No. 653,955. Patented July 17, 1900.

W. J. GORDON.

TRIPLE DIE PRESS.

(Application filed Jan. 4, 1900.)

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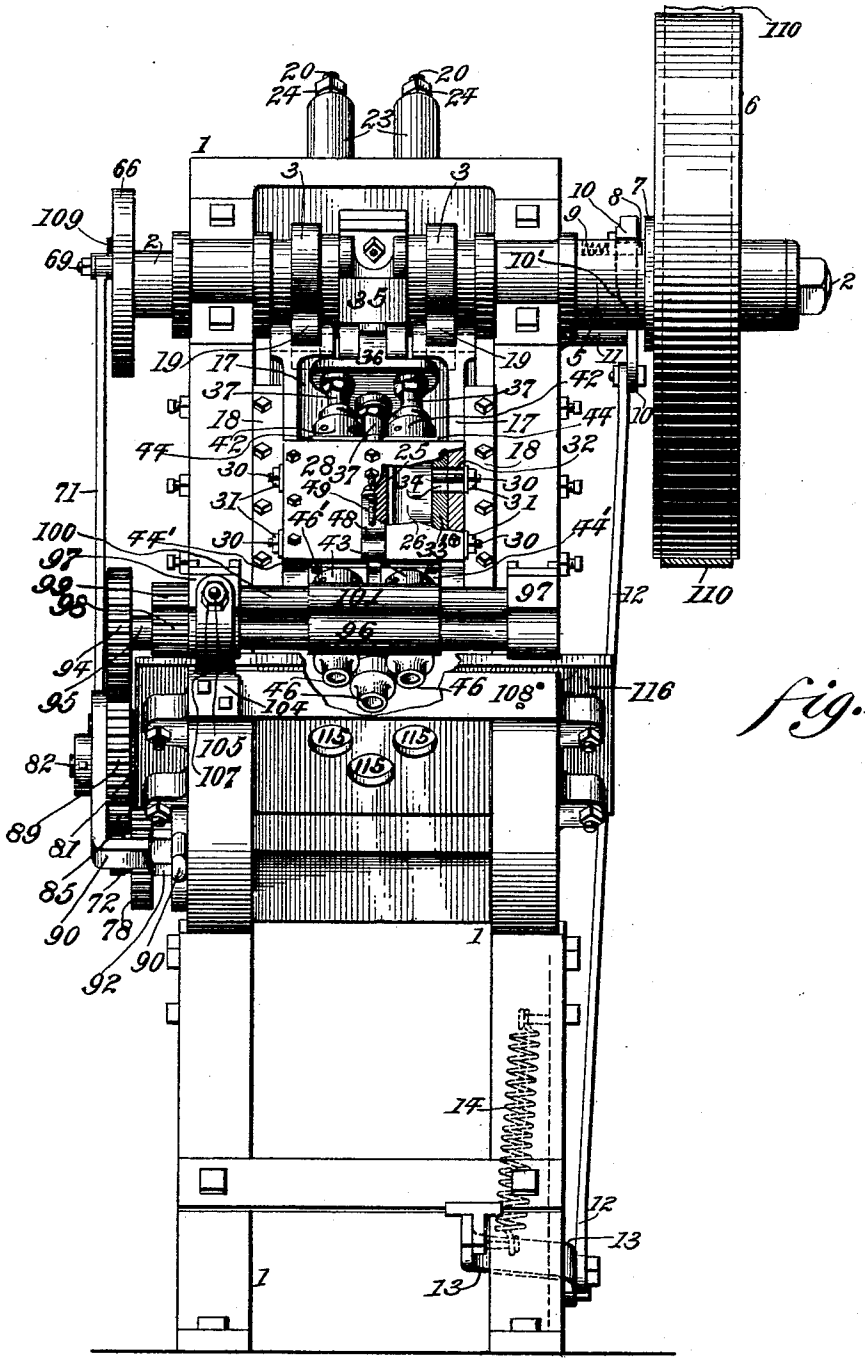


fig. 1.

Witnesses
L. Bouville,
P. F. Dagle.

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By William J. Gordon,
Wiedersheim & Fairbanks
Attorneys

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8 Sheets—Sheet 2.

fig. 3.

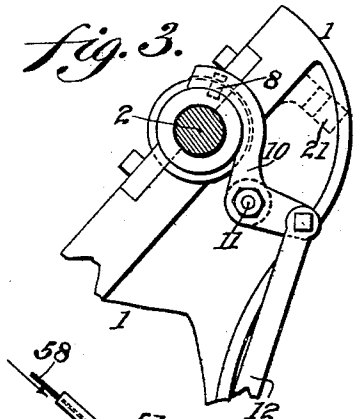


fig. 2.

Witnesses
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(No Model.) 8 Sheets—Sheet 3.

fig. 4.

