Aug. 4, 1936. A. J. LEWIS 2,049,915

MULTIPLE TRANSFER PRESS

Filed April 4, 1935 5 Sheets-Sheet 1

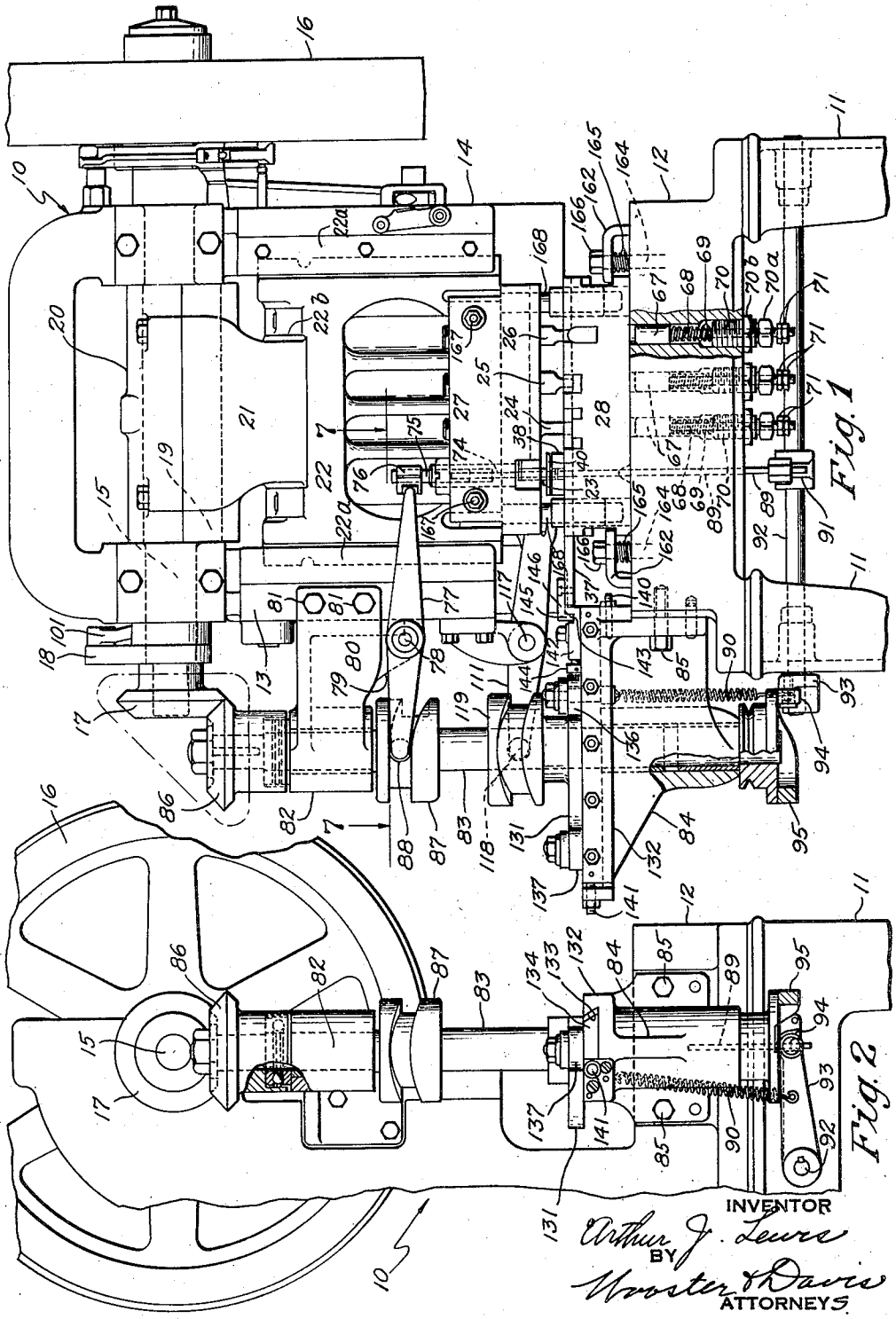


Fig. 1

Fig. 2

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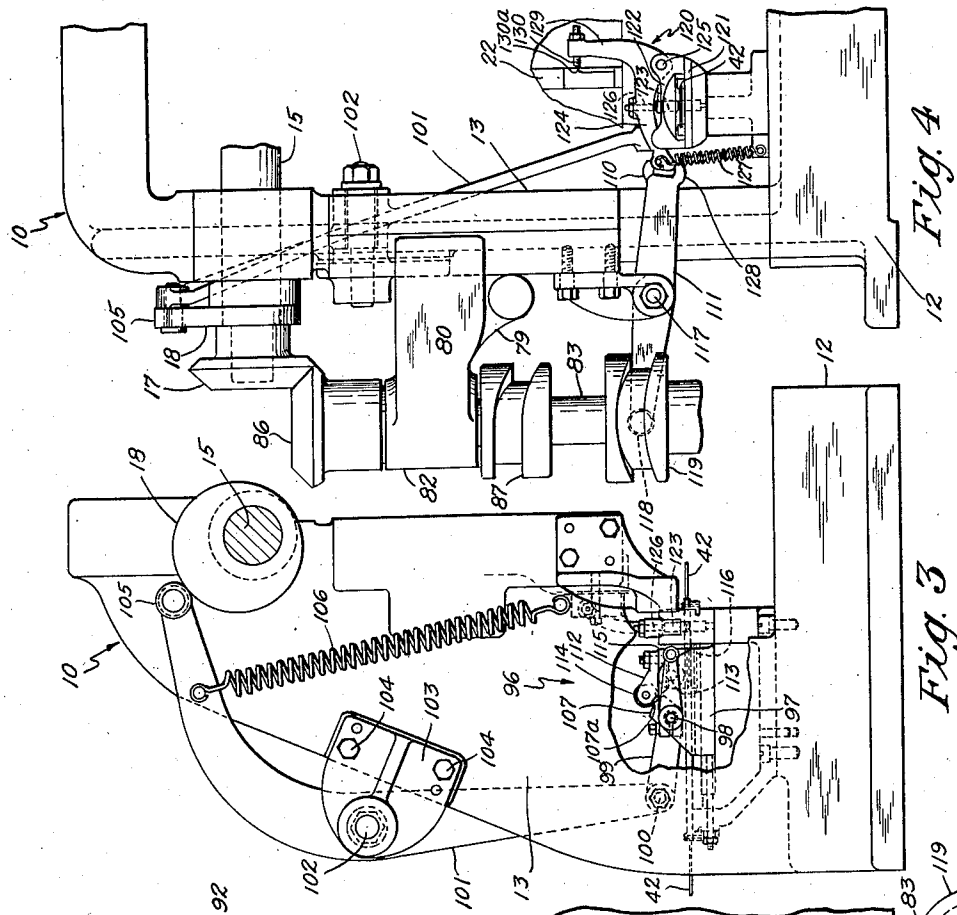


