

Aug. 8, 1939.

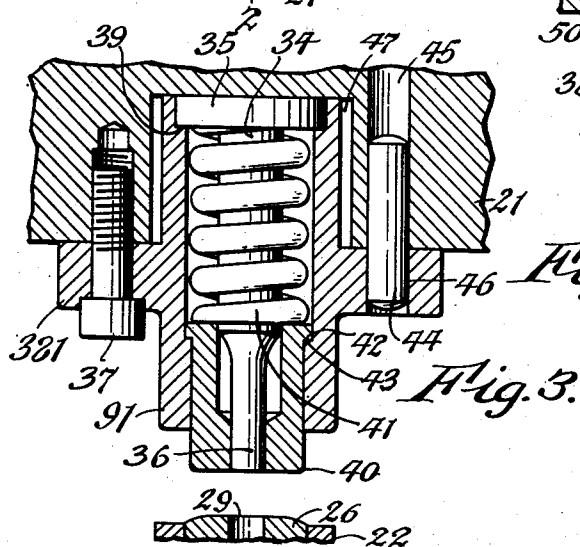
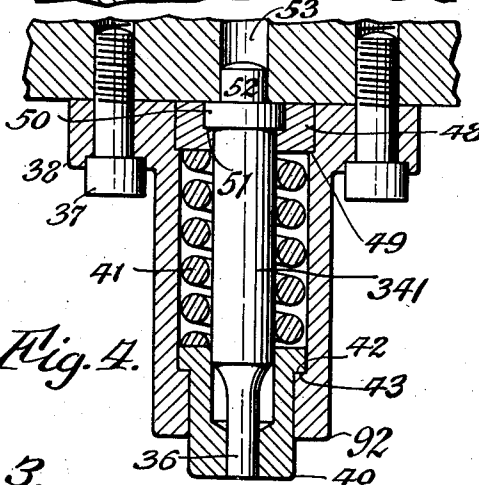
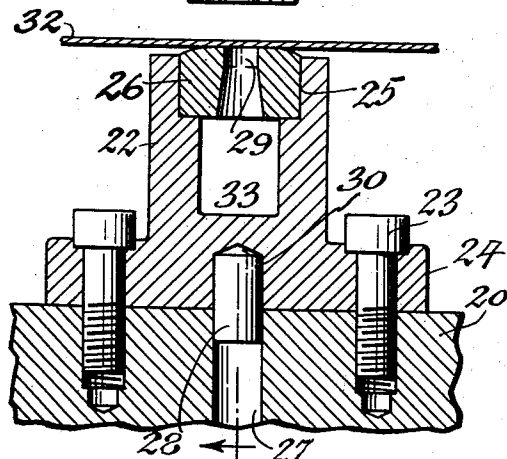
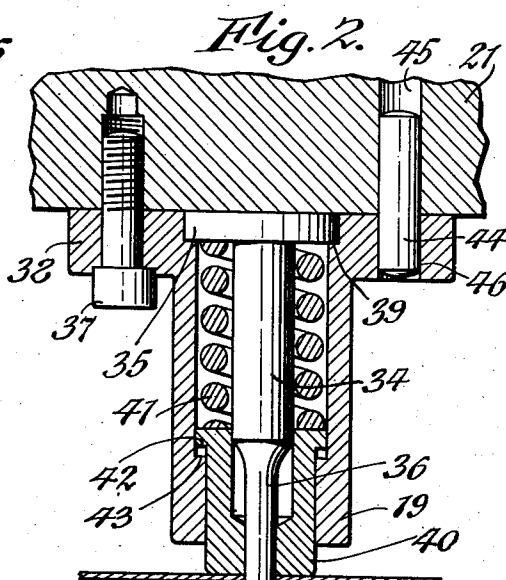
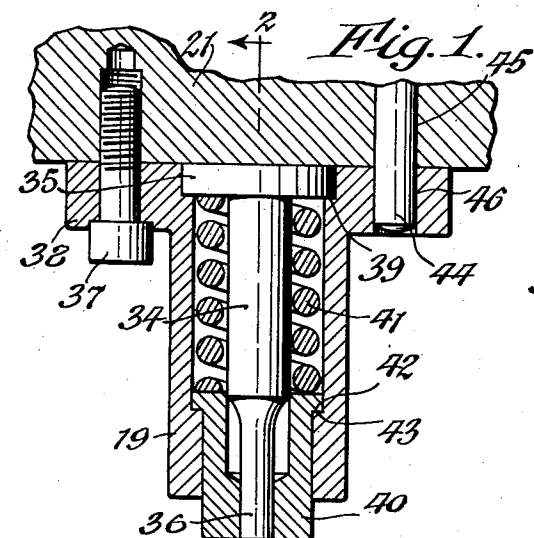
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2,168,377