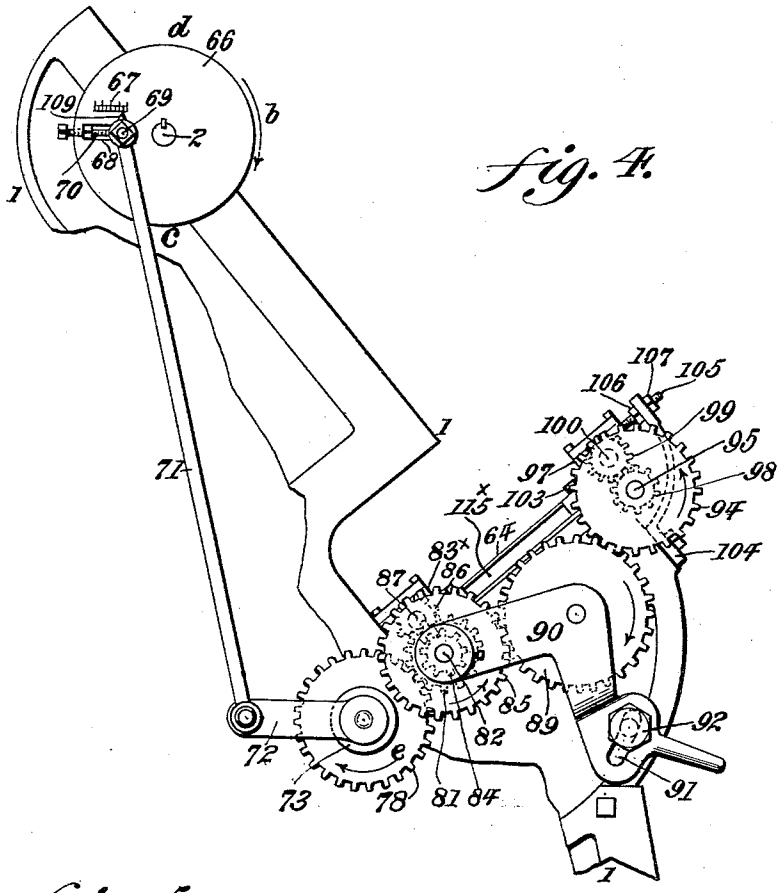


fig. 5.

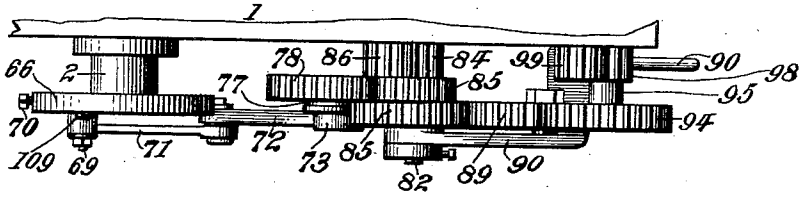
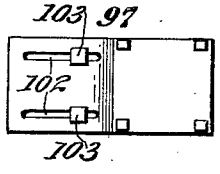


fig. 6.



Witnesses
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(No Model.) 8 Sheets—Sheet 4.

fig. 7.

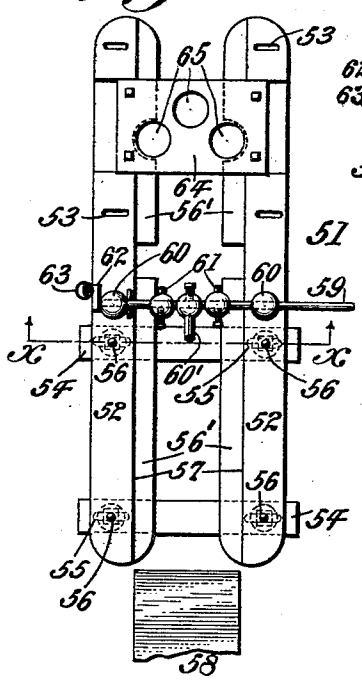


fig. 8.

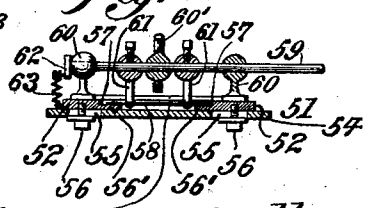


fig. 9.

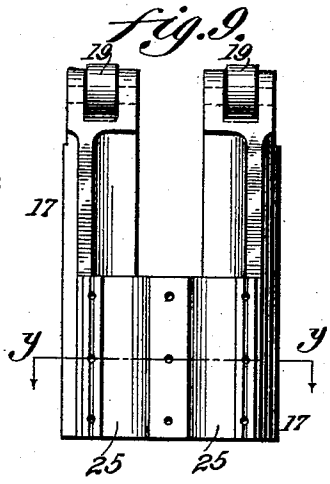


fig. 11.

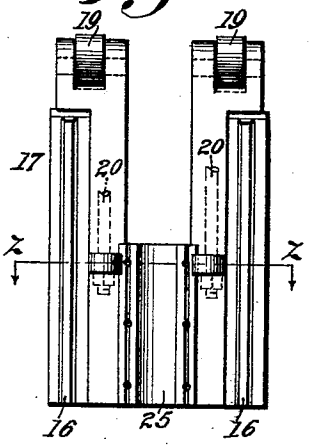


fig. 10.

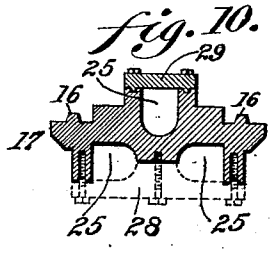


fig. 13.

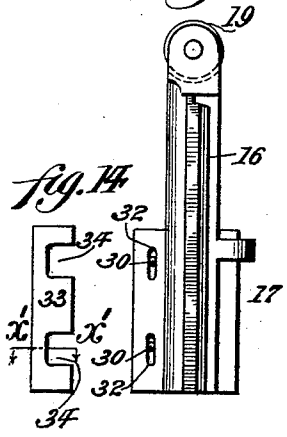


fig. 14.

fig. 12.

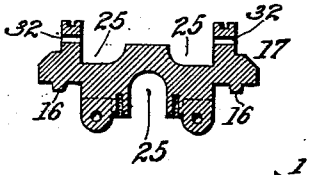


fig. 16.

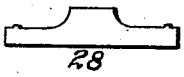


fig. 17.