Fig. 4

Fig. 3

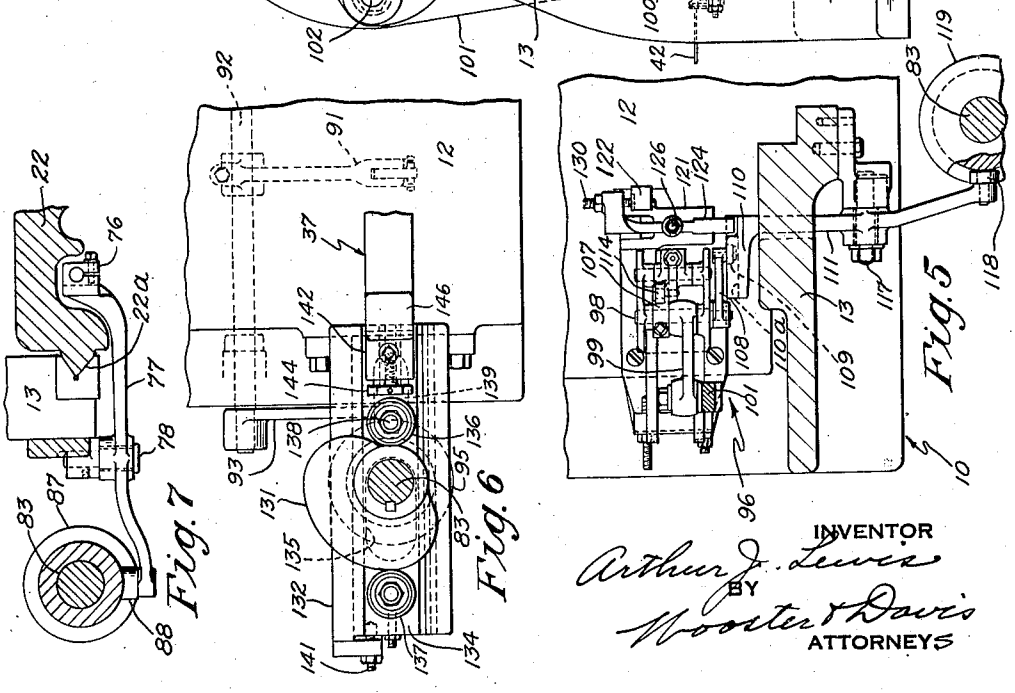


Fig. 5

Fig. 6

Fig. 7

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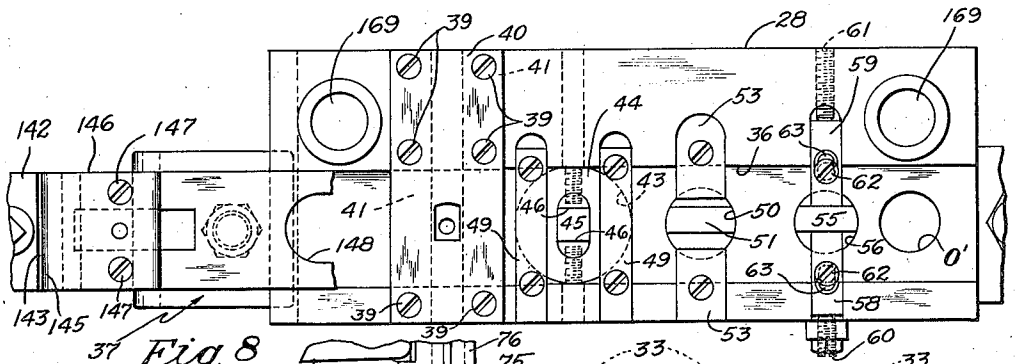


