 therein which opens through opposite sides and the rear end of said head, and inner projecting parts on the adjacent edges of the arms 22 are received in said slot and connected with said head by the pivots 23. At the rear end of the spindle 20 is an extension 31, and said spindle has thereon forward of such extension a flange 49. The extension 31 passes through a horizontal opening in the center of the head 19, and on the rear terminal of said extension, within the slot 30, is a washer 32 and a nut 33. The part of the head 19 through which the extension 31 passes is between the flange 49 and the aforesaid washer and nut, and the construction and arrangement of parts are such that said extension can rotate freely but can not move independently endwise in said head. For greater security the nut 33 is pinned at 34 to the extension 31. The forward terminal of the spindle 20 is slabbed off, as represented at 35 in Fig. 5, to form an angular or stem part for the reception of the hub 36 of a hand-wheel 37, a set-nut 38 being provided to prevent said hub from being withdrawn from said stem.

Extending outwardly from the rear terminal of one of the arms 22 is a post 39, and mounted on this post is a handle 40. The outer terminal of the post 39 is screw-threaded to receive a nut 41, by means of which the handle 40 is secured in place on said post, said nut being in said handle which is made hollow to receive it.

The pivotal connections between the parts

at 23 are so strong, and the pivotal connections which include the four links 24 are so rigid, that the rotation of the spindle and the action produced by such rotation causes or produces no twisting or distortion of the arms 22 and connected members.

The rear terminals of the arms 22, or the parts thereof which are behind the pivots 23, form the jaws of the punch, such jaws being indicated by the numerals 42 and 43. It is the arm 22 with which the jaw 43 is integral that is equipped with the handle 40. The punch pin 27 is secured to the jaw 42. The stop 28 is secured to the jaw 43 by means of a screw 4. One terminal of the pin 27 is received in a recess in the inner face of the jaw 42, and a screw 45 is tapped into one side of said jaw in position to engage such terminal and thus secure said pin in place. A passage 46 is formed in the jaw 43, said passage opening at the inner end through the inner face of said jaw, and at the outer end through the outer edge of said jaw. The inner terminal portion of the passage 46 is enlarged to receive the bushing 29, said bushing being held in place in said passage by means of a screw 47 that is tapped into one side of the jaw 43 and engages said bushing. Both the pin 27 and the bushing 29 are made of hardened steel. The bushing 29 is in position to receive the outer terminal of the pin 27 when the jaws 42 and 43 are closed to their fullest extent, as clearly shown in Fig. 5. The closing movement of the jaws 42 and 43 is limited by the stop 28 which is located between the inner faces of said jaws below the punch pin and bushing. The stop 28 is secured in this position to the inner face of the jaw 43 by means of the screw 44 which passes through said stop and is tapped into said jaw. Rising from the top of the stop 28 are two fingers 48. The fingers 48 are separated by a space sufficiently wide to permit of the passage of the pin 27, and are spaced apart from the bushing 29 a sufficient distance to enable the rib 1, or other work, to be received in the space between the exposed end of said bushing and said fingers.

Both the jaws 42 and 43 are of the same thickness, and they are in the same plane, and such thickness is approximately equal to the width of either of the slots 6, consequently such jaws can be readily slipped into and out of either of said slots. When the jaws are slipped into either slot 6, care is taken that the front edge of the rib 1 is received between the jaw 43 and the fingers 48 and said jaws are pushed into said slot until the rear edge of the stop 28 bears against the front edge of said rib. By this means the distance in from the front edge of the rib 1 of the hole to be punched in said rib is fixed and determined, and is the same in every case. The office of the fingers 48 is to facilitate the withdrawal of the punch pin 27 after the hole has been made in the rib 1, as will hereinafter be more fully explained.

The flanges 3 and boss 4 serve as abutments for the jaws 42 and 43, when the latter are in either slot 6, and with the longitudinal sides of such slot properly support and guide said jaws during the punching operation. The slots 6 necessarily must be of sufficient length to enable the jaws 42 and 43 to be opened and closed therein.