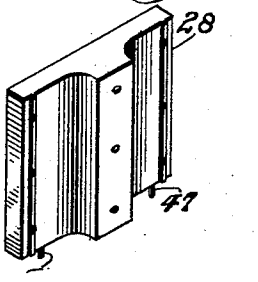


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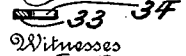
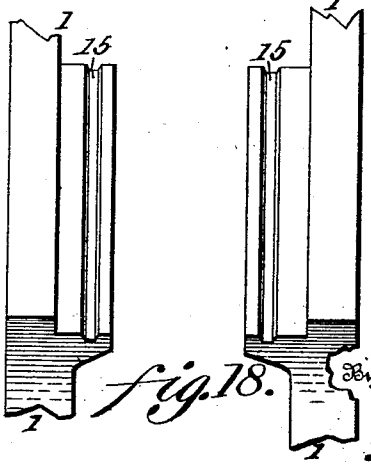


fig. 18.



Witnesses
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(No Model.) 8 Sheets—Sheet 5.

fig. 19

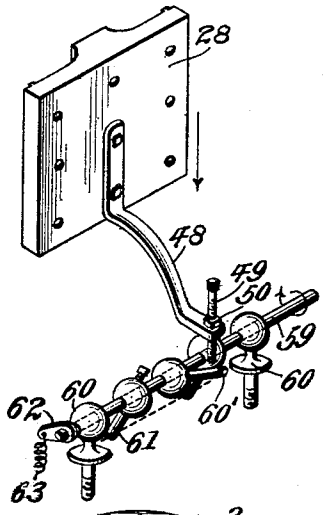


fig. 20.

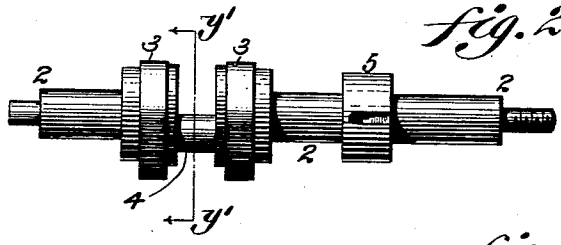


fig. 22.

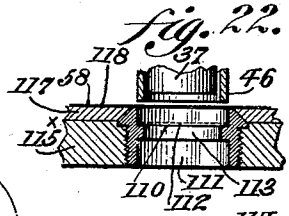
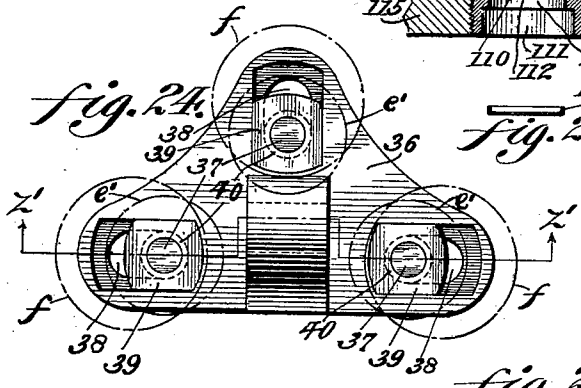


fig. 24.



114

fig. 23.

fig. 21.

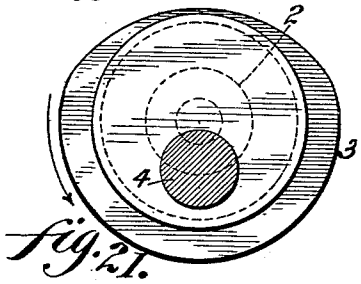


fig. 28.



fig. 26.

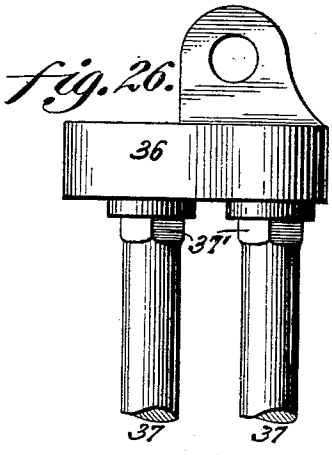


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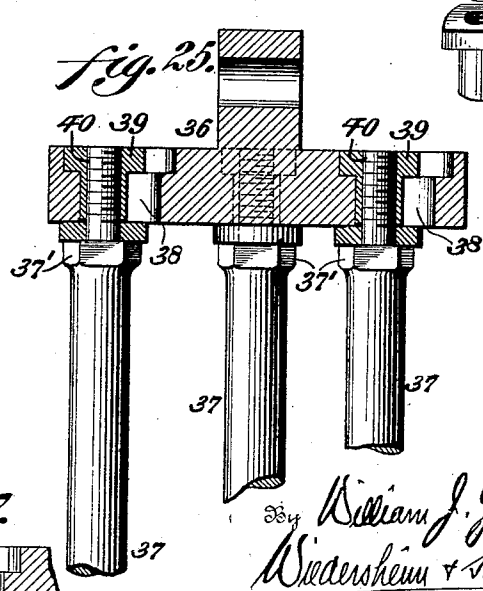
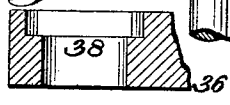


fig. 27.



Witnesses
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fig. 29.

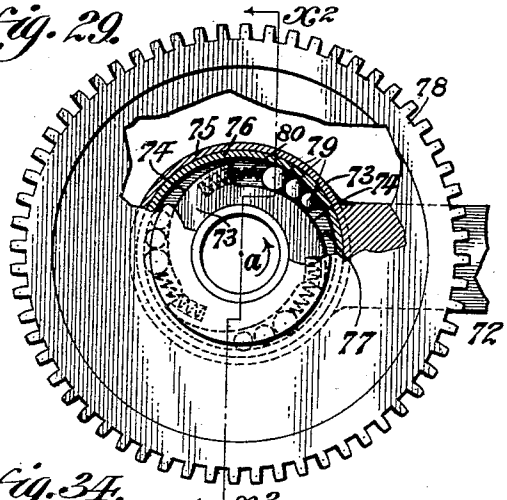


fig. 30.