Fig. 8

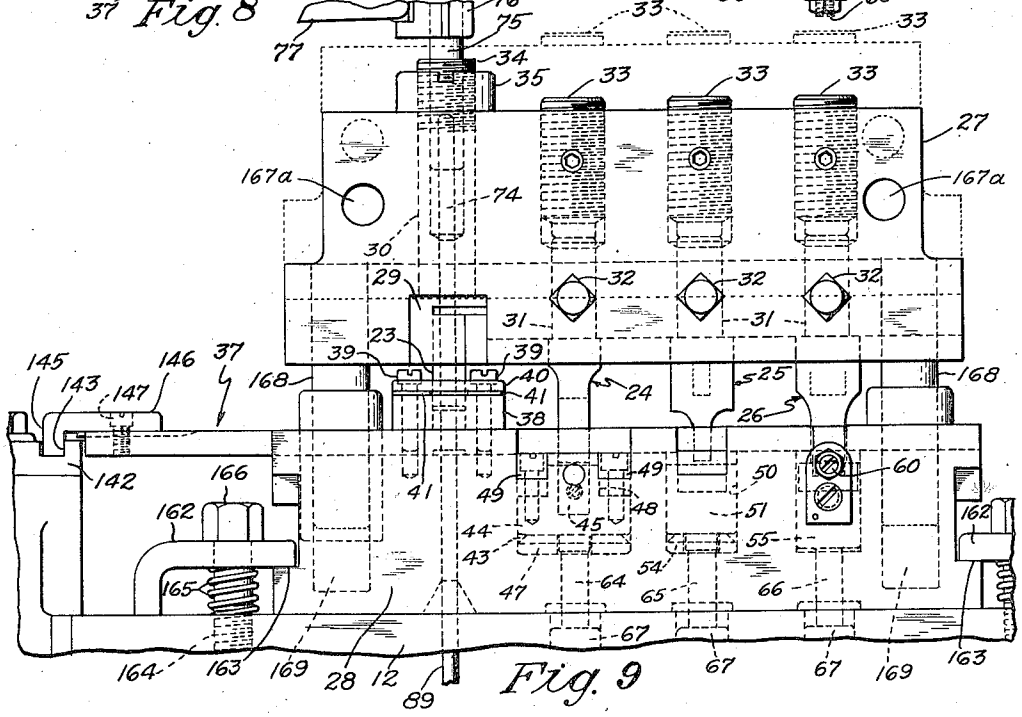


Fig. 9

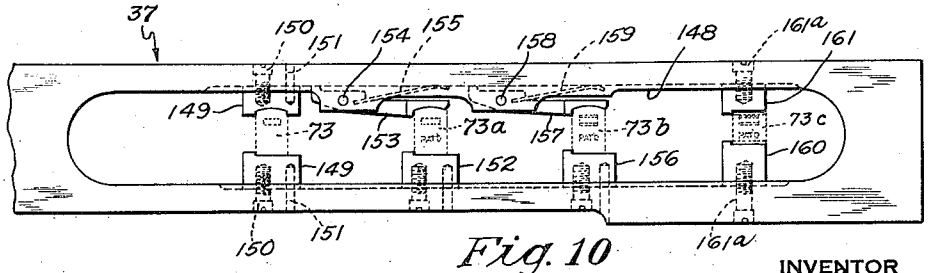


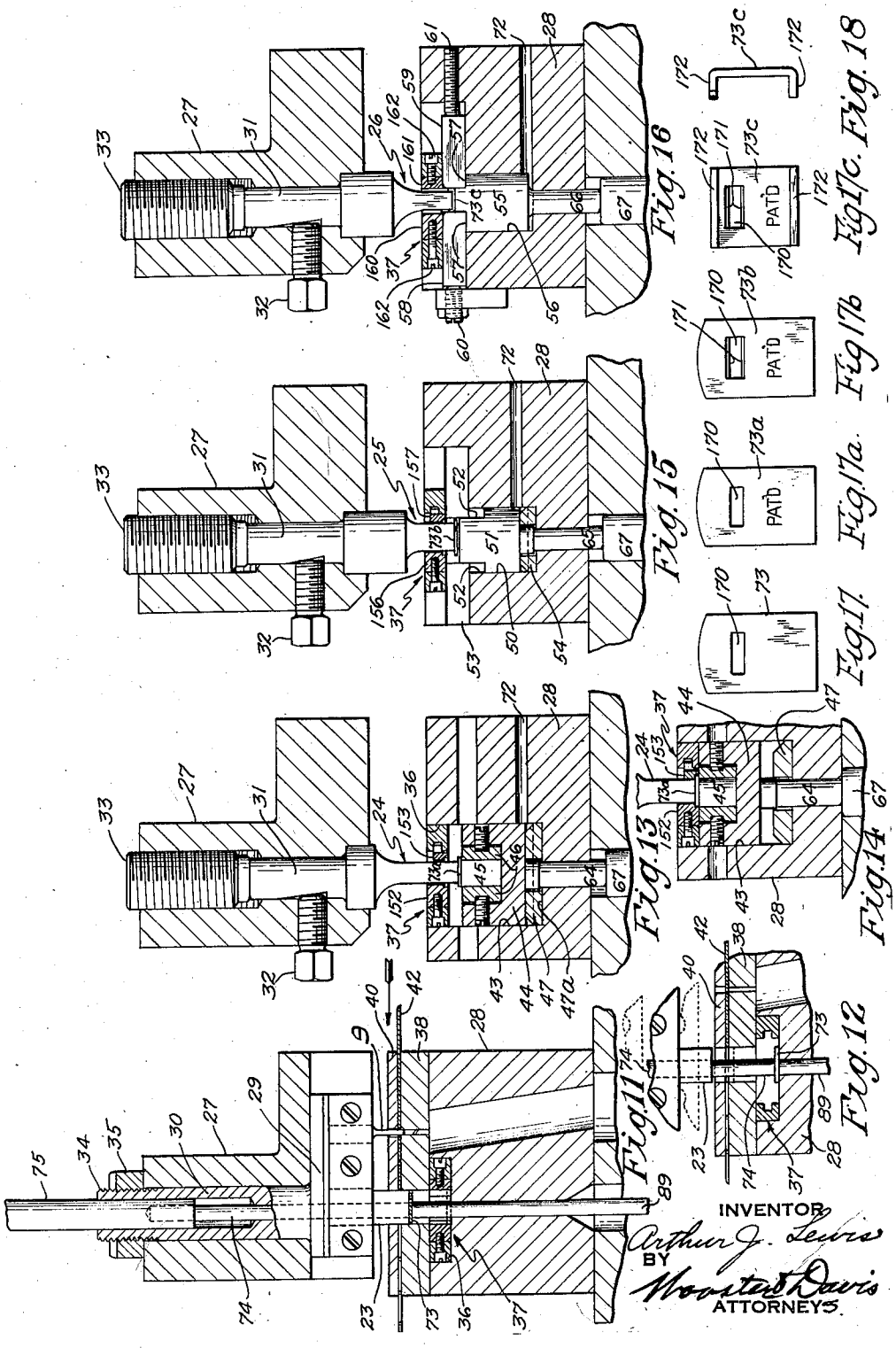
Fig. 10

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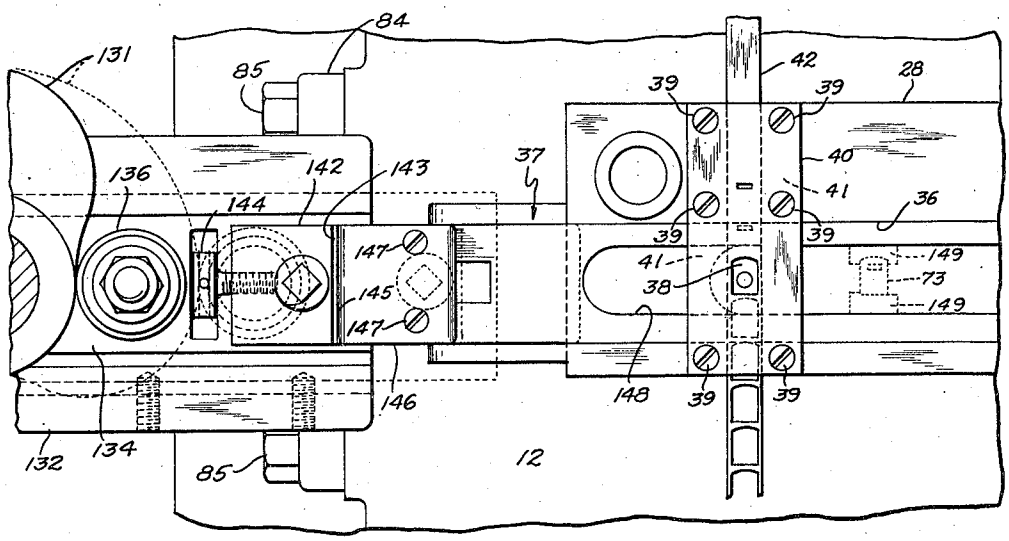