PUNCHING AND STRIPPING MECHANISM FOR PRESSES

Filed June 9, 1938

2 Sheets-Sheet 1



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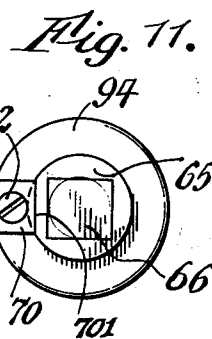
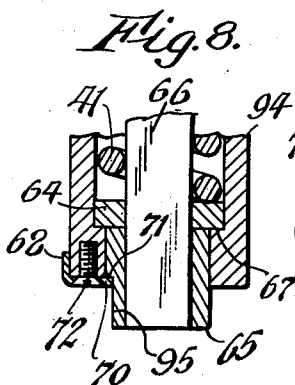
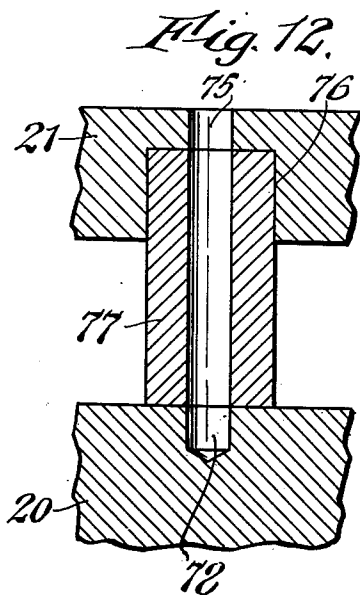
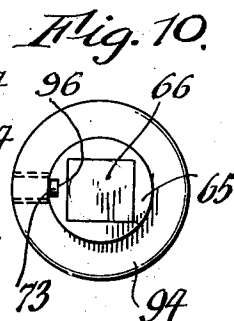
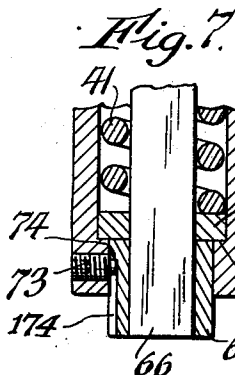
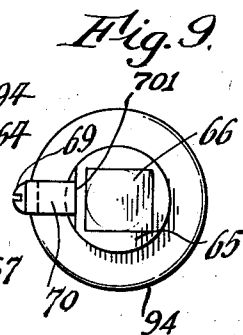
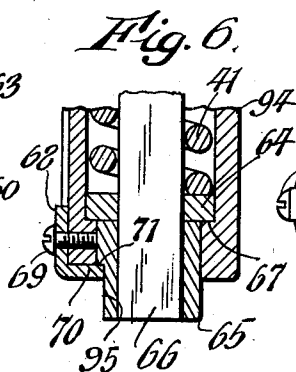
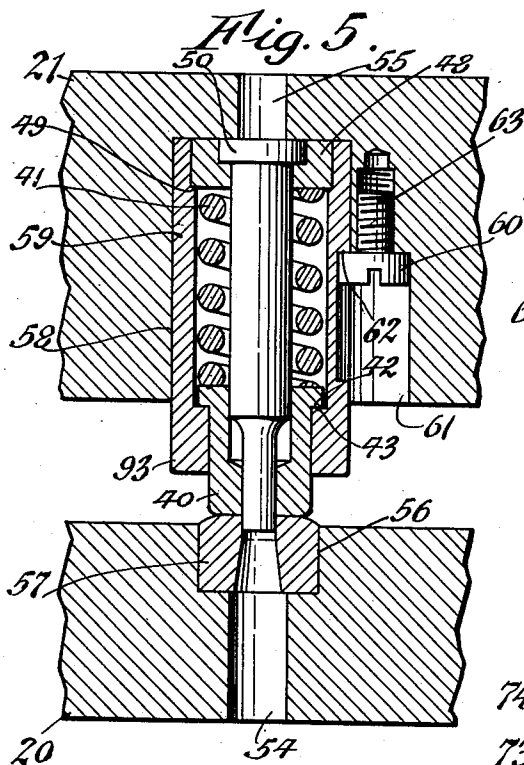
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2,168,377