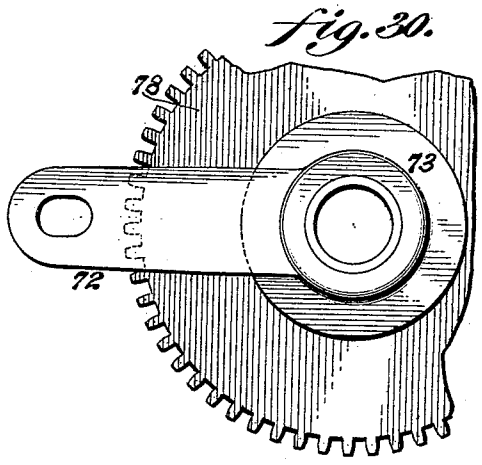


fig. 34.

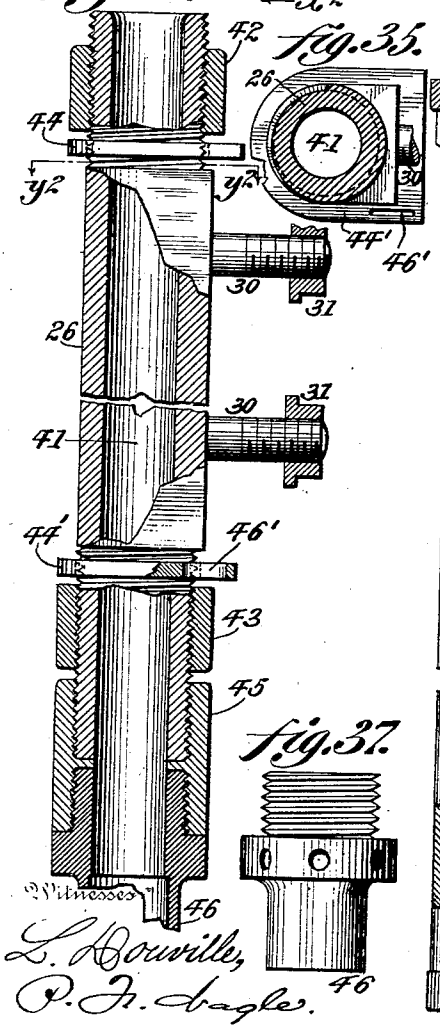


fig. 35.

fig. 36.

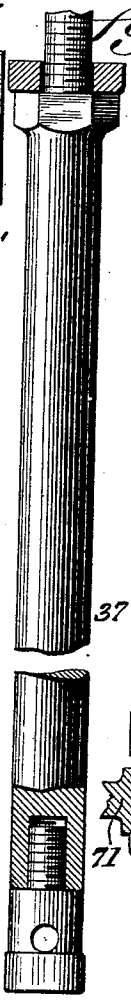
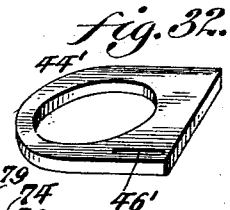


fig. 32.



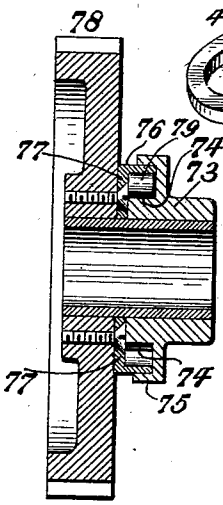


fig. 31.

fig. 33.

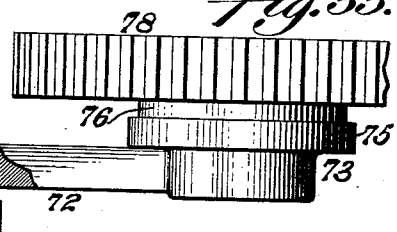


fig. 37.

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Fig. 38.

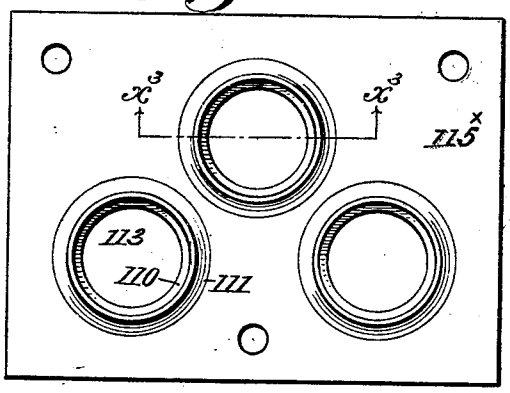


Fig. 39.

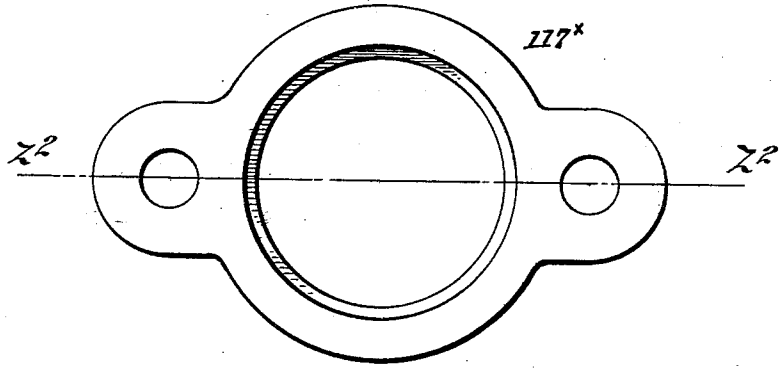
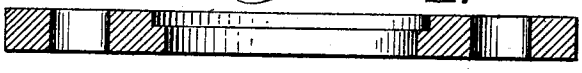


Fig. 40.