Fig. 19

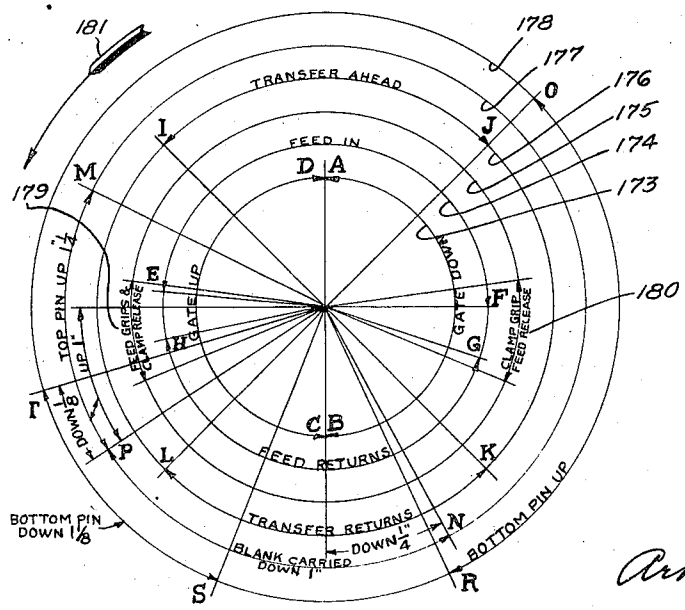


Fig. 20

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Patented Aug. 4, 1936 2,049,915

UNITED STATES PATENT OFFICE

2,049,915

MULTIPLE TRANSFER PRESS

Arthur J. Lewis, Stratford, Conn., assignor to The Baird Machine Company, Bridgeport, Conn., a corporation of Connecticut

Application April 4, 1935, Serial No. 14,613

18 Claims. (Cl. 153—2)

This invention relates to new and useful improvements in presses and has particular relation to multiple transfer presses.

An object of the invention is to provide a press of the kind indicated and which is particularly adapted for accurate and rapid handling of work.

Briefly the invention comprises a press including a single gate carrying and simultaneously operating tools for a plurality of operations, a reciprocating transfer means with work holding fingers for carrying the work from one set of tools to the other, and means independent of the blanking punch and operated in timed relation with the gate to carry the blanks through the blanking die.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevational view showing a press constructed according to the present invention;

Fig. 2 is an end view thereof looking from the left in Fig. 1 the metal feed and clamping means being omitted;

Fig. 3 is an end view showing the metal strip feeding means, other parts being omitted;

Fig. 4 is a front elevational view of a portion of the press showing the metal strip clamping means, other parts being omitted;

Fig. 5 is a view showing a part of the frame in section and showing the metal strip feeding means in plan;

Fig. 6 is a top plan view of the transfer operating means;

Fig. 7 is a detail view taken substantially along the line 7—7 of Fig. 1;

Fig. 8 is a top plan view on an enlarged scale of the die block of the press;

Fig. 9 is a front elevational view on an enlarged scale showing the complete tool assembly and with the gate in its lowest position;

Fig. 10 is a top plan view on an enlarged scale of the transfer slide;

Fig. 11 is a transverse sectional view on an enlarged scale through the blanking punch and die assembly with the punch in its lower position;

Fig. 12 is a somewhat similar view but shows the work carried into the transfer while the punch is moving upwardly;

Fig. 13 is a view similar to Fig. 11 but showing the tools at the second station of the press;

Fig. 14 is a view somewhat the same as Fig. 13 but showing the positions of the parts when the punch is carrying the work out of the transfer and when the work is being returned to the transfer for movement to the next station;

Fig. 15 is a view similar to Fig. 13 but showing the operation at the third station of the press;

Fig. 16 is a similar view but showing the operation at the last station of the press;

Figs. 17 to 17*c* are views showing in plan the work at the various stages of its progress through the press;

Fig. 18 is an edge view of the finished piece;

Fig. 19 is a top plan view on an enlarged scale showing the drive for the transfer and showing blanking die and a metal strip from which the work is being punched; and

Fig. 20 is a cam chart of the press.

Referring in detail to the drawings, the press is shown as including a frame generally designated 10 and mounted on any suitable support such as the legs 11 and the frame includes a base portion 12 and side arms 13 and 14. Extending across the frame 10 and supported by the upper portions of the arms 13 and 14 is a shaft 15 to one end of which is secured a combined drive pulley and fly wheel 16 driven in any or the usual manner as for example a belt from a suitable power shaft, to bring about rotation of the shaft 15. On the opposite end of the shaft is a beveled gear 17, and on the shaft between such gear and the adjacent arm of the frame is a cam 18. The purpose of the gear 17 and cam 18 will later be described.

Between the side arms of the frame the shaft 15 includes an eccentric portion 19 of relatively great length and about such shaft portion is a housing or bearing 20 connected as by a link portion 21 with a single vertically movable gate 22 slidable between the arms of the frame 10 in guides 22*a*, and adapted to be reciprocated vertically when the shaft 15 is rotated. The link 21 is hinged or pivoted at 22*b* to gate 22 so it may swing back and forth with the eccentric. The gate 22 carries a blank cutting tool 23 and forming tools 24, 25 and 26 all of which tools are carried by a punch block 27 and cooperate with suitable dies mounted in the die block 28 and later to be more fully described.

A mounting member 29, including a tubular

portion 30 extending vertically through the block 27, mounts or carries the cutting or blanking punch 23 and also may if desired mount a piercing punch 9 in certain spaced relation to the blanking punch. The various forming tools or punches 24, 25 and 26 are all mounted in substantially the same manner, and each includes a shank 31 entering a vertical socket in the block 27 and held therein and against turning movement as by a set screw 32. Threaded through the upper side of the block 27 are adjusting screws 33 bearing against the upper ends of the tool shanks 31 and adapted to adjust the positions of the tools on the set screws 32 being loosened. The upper end of the tubular portion 30 of the mounting member 29 is screw threaded as at 34 and a nut 35 thereon secures the member to the block 27.