When the spindle 20 is rotated in one direction, the sleeve 21 is actuated rearwardly and carries with it the links 24, with the result that said links cause the forward ends of the arms 22 to be drawn toward each other, said arms swinging on the pivots 23 in the head 19, and the jaws 42 and 43 to be more widely separated. This open position of the jaws 42 and 43 will be clearly seen upon referring to Figs. 3 and 4. Upon rotating the spindle 20 in the opposite direction, the sleeve 21 is actuated forwardly and carries with it the links 24, with the result that the forward terminals of the arms 23 are forced outwardly and the jaws 42 and 43 are forced inwardly. Powerful means are thus provided for causing the jaws 42 and 43 to be closed gradually and with great force, force sufficient, in fact, to drive the punch pin 27 through any work which is between said jaws, and the slow movement insures a clean-cut hole. The punchings are pushed through the passage 46 and out of the outer end thereof.

Although the operation of this punch and guide will be quite well understood from the foregoing, I will next briefly explain such operation as a whole.

Assuming that the guide is clamped to the rib 1 at the proper height, and that the jaws 42 and 43 are open, with the handle 40 grasped in the right hand and the hand-wheel 37 grasped in the left hand, the punch is raised and said jaws are inserted in one or the other of the slots 6 in such a way as to receive the front edge of the rib 1 in the space between the jaw 43 and the fingers 48, and said punch is pushed rearwardly until the back edge of the stop 28 comes to rest against said edge of said rib. With the punch held in this position, by means of the handle 40, the hand-wheel 37 is rotated in the direction to cause the jaws 42 and 43 to be closed. As the jaws continue to close the punch pin 27 passes between the fingers 48 into contact with the rib 1, causes the exposed end of the bushing 29 to bear hard against one side of said rib, and forces its way through said rib from the other side until it emerges from the rib and enters the bushing—see Fig. 5. Next the hand-wheel 37 is rotated in the opposite direction to cause the jaws 42 and 43 to open, when the pin 27 causes the fingers 48 to be forced

against the contiguous side of the rib 1, and said pin is slowly withdrawn from the rib, the opening movement continuing until the pin is entirely clear of the rib, or until said jaws are approximately wide open as illustrated in Figs. 3 and 4.

The jaws 42 and 43 are now withdrawn from the slot 6 in which they were first inserted and inserted in the other slot 6, when the operations just described are repeated to punch the second hole in the rib 1. After the second hole is punched and the jaws are again opened, the punch is withdrawn from the rib and guide, and the latter is unfastened and removed from the rib.

The punch may be disposed so as to enable the handle 40 to be grasped in the left hand instead of the right, of desired, for vertical work, and said handle may be grasped in either hand when the punch is used in connection with horizontal or oblique work.

During the punching operation the jaws are held so securely in the slot 6 in which they are inserted, and the stop 28 so adequately positions the rear end of the punch relative to the work or rib 1, that there is no rocking, tilting, or unnecessary sideways movement of the punch, whereby the holes might be improperly located, provided the punch, after being properly placed in position, be held steady by the hand, and there is no difficulty in so holding it owing to the construction and balance of the implements.

Attention is called to the fact that the stop 28 performs the following three functions, or serves three purposes, it limits the closing of the jaws 42 and 43, it positions the punch relative to the work laterally, and it bears against the work to enable the punch pin 27 to be withdrawn from the work.

It is conceivable that the plate 2 might have therein more or less than two of the slots 6, and that such plate might be provided with additional gripping parts and members.

In addition to the modifications or changes of which special mention has hereinbefore been made, other modifications or changes in the shape, size, construction, and arrangement of the parts and members of this punch and guide may be made without departing from the spirit of my invention or exceeding the scope of what is claimed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A guide, for a punch which cooperates with but is separate from said guide, comprising a plate grooved in one direction to receive the work, and slotted in another direction to receive the front ends of the jaws of the punch, and provided with work-engaging means, whereby said plate is attached to said work.

2. A guide, for a punch, comprising a plate grooved to receive the work, and slotted at right-angles to said groove to receive the jaws of the punch, arms pivotally connected with said plate, and provided with work-gripping members, and means to rock said arms on their pivots and actuate said gripping members into and out of engagement with the work.

3. A guide, for a punch, comprising a plate transversely grooved in the back side to receive the work, longitudinally slotted to receive the jaws of the punch and also to receive arms, and provided with lugs, arms pivotally connected with said lugs and extending through one of the slots in said plate, said arms being provided at their rear terminals with gripping posts, and one of said arms being bifurcated at its forward terminal, a screw tapped into the other of said arms and having a part which extends through said bifurcated terminal, and projecting members on said screw on opposite sides of said terminal.

