July 24, 1923.

1,462,733

G. BECHERER, JR

COMPOUND PROGRESSIVE PUNCH AND DIES

Filed June 20, 1921

4 Sheets-Sheet 1

FIG. 1

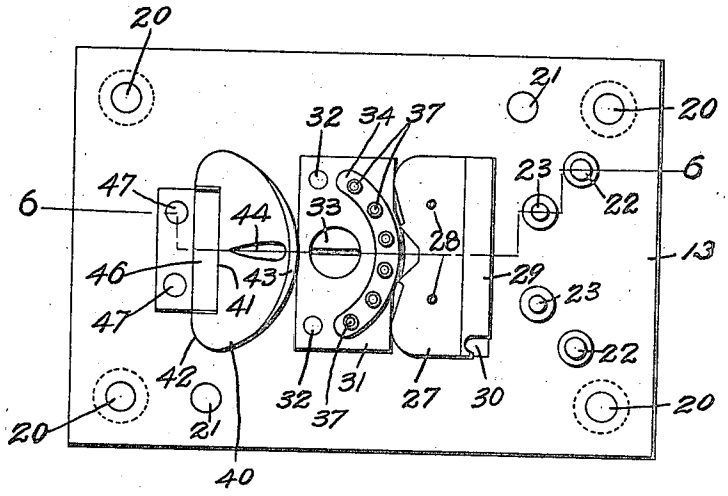
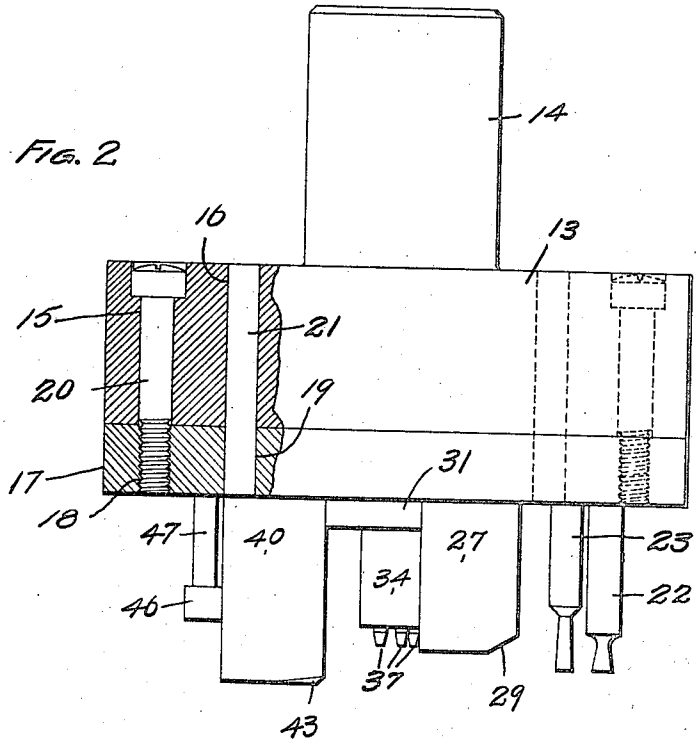