The die block 28 is in its upper side provided with a groove 36 in which is reciprocated a transfer device generally designated 37, the construction and operation of which will later be fully described. Mounted on the upper side of the block 28 and extending transversely of the groove 36 is a blanking or cutting die 38 held in place as by screws 39 which screws also secure in place a cover plate or stripper 40 between which and the die are arranged strips or spacers 41 having their adjacent edges spaced apart providing a channel for the passage of a flat strip of metal 42 from which the blanks are to be cut. From the above it will be understood that the transfer 37 operates beneath the cutting or blanking die 38.

In alignment with the second operation tool or punch 24 the die block is provided with a recess 43 within which is arranged a vertically slidable die holder 44 carrying a suitable die 45 clamped in place between the clamps or jaws 46. Within the recess 43 below the die holder 44 is an anvil 47 resting on a bottom wall 47a. In its opposite sides the die holder 44 is notched or cut away as at 48 and recessed into the block 28 are bars or straps 49 forming guides for the die holder and also forming stops against which the die holder engages when in its upper position, the notches 48 accommodating such bars.

A recess 50 is provided in the die block in spaced relation to the recess 43, and said recess 50 accommodates a die 51 for limited vertical sliding movement notched in its opposite sides as at 52. Straps 53 are recessed in the die block and their inner ends enter the notches or recesses 52 when the die 51 is in its upper position, and since the formation of the notches 52 results in the die having flatted portions the ends of the straps 53 serve to prevent turning of the die in the block and limit upward movement of the die. It is noted that the die 51 is in vertical alignment with the tool or punch 25 and cooperates therewith in the operation of the machine, and that an anvil 54 is located in the recess 50 below the die.

A vertically slidable die 55 is arranged in vertical alignment with the tool or punch 26 and is located in a recess 56 in the die block. The die 55 is notched in its oposite sides as at 57, and a pair of bars 58 and 59 are recessed into the die block and extend into such notches and are adjustable as by screws 60 and 61 respectively. Bars 58 and 59 serve to limit upward movement of the die 55 and they also function as part of the die as will later be fully described. While the bars are held in place by screws 62 it will be noticed that such screws pass through elongated openings 63 in the bars whereby the latter are adjustable by the screws 60 and 61.

Extending into the respective recesses 43, 50 and 56 beneath the die holder 43, die 51 and die 55 respectively are push pins or rods 64, 65 and 66 each at its lower end bearing against a head 67. The heads 67 are carried by rods 68 located within openings in the frame base portion 12, and about each such rod below its head is a coil spring 69 bearing at one end against a head 67 and at its other end against a screw threaded plug 70. These rods 68 extend below the base of the machine and are provided with adjustable stop nuts 71 whereby the distance the rods may be moved by the springs 69 is adjustable. From each of the recesses 43, 50 and 56 there is an opening 72 extending to the outer side of the die block and such openings provide for the escape of air from the recesses at certain times as will later appear. The plugs 70 may be adjusted by a wrench on heads 70a and secured in adjusted positions by lock nuts 70b.

According to the present invention the cutting punch 23 does not operate to force a blank through the cutting die 38. As the punch descends it cuts the blank 73 from the strip 42 and carries such blank substantially into the position in which it is shown in Fig. 11. Thereafter at the proper time the blank is forced through the die 38 and into the transfer 37 by means of a plunger 74 operable through but independent of the cutting punch. This plunger is carried by an extension 75 to the upper end of which is secured a member or head 76 having a notch receiving an end of an arm 77. Intermediate its ends the arm 77 is pivoted at 78 to an extension 79 of a bracket 80 secured to the frame 10 as by bolts 81.

The outer end portion of the bracket 80 comprises an upper bearing 82 for a vertically extending shaft 83 the lower end of which has bearing in a bracket 84 secured to the frame as by bolts 85. On the upper end of the shaft 83 and meshing with the beveled gear 17 is a beveled gear 86. Owing to this gearing it will be apparent that the shaft 83 will be rotated in timed relation with the movements of the gate 22. On the shaft 83 immediately below the bearing 82 is a cam 87 into the groove of which extends a roller 88 carried by the outer end of the arm 77. With the described arrangement it will be understood that as the cam 87 is rotated the arm 77 will be oscillated about its pivot and a reciprocating movement will be imparted to the plunger 74.

As the plunger 74 moves downwardly through the cutting punch 23 it will engage the blank 73 in the cutting die and carry such blank downwardly into the transfer 37. A follower or lift rod 89 is arranged in alignment with the plunger 74 and is movable into the die 38 to a position against the lower side of the blank 73 by a spring 90. This spring connected to lever 93 constantly tends to rock upwardly this arm and through shaft 92 and arm 91 carrying the follower 89, such arm 91 being clamped to shaft 92 which is supported beneath the machine bed and at one end carries the arm 93 keyed thereto and in turn carrying a roller 94 disposed against the underside of a cam 95. The spring 90 constantly urges the follower 89 upwardly and the cam 95 serves to draw such follower downwardly at the proper times. In this connection it is noted that the cam 95 is carried by the vertical shaft 83.

The stock 42 from which the blanks 73 are punched is in the form of a flat strip and is fed from any suitable source such as a coil (not shown) by any desired feeding means as, for example, that generally designated 96. Briefly

the feed includes a slide 97 carrying a shaft 98 to which is connected a link 99 pivoted at 100 to the lower end of an arm 101. Such arm is pivoted intermediate its ends at 102 to a bracket 103 secured to the frame 10 as by bolts 104.

At its upper end the arm 101 carries a roller 105 riding against the edge of the cam 18 and a strong coil spring 106 is secured at one end to the upper portion of the arm and at its other end is anchored to the machine frame and serves to maintain the arm in position with the roller 105 against the cam 18. Also on the shaft 98 is a cam 107 having an offset 107a and such cam is rigid with the shaft as is an arm 108 having a roller 109 operating in a groove 110a in a head 110 carried by an arm 111. A member or arm 112 pivoted at 113 carries a roller 114 against which the offset surface or edge of the cam 107 engages, and this member 112 controls an upper or clamping jaw 115 between which and a lower jaw 116 the stock 42 passes.