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fig. 41.

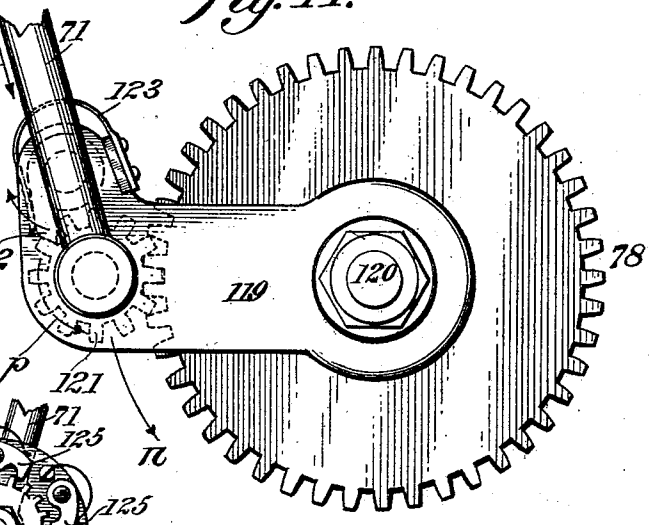


fig. 42.

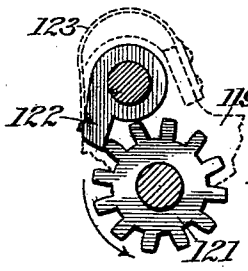


fig. 45.

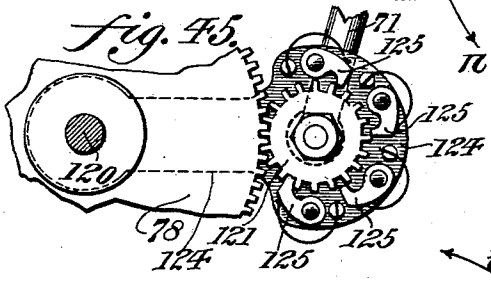


fig. 43.

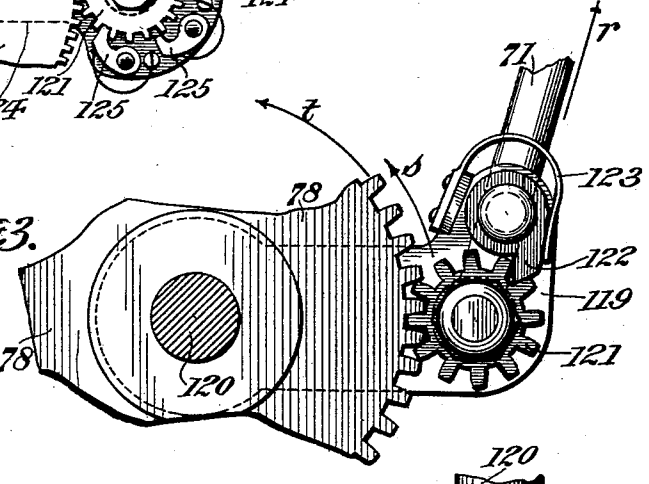
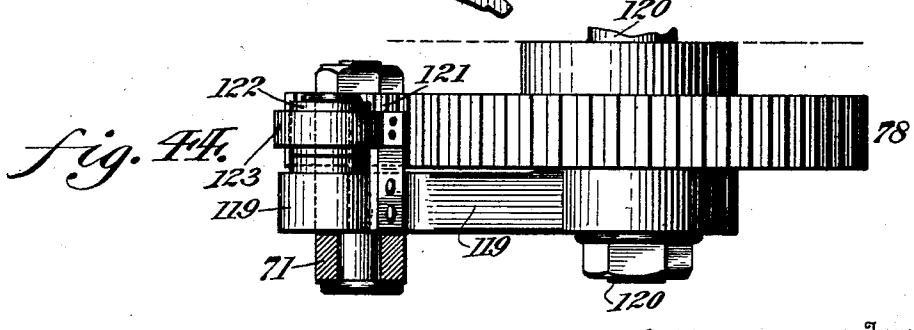


fig. 44.



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UNITED STATES PATENT OFFICE.

WILLIAM J. GORDON, OF PHILADELPHIA, PENNSYLVANIA.

TRIPLE-DIE PRESS.

SPECIFICATION forming part of Letters Patent No. 653,955, dated July 17, 1900.

Application filed January 4, 1900. Serial No. 328. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. GORDON, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Combination Triple-Die Presses, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to improvements in combination triple-die presses; and it consists in so locating the punches relatively to each other, and which in the present instance are three in number, that if a line be drawn from the center of one of said punches and through the centers of the other two, and then back to the center of the original punch, said line will describe a triangle.

It also consists of means whereby the sleeves to which the punches are secured may be brought nearer to or farther from each other, according to requirements.

It also consists of novel means for adjusting the punches in order to compensate for the wear of the same, which may occur from long use, grinding, &c.

It also consists of novel means for adjusting the rotation of the feed-rollers in order that the latter may cause the proper length of metal to be fed to the punches in a given time.

It also consists of novel means whereby sets of dies of various sizes may be employed and the same placed in alinement with punches of a corresponding size.

It also consists of means whereby one pair of feed-rollers may be moved nearer to or farther from the dies, according to requirements.

It also consists of novel means for retaining the dies and punches in position.

It also consists of novel means whereby a sheet of metal to be punched, after being placed in a guide which guides said sheet to the feed-rollers, is retained in said guide and prevented from reaching the feed-rollers until the proper time arrives, when the sheet is automatically released and is permitted to reach the feed-rollers.