FIG. 2



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Fig. 3

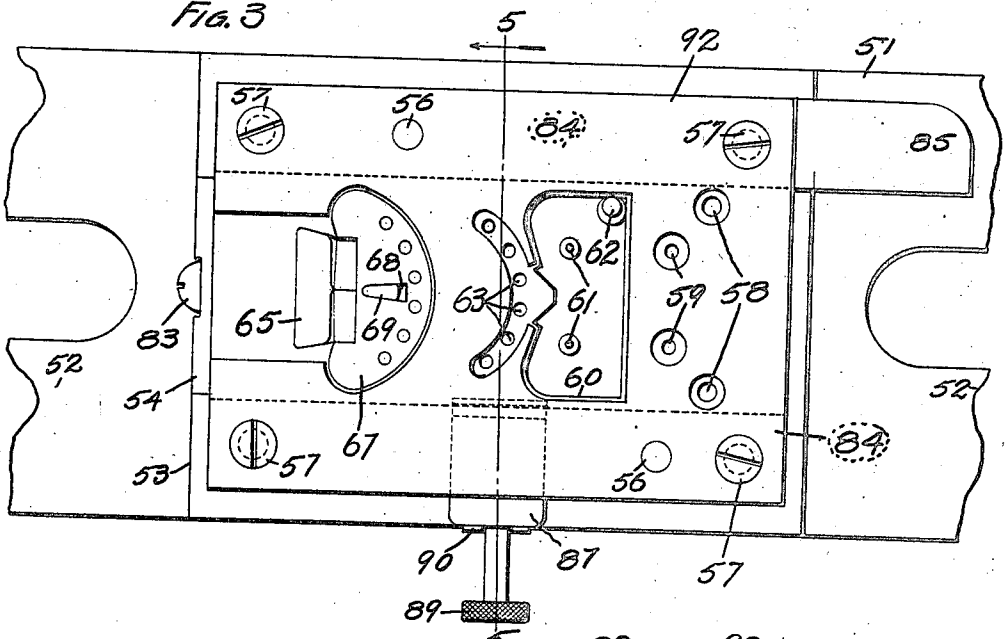
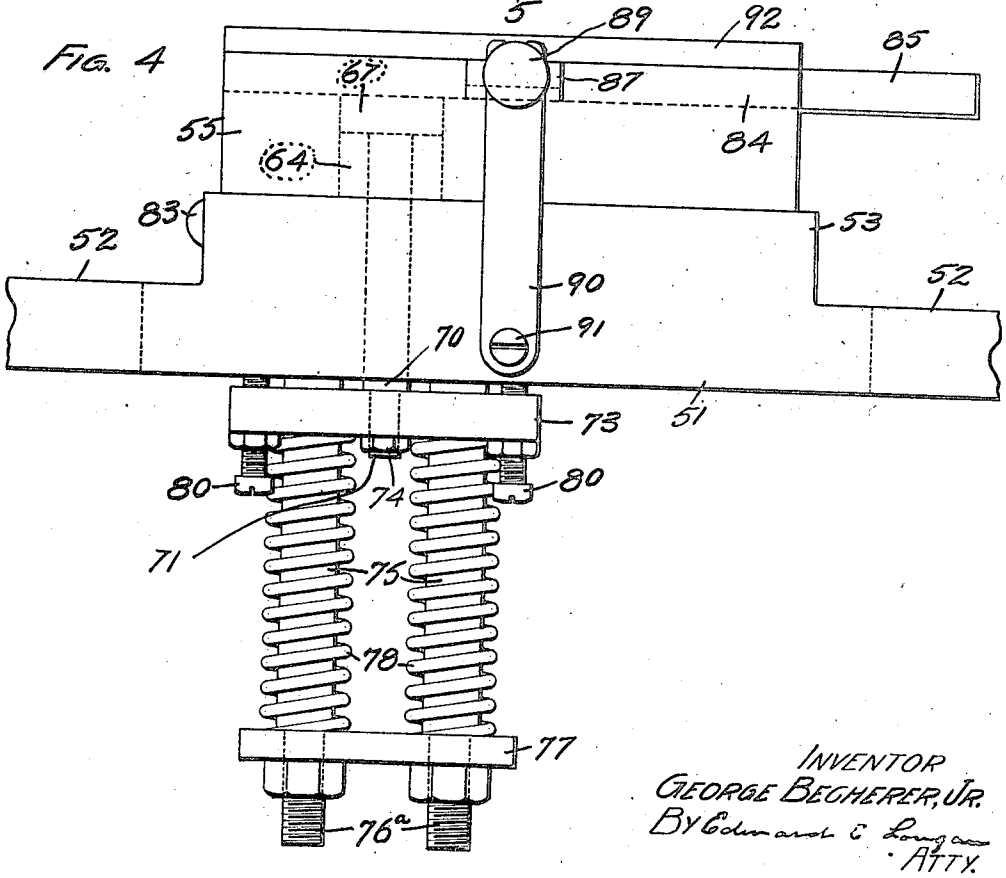