PUNCHING AND STRIPPING MECHANISM FOR PRESSES

Filed June 9, 1938

2 Sheets-Sheet 2



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PUNCHING AND STRIPPING MECHANISM
FOR PRESSES

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Application June 9, 1938, Serial No. 212,775

13 Claims. (Cl. 164—124)

This invention relates to a punching and stripping mechanism which is more particularly intended for use in connection with presses for punching and stamping sheet metal but may also be advantageously employed in other installations.

The object of this invention is to provide a mechanism of this character which is simple in construction, more durable in operation and capable of being set up accurately more easily and conveniently than has been possible heretofore.

In the accompanying drawings:

Fig. 1 is a vertical transverse section of one form of punching and stripping mechanism embodying my improvements, and showing the punching unit in its elevated inoperative position.

Fig. 2 is a vertical longitudinal section of the same taken on line 2—2, Fig. 1 and showing the punching unit in its lowered operative position.

Figs. 3, 4 and 5 are vertical sections of punching and stripping mechanism showing modified forms of this invention.

Figs. 6, 7 and 8 are fragmentary vertical sections showing different means for retaining the punch guide and stripper on the punch holder as compared with the construction shown in Figs. 1-5.

Figs. 9, 10 and 11 are bottom plan views respectively of the mechanism shown in Figs. 6, 7 and 8.

Figs. 12 is a vertical section showing means for accurately forming the companion pilot openings on the ram or punch head and the bed or die shoe for use in locating the punch and die units in their proper relative position on these parts.

In the following description similar characters of reference indicate like parts in the several figures of the drawings:

Referring to Figs. 1 and 2, the numeral 20 represents the lower stationary bed or shoe upon which the die unit is mounted and 21 the upper ram or head which is movable vertically toward and from the bed or shoe and upon which the punch unit is mounted.

Upon the bed is mounted a die holder 22 which rests on the same and is detachably secured thereto by screws 23 passing through lugs or ears 24 on opposite sides of this holder and entering threaded openings in the adjacent parts of the bed, as shown in Fig. 1.

In its upper side the die holder is provided with a pocket or recess 25 which receives a button shaped die 26 which is seated with its underside on the bottom of this recess and held against lateral movement therein by engagement of the

side of the die with the side wall of this recess. This holder is definitely located in a predetermined position on the bed so that the die carried thereby will be in exact alinement or register with the punch which cooperates therewith by forming a pilot opening 27 vertically in the top of the bed and is provided with a vertical locating pin or dowel 28 which is axially in line with the opening 29 in the die and has its upper end engaging with an opening 30 in the underside of the die holder while its lower end engages with the locating opening 27 in the bed. The slug 31 which is punched out of the sheet 32 which is being perforated passes from the opening 29 in the die downwardly and laterally through a chute 33 in the die holder and is discharged on one side of the latter.