It also consists of a novel construction of a cross-head and also of a bed in which the same reciprocates.

It further consists of novel details of construction, all as will be hereinafter fully set forth, and particularly pointed out in the claims.

Figure 1 represents a front elevation, partly broken away, of a press embodying my invention. Fig. 2 represents a side elevation of the press seen in Fig. 1. Fig. 3 represents a partial side elevation and partial vertical section of certain detached portions of the press. Fig. 4 represents a side elevation of certain of the parts seen in Fig. 2. Fig. 5 represents a plan view of the parts seen in Fig. 4. Fig. 6 represents a plan view of a journal-box employed, the same being on an enlarged scale. Fig. 7 represents a plan view of a guide employed. Fig. 8 represents a sectional view on line $x\,x$, Fig. 7. Fig. 9 represents a front elevation of a cross-head or slide employed. Fig. 10 represents a horizontal section on line $y\,y$ in Fig. 9. Fig. 11 represents a rear elevation of the cross-head seen in Fig. 9. Fig. 12 represents a horizontal section on line $z\,z$ in Fig. 11. Fig. 13 represents a side elevation of the cross-head seen in Fig. 9. Fig. 14 represents a side elevation of a plate employed. Fig. 15 represents a horizontal section on line $x'\,x'$ in Fig. 14. Fig. 16 represents a plan view of a cap employed. Fig. 17 represents a perspective view of the cap seen in Fig. 16. Fig. 18 represents a front elevation of certain portions of the frame of the press. Fig. 19 represents a perspective view of certain detached portions of the press. Fig. 20 represents a front elevation of a shaft and its adjuncts. Fig. 21 represents, on an enlarged scale, a vertical section on line $y'\,y'$, Fig. 20. Fig. 22 represents a vertical section on line $x^3\,x^3$, Fig. 38, with the addition of a portion of a punch and plunger employed. Fig. 23 represents a vertical section of a lid as produced by the press seen in Fig. 1. Fig. 24 represents a plan view of a certain detached portion of the press. Fig. 25 represents a partial front elevation and partial vertical section of certain detached portions of the press, the section being taken on line $z'\,z'$, Fig. 24. Fig. 26 represents a side elevation of certain of the parts seen in Fig. 25. Fig. 27 represents a vertical section of a portion of Fig. 25. Fig. 28 represents a perspective view of a nut employed. Fig. 29 represents a partial side elevation and partial vertical section of a ratchet mechanism

and a gear-wheel employed in connection therewith. Fig. 30 represents an elevation of the opposite side of certain of the parts seen in Fig. 29. Fig. 31 represents a vertical section on line x^2 x^2 in Fig. 29. Fig. 32 represents a perspective view of a washer employed. Fig. 33 represents a partial plan view and partial horizontal section of the parts seen in Fig. 30, with the addition thereto of a wrist-pin and a portion of a rod employed. Fig. 34 represents a partial side elevation and partial vertical section of a sleeve and its adjuncts. Fig. 35 represents a horizontal section on line y^2 y^2, Fig. 34. Fig. 36 represents a partial side elevation and partial vertical section of a plunger employed. Fig. 37 represents a view in elevation of a punch employed. Fig. 38 represents a plan view of a plate having dies secured thereto. Fig. 39 represents a plan view of a die employed for large-size blanks. Fig. 40 represents a vertical section on line z^2 z^2, Fig. 39. Figs. 41 and 43 represent elevations of opposite sides of a modified form of clutch mechanism. Fig. 42 represents a side elevation of certain of the parts seen in Fig. 41, but in different positions from those seen in the former figure. Fig. 44 represents a plan view of the parts seen in Fig. 41. Fig. 45 represents a side elevation, on a reduced scale, of certain of the parts seen in Fig. 43, with the addition of a plurality of check-pawls.

Similar characters of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates the frame of the machine, in which is journaled the shaft 2, the latter having the cams 3, the crank 4, and clutch member 5 formed therewith, it being evident that, if desired, said parts may be secured to the shaft 2 instead of being integral therewith, if so desired. (See more particularly Figs. 1 and 20.)

6 designates a driving-wheel loosely mounted on the shaft 2 and provided with a clutch member 7, which latter is adjacent to the member 5, so that said members 5 and 7 may be caused to either interlock or else be separated, according to requirements. The driving-wheel 6 is driven by a belt in the usual manner. The clutch member 5 is provided with a bolt 8, against which bears a spring 9. (See Fig. 1.)

10 designates a rock-arm fulcrumed to the frame 1, as at 11, (see more particularly Fig. 3,) said arm serving as a deflector for the bolt 8, as will be hereinafter described.

12 designates a link, one end of which is secured to the arm 10, the other end of said link being secured to a lever 13, which latter is in the present instance operated by foot and for a purpose to be hereinafter described. The lever 13 has connected therewith one end of a spring 14, the other end of said spring being secured to the frame 1, so that said spring 14 normally retains the lever 13 and its adjuncts in the positions seen in Figs. 1 and 3.