Fig. 4



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Fig. 5

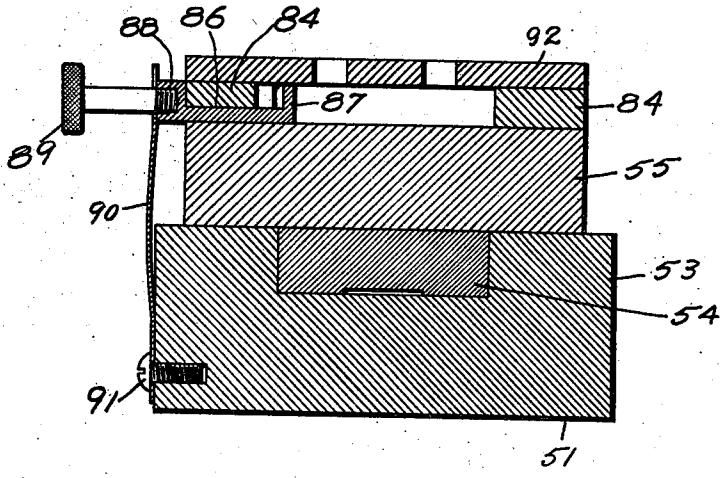


Fig. 8

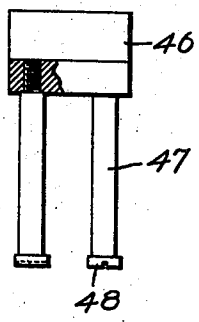


Fig. 10.

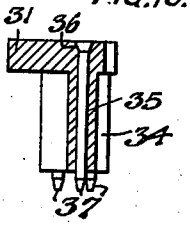


Fig. 9

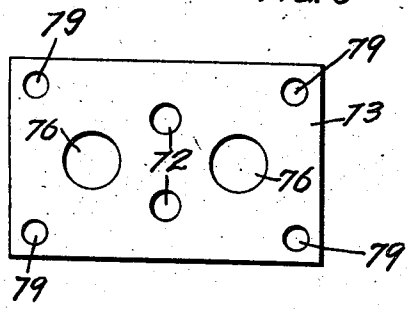
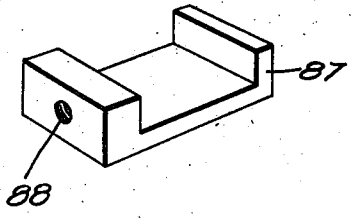


Fig. 11



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COMPOUND PROGRESSIVE PUNCH AND DIES