Arm 111 is pivoted intermediate its ends as at 117 and its outer end carries a roller 118 operating in the groove of a cam 119 also secured to the vertical shaft 83. As the cam 119 is rotated it rocks the arm 111 up and down about its pivot 117 and consequently the grooved head 110 on said arm is moved up and down and rocks the arm 108 and the rocking movement of this latter arm through the shaft 98 is imparted to the cam 107. When the high portion of this last cam is under the roller 114 the member 112 is rocked about its pivot so as to force the jaw 115 downwardly and clamp the strip 42 between such jaw and the jaw 116. It will be understood that the stock is thus clamped as the slide 97 is being moved forwardly by the arm 101 operating through the link 99. As the slide is moved rearwardly or retracted the arm 111 is rocked in the opposite direction and the low portion of the cam 107 comes under the roller 114 so that the upper clamping jaw 115 is no longer pressed downwardly and the stock 42 is released during the rearward or return movement of the feed mechanism.

To prevent the stock being drawn rearwardly during return movement of the feed slide any suitable clamping means, as for example that generally designated 120 may be employed. As here shown such clamping means includes a base portion 121 and a bridge-like portion 122 between which the stock passes, and through such bridge portion there extends a plug-like clamping member 123 arranged to be forced against the stock to clamp it. An L-shaped member or lever 124 is pivoted at 125 and one arm of such member carries an adjustable screw 126 adapted to be forced against the plug 123 to press the latter against the stock 42. A spring 127 constantly tends to rock the member 124 in a direction to cause clamping of the stock.

The arm 111, during feeding movement of the feed slide 97 is rocked in a direction to carry its head-like portion 110 upwardly, and such portion includes a flange or lip 128 extending below the end of one arm of the member 124 so that as the arm 111 is rocked upwardly the member 124 is rocked about its pivot 125 in a direction to raise the screw 126 away from the plug 123. If the cutting or blanking punch is provided with a pilot the arm 129 of the member 124 may be provided with an adjustable screw 130 positioned to be engaged by a cam on the gate 22 when the latter descends, so that the member 124 will be temporarily rocked to a position to release the stock 42 so that it is free to be properly located by the pilot. This might be used if the piercing punch 9 is used to punch or pierce an opening 170 and it is desired to pass the pilot into the pierced opening to accurately locate the metal strip before the blank is punched from it so that the pierced opening 170 is properly located in the blank 73.

It will now be understood that as the transfer 37 is reciprocated in the groove 36 of the die block, the transfer moves below the cutting or blanking die 38 and above the forming or second, third and fourth operation dies 45, 51 and 55. Reciprocating movement is imparted to the transfer by means of a cam 131 also keyed to the shaft 83. This cam is located at the upper side of a head 132, which may be formed as part of the bracket 84 and provided with a guideway 133 (see Fig. 2) in which is located a slide 134 having an elongated slot 135 (see Fig. 6) through which the shaft 83 passes.

Secured to the slide 134 at opposite sides of the cam 131 are rollers 136 and 137, and it will be apparent that as the high side of the cam rides against roller 136 the slide will be advanced and that as the high side of the cam rides against roller 137 the slide will be retracted. The stem 138 of the roller 136 (see Figs. 1 and 6) extends downwardly through a slot 139 in the head 132 and an adjustable stop screw 140 is positioned to be engaged by said stem to limit forward movement of the slide. A similar stop screw 141 limits rearward movement of the slide. Toward its forward end the slide 134 carries a block 142 having a slot or groove 143 therein, and the position of this block on the slide may be adjusted by a screw 144.

Into the groove 143 extends the bent or hooked end 145 of a member 146 secured by screws 147 to the rear or outer end portion of the transfer 37. Such transfer (see particularly Fig. 10) comprises an elongated member shaped to fit slidably in the groove 36 in the die block 28 and is provided with an elongated opening or slot 148 into which the various work carrying blocks and/or fingers extend.

The blocks for carrying the work or blank 73 from the cutting or blanking station or first working station to the second operation or first forming station comprise a pair of block-like parts 149 suitably shaped to carry the blank 73 and projecting into the groove 148 of the transfer from opposite sides thereof, and secured in place as by screws 150 and pins 151. For carrying the work from the first to the second forming or third operation station a block 152 and a finger 153 are used. Such finger is pivoted at 154 and a spring 155 urges said finger about its pivot toward the block 152. An arrangement similar to that just described is used to carry the work from the second to the third forming or fourth operation station. This means comprises a block 156, a finger 157 pivoted at 158 and a spring 159 tending to rock such finger toward the block 156.

At 160 and 161 a pair of blocks are shown for carrying the work from the third forming or fourth operation station. These blocks are held in place by screws 161a although any other means may be used to secure these and the previously identified blocks in place. In the present instance the blocks 160 and 161 are used to carry the finished piece from the third forming station to an outlet or discharge opening O' (see Fig. 8) although it will be understood that such blocks might be used to carry the piece to another work

station. Further, it is to be understood that the finished piece may be removed from the last or finishing work station by any desired or suitable means other than the blocks 160 and 161 of the transfer.

The die block 28 is secured to the base portion 12 of the machine by means of L-shaped clamps 162 arranged at the respective ends of the block and each having one arm overlying a lip or ledge 163 of the block. Bolts 164 pass through said clamp and are threaded or otherwise secured to the frame base and about each bolt is a coil spring 165. The clamps are tightened to secure the die block in place by threading down nuts 166 on the upper ends of the bolts 164. Bolts 167 passing through holes 167a in the tool or punch block 27 secure it to the gate 22. Alignment of the punch block 27 and die block 28 is insured by the pins 168 secured to the punch block and operating in openings 169 in the die block.

In the operation of the machine the strip 42 is fed intermittently, the clamp 120 being released while the feed 96 is advancing and gripping the portion of the strip from which blanks have been cut, as the feed is retracted. As the gate 22 moves down the punch 9 pierces the strip, in the example illustrated providing a rectangular opening 170, and at the same time blanking punch 23 cuts a blank 73 from the strip, such blank having a previously pierced opening 170 therein.

The blank is cut while the transfer is advanced, and punch 23 therefore does not force the blank through the cutting die into the transfer but moves it only part way through the die as to the position of Fig. 11. As the gate also carries the tools 24, 25 and 26 its downward movement causes these tools to engage the work at the second, third and fourth working stations and carry the work at these stations downwardly out of the transfer. As soon as the work at these stations is out of the transfer the transfer starts back toward retracted position. The follower 89 is up against the underside of the newly cut blank. Now as the gate moves upwardly the plunger 74 moves down forcing the blank through the die, and the timing is such that when the transfer reaches retracted position the plunger carries the blank into the transfer from the upper side thereof. The blank is gripped between the ends of the plungers or rods 74 and 89 so that it is held in proper position. Fig. 12 shows the punch 23 being retracted and the plunger 74 and rod 89 locating the blank in the transfer.