The frame 1 is formed with grooves or ways 15, (see Fig. 18,) said grooves 15 being adapted to receive the tongues 16, which project from the slide or cross-head 17, as best seen in Figs. 10, 11, 12, and 13, it being evident that said tongues and grooves will prevent even the slightest lateral displacement of said cross-head 17. The cross-head 17 is retained in position in the frame 1 by the gibs 18. The cross-head 17 is provided with rollers 19, which contact with the cams 3 for a purpose to be hereinafter described. The cross-head 17 has secured thereto the rods 20, (see Fig. 2,) which pass through lugs 21 on the frame 1 and are encircled by springs 22, the lower ends of which bear against said lugs, while their opposite ends bear against sleeves 23, which inclose said springs and are retained in position by nuts 24. The springs 22 return the cross-head 17 to its normal position, as seen in Fig. 1, after the same has been depressed by the cams 3. The slide or cross-head 17 is formed with recesses 25, (see Figs. 1, 10, and 12, said recesses being adapted to receive the sleeves 26, one of which is illustrated in detail in Figs. 34 and 35, it being noted that when said sleeves are placed within the recesses 25 they are retained therein by the caps 28 and 29. The sleeves 26 are provided with screw-threaded studs 30, on which are fitted nuts 31, which assist in retaining said punches in position within the cross-head 17. The slide or cross-head 17 is provided with slots 32, (see Figs. 1, 2, 12, and 13,) it being noted that the studs 30 are passed through said slots 32 in order to permit the sleeves 26 to be either raised or lowered, according to requirements, it being understood that the cap 29 is provided with slots similar to the slots 32. (Seen in Figs. 1, 2, 12, and 13.)

33 designates an adjusting-plate which is interposed, when required, between a sleeve 26 and the slide or cross-head 17, as best seen in Fig. 1 and for a purpose to be hereinafter described, it being noted that said plate is formed with recesses 34, through which the studs 30 are passed, it being apparent that said recesses permit a sleeve to be either raised or lowered while said plate may remain stationary.

35 designates a pitman, one end of which is fitted on the crank 4, its other end being pivoted to a triangular knuckle-yoke 36, in which are secured the plungers 37, which are preferably arranged in triangular order, whereby space is economized, waste of the material to be punched is reduced to a minimum, and the output of the machine is greatly increased, as best seen in Figs. 24, 25, and 26. (See also Figs. 1 and 2.) The triangular knuckle-yoke 36 is provided with slots 38, in which are placed the nuts 39, it being noted that the threaded portions 40 of the plungers 37 are fitted into said nuts in order to firmly secure said plungers to said yoke 36, it being apparent that said slots 38 permit the plungers 37 to be located nearer to or farther from each other, according to requirements and for

a purpose to be hereinafter described. The plungers 37 are located within chamber 41 of the sleeves 26, which carry the punches 46, so as to be raised and lowered therein, for a purpose to be hereinafter described. (See more particularly Figs. 34 and 35.) The sleeves 26 are provided with adjusting-nuts 42 and 43 and the washers 44 and 44′, said nuts serving to firmly secure the sleeves 26 to the slide 17, so as to cause the sleeves to move in unison with said cross-head, said nuts permitting the adjustability of the punches 46. Each sleeve 26 is provided with a screw-threaded coupling-sleeve 45, in which is fitted the punch 46. The washers 44′ are provided with slots 46′, which latter receive the pins 47, which depend from the cap 28. (See Figs. 17, 32, 34, and 35.) The object of the slots 46′ and pins 47 is to prevent the washers 44′ from turning when the nuts 43 are either tightened against the same or else slackened therefrom and for a purpose to be hereinafter described. The cap 28 is provided with a projecting arm 48, in whose outer extremity is fitted an adjustable bolt 49, (see Figs. 1, 2, and 19,) said bolt being retained in adjusted position by one or more lock-nuts 50.

51 designates a guide adapted to be secured to the frame 1 of the press, as best seen in Fig. 2, (see also Figs. 7 and 8,) it being noted that the guide-rails 52 of said guide are provided with slots 53, through which the bolts which secure said guide to the frame 1 are passed, it being apparent that said slots 53 permit the rails 52 of said guide to be brought either closer together or else moved farther apart, according to requirements and for a purpose hereinafter referred to. The braces or cross-bars 54 of the guide 51 are provided with slots 55, through which are passed the bolts 56, the latter serving to retain the guide-rails 52 in adjusted position, it being noted that said bolts 56 are screwed into said rails 52, as best seen in Fig. 8. It will be apparent that the slots 55 permit the guide-rails 52 to be moved either nearer to or farther from each other, according to requirements and for a purpose to be hereinafter described. The guide-rails 52 are formed with depressed portions 56′, which serve as ways for the sheet metal to be punched to rest upon, it being apparent that the walls 57 prevent a sheet 58 of metal from lateral displacement when placed in said ways. The guide 51 is provided with a rock-shaft 59, which is journaled in posts 60, secured to the members 52 of the slide 51, it being noted that said rock-shaft has firmly secured thereto the fingers 60′ and 61, the object of which will be hereinafter described. The rock-shaft 59 and its adjuncts are retained in their normal positions, as seen in Fig. 2, by an arm 62 and spring 63. (Best seen in Figs. 7 and 19.) The guide 51 has secured thereto a stripper-plate 64, which strips a sheet 58 from the punches 46 when the latter are being withdrawn from said sheet after a set of blanks have been punched, it being noted that said stripper-plate is provided with openings 65, through which the punches 46 pass.