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Fig. 6

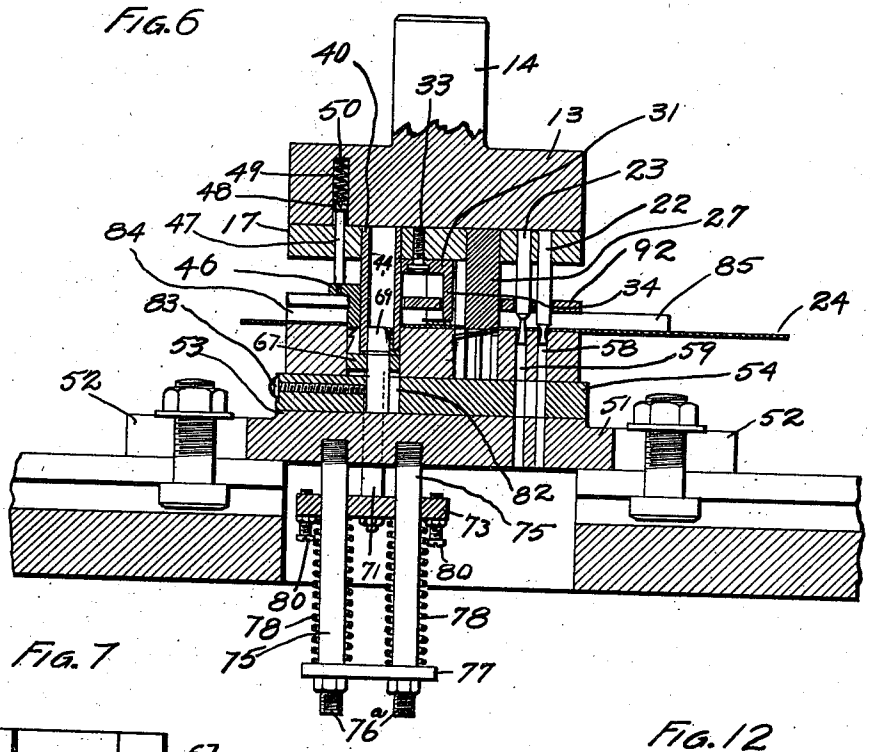


Fig. 7

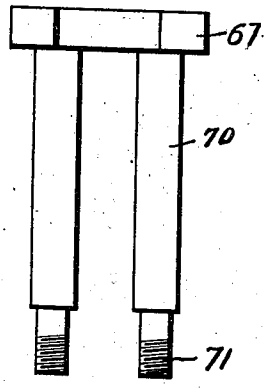
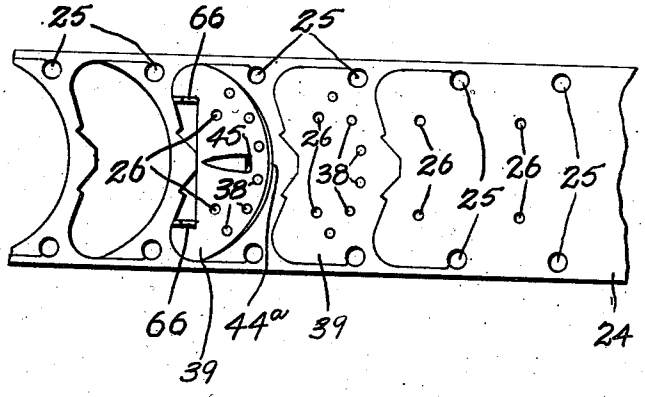


Fig. 12



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UNITED STATES PATENT OFFICE.

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COMPOUND PROGRESSIVE PUNCH AND DIES.

Application filed June 20, 1921. Serial No. 478,812.

To all whom it may concern:

Be it known that I, GEORGE BECHERER, JR., a citizen of the United States, and resident of the city of St. Louis, and State of Missouri, have invented certain new and useful Improvements in Compound Progressive Punches and Dies, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in compound progressive punches and dies and has for its primary object a punch and die, a part of which acts as a progressive punch and die and part as a compound punch and die.

A further object is to construct a punch and die, parts of which do punching only, parts forming only, and parts both punching and forming.

In the drawings,

Fig. 1 is a bottom plan view of the punch made use of.

Fig. 2 a side elevation of the same with parts broken away and in section.

Fig. 3 a top plan view of the die with portions thereof broken away.

Fig. 4 a side elevation of the same.

Fig. 5 a vertical cross section taken on the line 5—5 of Fig. 3, viewing the same in the direction of the arrow.

Fig. 6 is a sectional view of the punch and die, showing the same in operation, taken on the line 6—6 of Fig. 1.

Fig. 7 is an end elevation of the stripper which is located in the die.

Fig. 8 an end elevation of the stripper located in the punch with parts broken away and in section.

Fig. 9 a top plan view of the adjusting plate to which the stripper in the die is secured.

Fig. 10 a sectional view of the punch which forms the knob projections.

Fig. 11 a perspective view of the presser die.

Fig. 12 a top plan view of a fragment of sheet metal, showing the various stages of the work as it progresses through the die.