The punching unit includes an upright punch, the upper part 34 in the present case being of comparatively large diameter and provided at its upper end with a laterally projecting collar, flange or head 35 while the lower bit or tip 36 thereof is of smaller diameter. This punch is arranged within a tubular one-piece punch holder 19 which is secured to the ram with its upper end in engagement with the underside of the same by upright screws 37 passing through a flange 38 formed integrally on the side of the punch holder and into threaded openings in the adjacent parts of the ram, as shown in Figs. 1 and 2.

The punch is held against vertical and lateral movement on the ram by clamping the marginal part of the collar or flange 35 between the underside of the ram and an internal upwardly facing shoulder 39 formed in the upper end of the punch holder. The lower part or tip of the punch projects below the lower end of the punch holder and passes through a tubular stripper and punch guide 40 which slides vertically in the lower part of the punch holder. When the ram is elevated and the punch is in its inoperative position the stripper is projected so that its lower end is flush with the tip of the punch, this being accomplished by a stripper or ejector spring 41 arranged within the punch holder and around the punch and bears with its upper end against the underside of the punch flange 35 and with its lower end against the upper end of the stripper 40. The extent of downward movement of the latter within the punch holder under the action of the spring 41 is limited by a downwardly facing external shoulder 42 arranged on the stripper engaging with an upwardly facing internal shoulder 43 arranged on the inner side of the punch holder. Centering of the punch so that the same is in

exact alinement with the opening in the die is effected by means of vertical locating pins or dowels 44 each of which has its upper end arranged in an opening 45 in the underside of the ram 21 and its lower end engaging with an opening 46 in the flange 38 of the punch holder.

In the operation of this punching and stripping mechanism the workpiece or sheet of metal 32 to be perforated is placed on the die while the ram and punch are elevated so as to form the gap between the die and punch which receives the workpiece and the stripper 40 is projected to its fullest extent by the spring 41, as shown in Fig. 1. During the initial part of the downward stroke of the ram the stripper and punch move in unison therewith until the lower ends of the punch and stripper engage with the upper side of the workpiece. Thereafter the punch continues its downward movement independently of the stripper and punches a slug 31 out of the sheet 32 forming the workpiece, thereby forming a hole in the sheet, as shown in Fig. 2. While the punch is thus perforating the sheet the stripper is pressing downwardly on the sheet, the tubular punch holder is moving downwardly relative to the stripper and the spring 41 is compressed between the collar or flange 35 of the punch and the stripper, as shown in the last mentioned figure. During the first part of the subsequent upward movement of the ram with the punch and punch holder the stripper remains at rest on the work sheet 32 until the shoulders 42 and 43 of the stripper and punch holder engage one another, thereby causing the sheet of material which has been perforated to be pushed or stripped off from the tip of the punch and during the final part of the upward movement of the ram, punch and punch holder the same complete their upward stroke in unison and leave the perforated sheet on the die.

In setting up the die and punch units preparatory to operating the punching and stripping mechanism in the described manner the bed and die holder are first provided respectively with the openings 27 and 30 in the required position, and then the locating pin or dowel 28 is engaged at its lower and upper ends with said openings 27 and 30 thereby properly locating the die 26 whose axis is vertically in line with the axes of the pilot pin and these openings, as shown in Figs. 1 and 2. The die holder is then secured to the bed by means of the screws 23 passing through the holes in the lugs and into the bed.

For the purpose of accurately alining or locating the punch relative to the die so that the same cooperate properly during the subsequent operation of the press the spring 41 is removed from the punch holder and the punch guide or stripper is moved upwardly in the punch holder, thereby causing only the lower tip or bit 36 to project from the bottom of the punch holder. This bit is now inserted in the opening of the die so that the same serves as a pilot which positively aligns the punch and die and while these parts are in this position the holes are drilled in the ram for the reception of the locating pins 44 and the fastening screws 37. After this the punch holder is taken off the ram, the stripper or guide 40 is lowered in the punch holder, the spring 41 is restored between the stripper or guide and the collar, flange or head 35 of the punch and the punch holder is replaced on the ram in the proper location by the use of the locating pins 44 and then fastened thereto by the screws 37, thereby completing the die and punch assembly ready for operation.