When the blank is in the transfer, before any upward movement is imparted to the plunger 74 the cam 95, acting through arm 93 and shaft 92, shifts the arm 91 downwardly withdrawing the follower 89 from the underside of the blank. Now after the plunger 74 moves upward the transfer moves forward or toward advanced position carrying the blank with it, and since the blank is being carried by the blocks 149, when the transfer reaches advanced position the blank is positioned over the die 45 as in Fig. 14, the push pin 64 being held upwardly by its spring pressed head 67 and maintaining the die holder 44 against the straps 49 with the die 45 immediately at the underside of the transfer.

The blank is positioned as described in time to be engaged by the tool or punch 24 on the next downward movement of the gate 22. As the tool 24 passes through the transfer from the upper side thereof it carries the blank out of the transfer from its lower side. The tool forces the blank and the die 45 and its holder downwardly from the position of Fig. 14 to that of Fig. 13, compressing the spring actuating the push rod 64 and bringing the die holder against the anvil 47 so that the die is solidly mounted and work may be performed on the blank. In the drawings it is suggested that "Pat'd" is stamped on the blank at the first forming station and in Fig. 17 the partially formed blank is designated 73a. In Figs. 1, 9, 11, 13, 15 and 16 the gate and the tools 23, 24, 25 and 26 carried thereby are all in their lowermost position.

It will be understood that as the tool 24 is moved downwardly as just described the cutting punch 23 also moves with the gate 22 and cuts another blank from strip 42. As the gate now moves upwardly the spring actuating the push pin 64 causes said pin to raise the die block 44 and die 45 returning these parts to the positions of Fig. 14. During this downward and upward movement of the die 45 the transfer has been retracted to bring the next set of holders 152 and 153 into alignment with die 45, and as the die parts reach this upper position they place the partially completed piece 73a back in the transfer. However, as the transfer is now retracted, since it started rearwardly just as soon as the tool 24 moved the blank from between the transfer blocks 149, the piece 73a is returned to the transfer between the block 152 and the finger 153 of the transfer.

As the piece 73a is returned to the transfer through the lower side thereof the next blank 73 is fed into the transfer by the plunger 74 and rod 89. Now when the transfer next advances (this taking place when gate and tools 23, 24, 25 and 26 are raised) it carries the second cut blank 73 to position beneath tool 24 and piece 73a being held by block 152 and finger 153 is carried to a position beneath the tool 25. The gate again descending the tools 23 and 24 act as before and tool 25 forces the work piece 73a from the transfer against the die 51 which descends to the position of Fig. 15, and here the edges of the opening 170 are chamfered as at 171. After such treatment the work piece is identified in Fig. 17 as 73b.

When the work piece is removed from the transfer by tool 25 it is taken from the block 152 and finger 153, and during movement of the tool down and back with the die 51 the transfer is retracted, and therefore when the spring actuated pin 65 returns the die to normal position the piece now 73b is delivered to the block 156 and finger 157 of the transfer. The transfer again advancing the piece now 73b is carried into position below the tool 26 and in position overlying the adjacent ends of the bars 58 and 59. As the gate again descends tools 23, 24 and 25 function as previously described, and tool 26 engaging the intermediate portion of piece 73b carries it downwardly between the adjacent ends of the bars 58 and 59, forcing it against the die 55 and bending its ends upwardly as at 172.

So far as the example of the present disclosure is concerned the piece when so bent is the finished article, and in Figs. 17 and 18 is identified as 73c. The finished article may be removed from the die 55 in any desired manner or by any desired means but preferably it is carried by the transfer blocks 160 and 161 from the die to the outlet opening O' where it is removed by any suitable stripping means, not shown, or may drop out of its own weight. When bending the ends 172 of the work the latter is carried out of the transfer by the tool 26 and then the transfer is

retracted and prior to its next advance the finished piece is returned to the transfer between its blocks 160 and 161.

It should now be understood that the gate and the tools are constantly reciprocated, that on each down stroke of the gate a blank is cut from the strip 42 and that at each of the other stations work is performed on a previously cut piece. All the parts are operated in timed relation with the gate. The blanks are fed into the transfer from the cutting die by the plunger 74 and rod 89 while the transfer is retracted, and at each forming station the pieces are forced out of the transfer by the tools or punches while the transfer is in the advanced position and are fed back to the transfer while it is retracted. Therefore, on each forward movement of the transfer each piece is advanced one step through the machine.

Referring to the cam chart of Fig. 20, each circle of the chart represents one cam of the machine, and in the chart the innermost circle 173 represents the cam or eccentric portion 19 of the shaft 15 for reciprocating the gate 22. The circles 174, 175, 176, 177 and 178 represent respectively the cams 18, 119, 131, 87 and 95. The arrow 181 indicates the direction of rotation of the cams.

From the chart it will be clear that the gate is always moving up or down. Between the points A and B the gate is moving down and between the points C and D the gate is moving up. The feed 96 is moving in during the time represented between the points E and F on the circle 174 of the chart, is stationary from F to G, is moving out during the time represented from G to H and is again stationary during the time represented between points H and E. At 179 the printing shows when the feed grips the stock and the clamp 120 releases it, and the wording at 180 shows the feed releasing the stock and the clamp gripping it.

On the circle 176 the movements of the transfer are represented. It will be seen that the time represented between points I and J represents the advancing of the transfer, that it is stationary or dwells between the points J and K, retracts between points K and L and again dwells at the end of its retracting movement as represented between the points L and I. From circles 177 and 178 it will be clear that the plunger 74 dwells or moves downwardly with punch 23 between the points M and N, moves downwardly from N to P and upwardly from P to M. The follower 89 is up from O to R, moves down with the blank from R to S and then is carried down from S to T, such downward movement of the follower continuing after the plunger has started upwardly as will be seen by a comparison of the points P and T, it being understood that the plunger starts up at P while the follower continues down to T.

Having thus set forth the nature of my invention, what I claim is:

1. In a press, a single reciprocating gate, a plurality of tools carried by said gate for simultaneous operation and of which one tool is a cutting punch, dies for cooperation with the respective tools, said punch having insufficient movement to carry a cut blank through its die, a transfer means for carrying the cut blank from the outlet side of the punch die to another set of tools, and means independent of the cutting punch and operated in timed relation with the gate to carry the blanks through the cutting die after they have been cut by the punch and deliver them to the transfer.