In the construction of my device I employ an ordinary punch press having a ram and a bed plate. Secured to the ram is my improved punch which consists of the base portion 13. This base portion has formed integral therewith a projecting member 14 which is designed to be inserted in the ram so that the die may be secured thereto. The base portion 13 is provided with countersunk openings 15 and straight openings 16. Secured to the base 13 is a plate 17 which is provided with screw threaded openings 18 and the straight openings 19. The screw threaded openings are designed to receive the ends of bolts or screws 20 by means of which the plate 17 is secured to the base 13, while the openings 16 and 19 are designed to receive the pins 21. The purpose of the pins 21 is to prevent shifting occurring between the base 13 and plate 17, while the screws 20 bind the two together. Secured to the plate 17 are punches 22 and 23. These punches are for forming circular openings in a strip of metal 24. The punches 22 make the openings 25, while the punches 23 make the openings 26. The purpose of these openings will be explained in detail later. The punches 22 and 23 are located near one of the short edges of the plate 17. Immediately in advance of the punches 23 is located a punch 27. This punch is adapted to blank out a portion of the finished article. The punch 27 is provided with a pair of openings 28 which are in direct alinement longitudinally of the punch with the punches 23. The rear end of the punch 27 is cut away or inclined as indicated at 29. This is for the purpose of allowing the punch 27 to only cut out a portion of the finished article. The punch 27 is further provided with a recess 30, the purpose of which will be explained in detail. Secured to the base 17 and in advance of the punch 27 is a plate 31. This plate is secured to the plate 17 by means of pins 32 which prevent its shifting and by means of a screw 33. The plate 31 is provided with a projection 34. This projection being curved or in other words a fragment of a cylinder. The projection 34 is provided with a plurality of bores 35 which are cylindrical throughout the greater portion of their length. The ends of the portions 35 adjacent the plate 31 are tapered as indicated by the numeral 36. Within these bores are located pins 37 which have their upper or projecting ends shaped in the form of a truncated cone. The purpose of these pins is to form depressions 38 in the heel plate 39. These depressions being formed on one side of the plate, cause knobs

to be formed on the other side, which knobs act as a wearing surface. To the front of the plate 31 is secured a punch 40. This punch has its one surface practically semi-circular in form, and opposite the semi-circular surface of the die is a recess or groove 41. This recess or groove is connected to the semi-circular portion by means of the rounded surfaces 42. The punch 40 has a portion of its semi-circular surface cut away or chamfered as at 43. The purpose of this is to form the ridge or sharpened edge 44ª on the heel plate. The punch 40 is further provided with the opening 44 which is for the purpose of admitting a punch for punching out the central fastening tongue 45 which operation will be described later. Located in the recess 41 is a stripper 46 which is constructed of an L-shaped piece of material to which are secured studs 47. The ends 48 of the studs are designed to pass into openings or bores 49 formed in the base 13. In these bores are located coil springs 50 which exert pressure on the studs 47 and force the stripper 46 toward the end of the punch 40. The heads 48 are for preventing the studs from passing through the plate 17. The punches 22, 23, 27 and 40 are inserted in openings formed in the plate 17 and are secured therein by means of peining so that they will at all times hold against any movement whatsoever.