4. The combination, in a punch and guide therefor, both being separable and independent, but adapted to cooperate with each other, with a guide comprising a plate having a slot therethrough, and having work-receiving parts on opposite sides of said slot, and provided with gripping and releasing means for the work, of a punch provided with a punch pin, and having jaws which are receivable at their forward terminals in said slot, and adapted to project through and beyond the same, so that, said jaws and pin can engage that part of the work which extends across the slot.

5. The combination, in a punch and guide therefor, with a guide comprising a plate having slots therein, and having work receiving parts on opposite sides of said slots, and provided with gripping and releasing means for the work, which means extend into one of said slots, of a punch having jaws which are adapted to have their forward ends inserted in the other of said slots, wherein said ends are guided by the sides thereof, and provided with a punch pin, the punch being insertable in and removable from the guide at will.

6. In a punch and guide therefor, a punch having jaws which are provided with a punching member, and a guide having work-receiving parts, and provided with gripping and releasing means for the work, and also having positioning means for said jaws, whereby holes which are separated by a predetermined distance may be punched in the work by said punching member.

7. In a punch and guide therefor, a punch having jaws which are provided with a punching member, and further provided with means to determine the distance in from the front edge of the work of the holes punched by said punching member, and a

guide having work-receiving parts, and provided with gripping and releasing means for the work, and also having positioning means for said jaws, whereby holes which are separated by a predetermined distance may be punched in the work by said punching member.

8. The combination, in a punch and guide therefor, with a guide attachable to the work and adapted to position the jaws of a punch, of a punch comprising a head, a screw-threaded spindle rotatably connected with said head, a sleeve in threaded engagement with said spindle, arms having jaws formed thereon, and pivotally connected with said head, links pivotally connecting said arms with said sleeve, a punch pin projecting from the inner face of one of said jaws, the other of said jaws being recessed to accommodate the free end of said pin when said jaws are closed, and a stop secured to the inner face of said last-named jaw, and adapted to limit the closing of the jaws.

9. The combination, in a punch and guide therefor, with a guide attachable to the work, of a punch comprising a head, a screw-threaded spindle rotatably connected with said head, a sleeve in threaded engagement with said spindle, arms having jaws formed thereon, and pivotally connected with said head, said guide being adapted to position said jaws, links pivotally connecting said arms with said sleeve, a punch pin projecting from the inner face of one of said jaws, the other of said jaws being recessed to accomodate the free end of said pin when said jaws are closed, and a stop secured to the inner face of said last-named jaw, and adapted to bear against the front edge of the work and thus determine the position in from such edge of the hole punched by said pin.

10. The combination, in a punch and guide therefor, with a guide attachable to the work and adapted to position the jaws of a punch, of a punch comprising a head, a screw-threaded spindle rotatably connected with said head, a sleeve in threaded engagement with said spindle, arms having jaws formed thereon, and pivotally connected with said head, links pivotally connecting said arms with said sleeve, a punch pin projecting from the inner face of one of said jaws, the other of said jaws being recessed to accommodate the free end of said pin when said jaws are closed, and a stop secured to the inner face of said last-named jaw, said stop having a projecting part to bear against the work when said pin is withdrawn therefrom.

11. The combination, in a punch and guide therefor, with a guide attachable to the work and adapted to position the jaws of a punch, of a punch comprising a head, a screw-threaded spindle rotatably connected with said head, a sleeve in threaded engagement with said spindle, arms having jaws provided with punching members, said arms being pivotally connected with said head, and one of said arms being provided with a handle, links pivotally connecting said arms with said sleeve, and a hand-wheel on the spindle.

12. The combination, in a punch and guide therefor, with a guide attachable to the work and adapted to position the jaws of a punch, of a punch comprising a head, a screw-threaded spindle rotatably connected with said head, a sleeve in threaded engagement with said spindle, arms having jaws and provided with punching members, said arms being pivotally connected with said head, and one of said arms being provided with a handle, a stop attached to one of said jaws, links pivotally connecting said arms with said sleeve, and a hand-wheel on the spindle.

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