In order to permit a die and punch mounting of the character shown in Figs. 1 and 2 to be mounted on a press in which the shut height between the bed and ram is less than that shown in these figures the mounting of the punch holder on the ram may be modified as shown in Fig. 3. In this construction the upper end of the punch holder 91 is arranged within a recess 47 counterbored in the underside of the ram and the upper ends of the punch and punch holder bear against the bottom of this recess. Between its upper and lower ends the punch holder 91 is provided with a laterally projecting flange 381 which is secured to the underside of the ram by fastening screws 37 and the punch is properly located with reference to the die on the bed by a locating pin 44 engaging holes 45 and 46 in the ram and the flange 381 in the same manner as that shown in Figs. 1 and 2. This method of mounting the punching unit on the ram provides the necessary flexibility for adapting the punching unit to presses having various shut heights between the ram and bed inasmuch as it only requires the ram to be counterbored to produce a recess 47 having a depth equal to the distance which the lower end of the bit of the punch must be arranged from the underside of the ram in order to accommodate this punching unit.

If desired the use of separate locating pins or dowels may be avoided and the punch may be so constructed that the same also serves as a locating pin or dowel. Such an organization is shown in Fig. 4 and constructed as follows:

The numeral 48 represents a ring shaped abutment which is engaged on its underside by the stripper or ejector spring 41 and which is secured within the punch holder by clamping the same between the underside of the ram and an upwardly facing shoulder 49 in the bore of the punch holder 92. The upper part 341 of the punch is arranged within the ring shaped abutment 48 and held against vertical movement relative to the ram and punch holder 92 by a flange or collar 50 arranged on the upper part of the punch and clamped between the underside of the ram and an upwardly facing shoulder 51 in the bore of the abutment ring 48. At its upper end the body 341 of the punch is provided with a locating pin or dowel 52 which is axially in line therewith and engages with a locating opening 50 or hole 53 arranged in the underside of the ram. Fastening of the punch holder 92 to the ram is effected in the same manner as that shown in Figs. 1 and 2 except that double screws are used.

The modified form of this invention shown in Fig. 5 embodies some of the features shown in Figs. 1-4 and is constructed as follows:

In this construction the bed and ram are drilled and reamed at the same time so as to form thereon alined locating holes or openings 54, 55 in the bed and ram, respectively for properly locating the die and punching units in the proper relative position for insuring cooperation with each other. Thereafter the bed is counterbored around the upper end of the bed opening 54 to form a concentric cylindrical socket or recess 56 which receives the die 57 and the ram is counterbored around the lower end of the locating hole 55 to form a seat 58 in which is closely fitted the upper end of the punch holder 59. The punch holder 70 is held in the seat 59 by a screw having its head 60 arranged in a counterbored recess 61 in the underside of the ram and engaging with a downwardly facing shoulder 62 on the side of the punch holder 93 and having its threaded shank 75

63 engaging a threaded opening in the bottom of the counterbore 61. In other respects the other structural features of this form of the punch unit are substantially like those shown in Figs. 1-4 and the corresponding parts are therefore identified by the same reference characters and the description of their function is equally applicable.