The die consists of a base 51 which is provided with slotted extensions 52 so that the same may be secured to the bed of the press. The base is provided with an upwardly projecting portion 53 which has formed therein a centrally slotted or cut away portion in which is located a plate 54. This plate is preferably of hard steel. Located on the projection 53 and plate 54 is a second plate 55, likewise formed of hard steel. This plate forms the die and is secured to the base 51 by means of pins 56 and screws or bolts 57, in the same manner that the plates 13 and 17 are secured together. Formed in the plate 55 are openings 58 which are in alinement with and coact with the punches 22 for forming the openings 25. In the plate 55 are also the openings 59 which coact with the punches 23 so that the openings 26 may be formed. In advance of the openings 59 and in the plate 55 is formed the opening 60 which is designed to coact with the punch 27. Extending upwardly in the opening 60 and secured in the plate 54 are pins 61 which have their upper edges tapered so as to be substantially conical in shape. These conical ends are designed to enter the openings 28 and thus countersink the openings 26 which have been formed in the strip of material 24. Located in the plate 54 and extending upwardly in the opening 60 is a pin 62. This pin extends slightly above the upper surface of the die or plate 55 and is for the purpose of entering one of the openings 25. The openings 25 merely serve as a gage for feeding the material and my purpose in forming two openings instead of one, is to distribute the pressure equally on the punch so that no twisting may result. Formed in advance of the opening 60 and in the die 55 are a plurality of openings 63 which register with the pins 37. Formed through the die and in advance of the openings 63 is an opening 64. This opening is of substantially the same shape as the punch 40. Secured in the die 55 is a die 65. This die fills out the recess 41 formed in the punch 40 and is for the purpose of cutting out and forming the prongs 66. Located in the recess or opening 64 is a stripper 67. This stripper has a central opening 68 through which the punch 69 for forming the prong 45 extends. This stripper has formed integral therewith studs or projections 70. These studs or projections extend entirely through the plate 54 and base 53. The ends of the studs 70 are turned down or reduced in size and screw threaded as at 71. This reduced portion is adapted to enter the openings 72 formed in the adjusting plate 73 and the studs 70 are designed to be secured to the plate 73 by means of nuts 74. Secured in the base 52 are posts 75. These posts are adapted to pass through openings 76 formed in the plate 73. The posts 75 have their lower ends reduced and screw threaded as at 76ª. This reduced end is adapted to pass through a plate 77. Between the plates 77 and 73 and surrounding the posts 75 are coil springs 78 which exert an upward pressure on the plate 73. The plate 73 is further provided with screw threaded openings 79 through which pass adjusting screws 80. These adjusting screws are designed to contact with the under surface of the base 51 so that the adjustment of the stripper 67 can be regulated. Secured in the plate 54 is an abutment 82 which is for the purpose of preventing the punch 69 from mashing backward into the plate 54. The abutment 82 is constructed of hardened tool steel and in order to secure the punch 69 in position, I employ the screw 83 which extends through the plate 54 and holds the punch 69 against the abutment 82. Located on the die 55 are spacing strips 84. One of said strips has an extension 85 which serves as a guide for the material 24. The other strip is provided with a recess or opening 86 through which the presser guide 87 extends. This presser guide is so arranged as to have its outward and inward movement limited. This is clearly shown in Figs. 5 and 11. The presser guide is provided with a screw threaded opening 88 in which is adapted to be seated a stud 89. This stud has a knurled head so that the presser guide may be oper-

ated. Secured to the base 51 is a leaf spring 90 having its upper end bifurcated so that it will straddle the shank of the stud. The lower end is secured to the base by means of the screw 91. Located on the spacing strips 84 is a stripper plate 92 having therein openings to allow the various punches and other parts carried to pass therethrough and to enter their respective recesses in the die. This stripper plate as well as the spacing strips is secured to the die and base by means of the pins 56 and screws 57.