2. In a press, a single gate carrying a blank cutting punch and a second operation punch, dies for cooperation with said punches, said cutting punch having insufficient movement to carry the cut blank through the die, a mechanism to carry a cut blank through the cutting die after being cut and independent of the cutting punch, and mechanism for carrying the cut blank from the outlet side of the cutting die to the second operation punch.

3. In a blank cutting and forming machine, a single gate carrying spaced blank cutting and blank forming punches, dies for cooperation with said punches, a transfer for carrying a blank from the cutting to the forming position, and a plunger operating through and independent of the blanking punch for carrying a blank through the blanking die to such transfer.

4. In a blank cutting and forming machine, a cooperating blank cutting punch and die, a cooperating forming punch and die, a single gate carrying both said punches and operating them simultaneously, a carrying mechanism for receiving a cut blank at the cutting position and carrying it to the forming position, and a plunger operating through but independent of the cutting punch for carrying a cut blank through the cutting die and into the carrying mechanism.

5. In a blank cutting and forming machine, a cooperating blank cutting punch and die, a cooperating forming punch and die, a single gate carrying both said punches and operating them simultaneously, a carrying mechanism for receiving a cut blank at the cutting position and carrying it to the forming position, a plunger operating through but independent of the cutting punch for carrying a cut blank through the cutting die and into the carrying mechanism, and a spring pressed follower to hold a blank against the plunger as the latter carries the blank through the cutting die.

6. In a blank cutting and forming machine, a single gate carrying spaced blank cutting and blank forming punches, dies for cooperation with said punches, a transfer for carrying a blank from the cutting to the forming position, a plunger operating independent of the blanking punch for carrying a blank through the cutting die to such transfer, and a follower to hold a blank against the plunger as the latter carries the blank through the cutting die.

7. In a press, a single gate carrying blank cutting and forming punches, a die cooperating with the cutting punch to cut blanks from a strip of stock and through which die the cutting punch does not pass, and means to carry a cut blank through the die independent of the cutting punch.

8. In a device of the character described, a reciprocating gate, a plurality of tools carried by said gate, a reciprocable transfer to shift work from one tool to another, means for feeding a blank from the first tool to the transfer from one side thereof while the transfer is retracted, and means cooperating with the second tool to remove a blank from the transfer to the other side thereof when the transfer is advanced and feed the blank back to the transfer when the latter is retracted.

9. In a device of the character described, a reciprocating gate, a blank cutting tool and a tool for subsequently performing work on the blank both carried by the gate, a reciprocable

transfer device, means for feeding a blank to the transfer from one side thereof while the transfer is retracted so as to be carried to a second tool on the next forward movement of the transfer, and means cooperating with the second tool to remove the blank at the opposite side of the transfer while the latter is in advanced position and feed it back to the transfer while the latter is in retracted position.

10. In a blank cutting and forming machine, a reciprocating gate, a blank cutting tool and a second tool carried by said gate, a die cooperating with each of said tools, a reciprocable transfer, means operable independent of the cutting tool for carrying a blank through the cutting die into the transfer through one side thereof while the transfer is retracted, and means cooperating with the second tool to remove the blank through the other side of the transfer when the latter is advanced and feed it back into the transfer when the latter is next retracted.

11. In a machine of the class described, a gate, a tool carried by the gate, a die cooperating with said tool, a reciprocable transfer, said gate operable to move said tool through the transfer to remove a piece of work therefrom when the transfer is in one position, and means to return said piece of work to the transfer when it is in another position.

12. In a machine of the class described, a vertically reciprocating gate, a forming tool carried by the gate, a die below the gate and cooperating with the tool, a reciprocable transfer between the die and gate, spring means normally maintaining the die in a raised position at the lower side of the transfer, said gate operable to move said tool downwardly through the transfer to remove a piece of work therefrom to the die when the transfer is in one position and force the die down to a solid position, and said spring means operable as the gate carries the tool upwardly to return the die to normal position and return the piece of work to the transfer with the latter in another position.

13. In a machine of the class described, a vertically reciprocating gate, a forming tool carried by the gate, a die below the gate and cooperating with the tool, a reciprocable transfer between the die and gate, spring means normally maintaining the die in a raised position at the lower side of the transfer, said gate operable to move said tool downwardly through the transfer to remove a piece of work therefrom to the die when the transfer is in advanced position and force the die down to a solid position, and said spring means operable as the gate carries the tool upwardly to return the die to normal position and return the piece of work to the transfer with the latter in retracted position.

14. In a device of the character described, a reciprocating gate, a plurality of tools carried by said gate, a reciprocable transfer to shift work from one tool to another, means independent of the first tool for feeding a blank therefrom to the transfer while the latter is retracted, and means cooperating with the second tool to remove a blank from the transfer while it is advanced and return the blank to it while it is retracted.

15. In a device of the character described, a reciprocating gate, a plurality of tools carried by said gate, a reciprocable transfer to sift work from one of said tools to another, and means independent of the first tool for feeding a blank therefrom to the transfer while the latter is retracted.

16. In a blank cutting and forming machine, a cooperating blank cutting punch and die, a cooperating forming punch and die, a single gate carrying both said punches and operating them simultaneously, a carrying mechanism for receiving a cut blank at the cutting position and carrying it to the forming position, a plunger operating through but independent of the cutting punch for carrying a cut blank through the cutting die and into the carrying mechanism, a spring pressed follower to hold a blank against the plunger as the latter carries the blank through the cutting die, and cam means to retract said follower from the blank when the latter is positioned in the carrier.

17. In a press, a single reciprocating gate carrying tools for a plurality of operations so as to be simultaneously operated by the gate, one of said tools being a blanking punch, a die cooperating with said punch, a reciprocating transfer below the die, means on the transfer for carrying work from one tool to another, and means for carrying a cut blank through the die to the transfer operated in timed relation with the gate.

18. In a machine of the class described, a movable gate, a blanking punch carried by said gate, a blanking die cooperating with said punch to cut a blank, said punch having insufficient movement to carry the blank through the die, a second operation punch carried by said gate and a die cooperating therewith, a carrier means below the first die adapted to carry blanks from below the blanking die to the second operation die, and means independent of the blanking punch for carrying the blank through the blanking die and placing it in said carrier.

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