Instead of constructing the stripper and punch guide and mounting the same on the punch holder in the manner shown in Figs. 1-5 this may be accomplished by the various means shown in Figs. 6-11 and constructed as follows:

Referring to Figs. 6 and 9, the numeral 64 represents an abutment ring which is engaged by the lower end of the stripper spring 41 and which engages with the upper end of a tubular stripper 65 surrounding the lower or bit end 66 of the punch and resting on an upwardly facing shoulder 67 in the bore of the punch holder. The stripper 65 is slidable in the lower end of the punch holder 94 and capable of moving upwardly into the punch holder by compressing the stripper spring 41 when the stripper engages the workpiece but the downward movement of the stripper for stripping the workpiece from the bit of the punch is limited by an L-shaped clip having an upright arm 68 secured to the outer side of the punch holder by a horizontal screw 69 said arm having a stop finger 70 which projects inwardly from the lower end of the arm 68 and into the path of a downwardly facing shoulder 71 on the side of the stripper and adapted to be engaged by the same, as shown in Fig. 6.

If desired the L-shaped clip may be secured to the punch holder by a vertical screw 72 passing through the stop finger of this clip into the lower end of the punch holder, as shown in Figs. 8 and 11.

In the construction shown in Figs. 7 and 10 the downward movement of the stripper or punch guide relative to the punch holder is limited by a stop screw 73 engaging with a downwardly facing shoulder 74 on the side of the stripper 65.

When using a punch having a bit which is not round, such as the square bit 66 shown in Figs. 9, 10 and 11 it is necessary to prevent the same from turning in order that it will cooperate with the correspondingly shaped die. This may be accomplished in constructions shown in Figs. 6, 9, 8 and 11 by engaging the inner end of the lower finger 70 of the retaining clip with a flat face 95 formed on the side of the stripper 65 or by engaging the inner end of the screw 73 with a longitudinal slot 96 in the side of the stripper 65, as shown in Figs. 7 and 10.

The use of retaining members similar to the clips 68, 70 and the screw 73 also renders it possible to use different strippers to suit different sizes of punches in the same punch holder 94.

If desired the drilling, reaming and counterboring of the bed and ram preparatory to mounting the die and punching units in proper alignment thereon may be effected in the manner shown in Fig. 12 which consists in first drilling a locating hole 75 in the ram, then counterboring a seat 76 in the underside of the ram around the lower end of the hole 75, then placing a pilot or locating bushing 77 with its upper end into the counterbore 76 and engaging the lower end of this bushing with the top of the bed 20 and then passing the drill through the ram opening 75 and the bore of the pilot bushing 77 and forming a locating opening 78 in the bed. The counterbore may receive the upper end of the punch

holder when the form of punch unit shown in Figs. 3 and 5 is employed, the hole 75 may be used for locating purposes when employing the punching unit shown in Fig. 4, and the hole 78 in the bed may be used for locating the die holder and when using the construction of die unit shown in Figs. 1 and 2. When the punch is round the stop 70, shown in Figs. 6 and 8, only serves the purpose of limiting the downward movement of the stripper 65, and if it is desired, the stripper may be held against turning relative to a round punch by a form of the stop 73, 74 which is shown in Fig. 7 and engages with a longitudinal groove 174 in the outer side of the respective stripper.

When the punch is square in cross section, as shown in Figs. 9, 10 and 11, or of other non-circular formation, then the stop 70 will not only limit the outward movement of the stripper but also hold the stripper and the punch against rotation by engaging the inner end of the stop with a flat face 701 on the side of the respective stripper, as shown in Figs. 9 and 11.

I claim as my invention:

1. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is secured between the underside of the ram and an upwardly facing shoulder on the punch holder, a tubular stripper movable lengthwise between the lower parts of the punch and the punch holder and limited in its downward movement and an ejector spring arranged between said punch and punch holder and operating to project said stripper and engaging its upper end with said collar.

2. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and adapted to project said stripper, and an annular abutment surrounding the punch and engaged by the lower end of said spring and bearing against the upper end of said stripper and an upwardly facing stop shoulder on said punch holder.

3. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited

ited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and adapted to project said stripper, an annular abutment surrounding the punch and engaged by the lower end of said spring and bearing against the upper end of said stripper and an upwardly facing stop shoulder on said punch holder, and means for limiting the downward movement of said stripper including a stop member secured to said punch holder and adapted to be engaged by a downwardly facing stop shoulder on said stripper.

4. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and operating to move the stripper downwardly, and means for detachably connecting the punch holder with said ram including a flange formed integrally on the punch holder, and a screw passing through said flange into said ram.

5. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and operating to move the stripper downwardly, means for detachably connecting the punch holder with said ram including a flange formed integrally on the punch holder, and a screw passing through said flange into said ram, and a locating pin engaging with openings in said flange and ram.

6. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and operating to move the stripper downwardly, a die holder supporting said die and engaging said bed, and means for detachably connecting the die holder and bed including a lug formed integrally with the die holder and a fastening screw passing through said lug and into said bed.

7. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a one-piece tubular punch holder secured at its upper end to the ram, a punch arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and operating to move the stripper downwardly, a die holder supporting said die and engaging said bed, means detachably connecting said die holder and bed, and means for locating said die holder on the bed consisting of a locating pin arranged axially in line with said die and engaging with locating holes in said die holder and bed.

8. A punching press comprising a bed and ram one movable relatively to the other, a die mounted on the bed, a punch adapted to cooperate at its lower end with said die and provided at its upper end with a collar engaging with the underside of the ram, means for locating said punch on the ram consisting of a locating pin projecting upwardly from the punch and a locating opening in the ram which receives said pin, a holder for said punch secured to the ram, a stripper arranged adjacent to the lower end of said punch, and spring means for ejecting said stripper arranged in the holder.

9. A punching press comprising a bed and ram one movable relatively to the other, a die mounted on the bed, a punch adapted to cooperate at its lower end with said die and provided at its upper end with a collar engaging with the underside of the ram, means for locating said punch on the ram consisting of a locating pin projecting upwardly from the punch and a locating opening in the ram which receives said pin, a tubular holder surrounding the punch and secured to the ram, an abutment and retaining ring interposed between the underside of the ram and an upturned shoulder on the punch holder and provided with an upturned shoulder engaging the underside of said collar, a tubular stripper surrounding the lower part of said punch and provided with a downwardly turned shoulder cooperating with an upturned shoulder on the punch holder, and an ejector spring interposed between said ring and said stripper.

10. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a tubular punch holder having its upper end arranged in a recess in the underside of the ram and provided between its upper and lower ends with a laterally projecting flange secured to the underside of said ram, a punch arranged in the punch holder and adapted to cooperate with said die, a stripper movable lengthwise of the punch, and spring ejecting means arranged in the punch holder and operating to project said stripper.

11. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a tubular punch holder having its upper end arranged in a recess in the underside of the ram and provided with a downwardly facing shoulder, a screw secured to said

ram and having a head engaging the shoulder of said punch holder, a stripper movable lengthwise of the punch, and spring means arranged in the punch holder and operating to project said

5 stripper.

12. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a tubular punch holder

10 having its upper end arranged in a recess in the underside of the ram, means for connecting said punch holder with said ram, a punch arranged in the holder and adapted to cooperate with said die, a stripper movable lengthwise of said punch, and

15 spring means for projecting said stripper.

13. A punching press comprising a bed and a ram movable one relatively to the other, a die unit mounted on the bed, and a punch unit mounted on the ram and including a tubular punch holder

20 secured at its upper end to the ram, a punch

arranged within the punch holder and having its lower bit end projecting beyond the punch holder and adapted to cooperate with said die and provided at its upper end with an integral collar which is immovably connected with said ram and punch holder, a tubular stripper slidable lengthwise between the lower parts of said punch and punch holder and limited in its downward movement relative thereto, an ejector spring arranged between said punch and punch holder and adapted to project said stripper, an annular abutment surrounding the punch and engaged by the lower end of said spring and bearing against the upper end of said stripper and an upwardly facing stop shoulder on said punch holder, and means for limiting the downward movement of said stripper and also preventing turning of the same relative to said punch holder.

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