The operation of my device is as follows: After the punch and die have been secured to the press and properly adjusted, the strip of metal 24 is inserted in the die underneath the stripper plate 92, in such a manner that one edge of the metal will bear against the extension 85. The press is then operated and the punches 22 and 23 form the holes 26 and 25. The press is then stopped and the presser guide 87 is drawn out to its fullest extent. The strip of metal is then fed forward by hand and one of the openings 25 placed over the guide pin 62. The presser guide 87 is then released and by the action of the spring 90, the material is held against lateral shifting, and the press is now again placed in operation. This next operation will punch two additional holes 25 and 26 and cut out a portion of the heel plate and at the same time counter-sink the holes 26. The punch then again rises as the press continues to operate. The strip of metal 24 is raised to disengage the opening 25 from the guide pin 62 and the strip of metal pushed forward until the opening 25 which has just been formed by the punch 22 slips over the guide pin 62. This brings the heel plate which has been partially formed and in which the holes 26 have been counter-sunk into the position over the openings 63 formed in the die. The downward movement of the punch now forms the knob projections or recesses 38. Upon the punch arising again the strip of metal is fed forward in the same manner as previously stated. This brings the heel plate which has already been partially formed and on which the knob projections have now been placed under the punch 40, here by means of the dies 65 and 69, the prongs 66 and 45 are cut and bent to their proper shape. During this operation the sharpened edge 44^a is also formed and the heel plate completely severed from the strip of material, thus it will be seen that four operations of the punch are necessary to turn out a complete heel plate and after the first operation a complete heel plate is turned out with every downward movement of the punch. While I have shown my device as being used for the manufacture of heel plates, still it is obvious with changes in the formation of the punch and die, various other objects can be manufactured in the same way. After the heel plate has been formed the stripper plates 67 and 46 come into action. The plate 67 raises the heel plate out of the opening 64 formed in the die. While the stripper 46 removes the prongs 66 from the sides of the recess 41 cut into the punch 40, the position which the strip of metal and the various portions of the heel plate assume during the process of manufacture is clearly illustrated in Fig. 6. This also shows the several positions which the strippers 67 and 46 assume while the heel plate is being formed. During the downward movement of the punch the guide pin 62 enters the recess 30 formed in the punch 27. This recess prevents the breaking of the guide pin 62 which would be the case were it not present.

Having fully described my invention, what I claim is:

1. A compound punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only, some as formers only, and some having dies formed therein, a die with which said punches coact, said last mentioned die being equipped with punches to coact with the dies formed in the punches, and means for securing the punch and die to a punch press.

2. A compound punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only, some as formers only, and some having dies formed therein, a die with which said punches coact, said die being equipped with punches to coact with the dies formed in the punches, a stripper plate carried by the die, a spring actuated presser guide carried by said die, and means for securing the punch and die to a punch press.

3. A compound progressive punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, strippers carried by the punch member and located in the forming punches, some of said punches acting as formers only, and some as punches only, a die with which said punches coact, spring actuated strippers located in said punch and die, and means for securing the punch and die to a punch press.

4. A compound punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only, some as formers only, and some having dies formed therein, a die with which said punches coact, said die being equipped with punches to

coact with the dies formed in the punches, a stripper plate carried by said die, a presser guide carried by the die and beneath said stripper plate for preventing lateral movement of material fed under the punch, and means for securing the punch and die to a punch press.

5. A compound progressive punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only, and some as formers only, a die with which said punches coact, spring actuated strippers carried by the punch and the die, a spring actuated presser guide carried by the die for preventing lateral movement of material fed under the punch, and means for securing the punch and die to a punch press.

6. A compound progressive punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only and some as formers only, a die with which said punches are adapted to coact, a stripper plate carried by the die, a spring actuated presser guide carried by the die and located beneath the stripper plate for preventing lateral movement of material fed under the punch, and means for securing the punch and die to a punch press.

7. A compound punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, some as punches only, some as formers only, and some having dies formed therein, a die with which said punches coact, said last mentioned die being equipped with punches to coact with the dies formed in the punches, a stripper plate carried by the die, a spring actuated presser guide carried by the die and located beneath said stripper plate for preventing lateral movement of material fed under the punch, and means for securing the punch and die to a punch press.

8. A compound progressive punch and die, comprising a punch member having a plurality of punches secured thereto, some of said punches acting as combined punches and formers, strippers carried by the punch member and located in the forming punches, some of said punches acting as formers only, and some as punches only, a die with which said punches coact, spring actuated strippers located in said punch and die, a spring actuated presser guide carried by the die for preventing lateral movement of material fed under the punch, and means for securing the punch and die to a punch press.

In testimony whereof, I have signed my name to this specification.

GEORGE BECHERER, JR.