The shaft 2 has secured thereon a disk 66, (see Figs. 1, 4, and 5,) it being noted that said disk is provided with a graduated scale 67 and a slot 68, in which latter is fitted an adjustable wrist-pin 69, which may be moved nearer to or farther from the axis of the shaft 2 by means of the bolt 70, which is swiveled to said wrist-pin, it being noted that said wrist-pin 69 has connected therewith one extremity of a link 71, the opposite extremity of which is connected to an arm 72, which latter projects from a clutch member 73, whose inner portion is provided with eccentric working faces 74 (see more particularly Fig. 29) and an outer rim 75, which latter fits snugly against the rim 76 of the clutch member 77, secured to the gear-wheel 78, it being noted that rollers 79 are interposed between the working faces 74 of the clutch members 73 and the rim 76 of the clutch member 77 and that said rollers are retained in their normal positions, as seen in Fig. 29, by springs 80. The gear-wheel 78 is journaled in the frame 1 and meshes with a pinon 81, secured to the shaft portion 82 of a feed-roller 83, journaled in boxes $83^{\times}$, bolted in the frame 1. (See Figs. 1, 2, 4, and 5.) The shaft portion 82 has secured thereon a pinion 84 and gear-wheel 85, it being noted that the pinion 84 meshes with a pinion 86, secured to the shaft portion 87 of a feed-roller 88, journaled in the frame 1. The gear-wheel 85 meshes with an idler 89, journaled in quadrant 90, fulcrumed on the shaft portion 82, as best seen in Figs. 4 and 5. The quadrant 90 may be turned on its fulcrum for a purpose to be hereinafter described, it being noted that said quadrant is provided with a slot 91, through which is passed a bolt 92 for securing said arm in its adjusted position. The idler 89, which meshes with the gear-wheel 85, meshes also with a gear-wheel 94, which latter is secured to the shaft portion 95 of the feed-roller 96, it being noted that the extremities of said roller 96 are journaled in boxes 97 in the frame 1. The shaft portion of the roller 96 has secured thereto a pinion 98, which meshes with a pinion 99, secured to the shaft portion 100 of the feed-roller 101. The journal-boxes 97 are provided with slots 102, (see more particularly Fig. 6,) it being apparent that said slots permit the boxes 97 to be placed nearer to or farther from the boxes $83^{\times}$, for a purpose to be hereinafter described. The boxes 97 are secured in adjusted position by bolts 103.

104 designates a bracket secured to the frame 1 and provided with a bolt 105, which latter is retained in adjusted position by nuts 106 and 107, and the object of said bolt will be hereinafter described. In practice two brackets 104 are employed, although but one of these is illustrated in the drawings, the one that is not shown being bolted to the portion 108 of the frame 1. (See Fig. 1.)

The wrist-pin 69 is provided with a pointer or index 109, employed in connection with the graduated scale 67. (See Fig. 4.)

The operation is as follows: Motion is imparted to the pulley 6 in the present instance by a bolt 110, (seen in Fig. 1,) the clutch member 7 rotating with said pulley 6. When it is desired to put the press in motion, the lever 13 is depressed, thereby causing a portion of the rock-arm 10 to rise in order to be moved out of the path of the bolt 8, which latter, no longer meeting with the resistance presented by said rock-arm, is moved forward by the spring 9 and caused to engage the clutch member 7, whereby motion from the pulley 6 is transmitted to the shaft 2, cams 3, and crank 4 thereon. A sheet 58 of metal is then placed in the slide 51 and descends by gravity to the fingers 61, against which it abuts and is temporarily prevented from further descent. The cams 3 now cause the cross-head 17 to descend, as likewise the punches secured thereto. At the proper time the bolt 49 is brought in contact with the finger 60′ and depresses the same, thereby turning the rock-shaft 59 and causing the fingers 61 to rise in order to release the sheet 58 of metal, which then continues to descend until it reaches the feed-rollers 96 and 101, so as to be drawn between them in order to be fed thereby to the punches 46. The rotation of the shaft 2 transmits a similar motion to the disk 66, which in turn imparts motion to the link 71, thereby rocking the arm 72 and causing the same to impart a partial rotation to the clutch member 73 in the direction indicated by the arrow *a* in Fig. 29, thereby causing the working faces 74 to jam the rollers 79 against the rim 76 and cause the latter to move in unison with said clutch member 73, and consequently impart motion to the gear-wheel 78, which latter will, as is evident, set the entire train of gearing seen in Fig. 4 in motion in order to rotate the feed-rollers 83, 88, 96, and 101, so that the same will cause the sheet 58 of metal to be drawn between them in order to be fed thereby to the punches 46. The rotary motion imparted to the feed-rollers hereinbefore described is an intermittent one. When a sheet 58 has been brought in the proper position relatively to the punches 46 by said feed-rollers, said punches are moved downwardly by the action of the cams 3 on the cross-head 17 and are forced through the sheet 58, thereby cutting blanks therefrom and causing the same to rest on the rims 110 in the dies 111, as best seen in dotted lines, as at 112, in Fig. 22. The plungers 37 are now lowered by the crank 4 and pitman 35 and force the blanks through the openings 113 in the rims 110, thereby producing a flange or rim 114 in the blank, as seen in Fig. 23. After the blanks have been cut and the flanges or rims formed thereon, as hereinbefore described, the punches 46 and plungers 37 are raised, the former by the spring-actuated rods 20 and the latter by the crank 4. The finished articles, similar to those seen in Fig. 23, drop through the openings 115 (seen in Fig. 1) and may fall into a receptacle of any suitable description. It is to be noted that when the disk 66 is revolving in the direction indicated by the arrow *b* in Fig. 4 and the wrist-pin 69 is moving from *c* to *d* said disk will exert a pull upon the link 71 and cause the same to impart a partial rotation to gear-wheel 78 by the clutch mechanism hereinbefore described in connection with Fig. 29 and cause said gear-wheel 78 to revolve in the direction indicated by the arrow *e* in Fig. 4. When, however, the wrist-pin 69 is traveling from *d* to *c*, the disk 66 will exert a push upon the link 71 and cause the latter to depress the arm 72, thereby causing the clutch member 73 to move freely on the clutch member 76, and thus impart no motion to the latter until the link 71 is again raised by the rotation of the disk 66. The intermittent rotary motion imparted to the clutch member 76 will be transmitted to the gear-wheel 78, which in turn will impart a simiiar motion to the train of gearing seen in Figs. 4 and 5 and cause the several gear-wheels and pinions to turn in the direction indicated by the arrows in said figures, thereby causing the feed-rollers hereinbefore described to impart an intermittent feed to a sheet 58, so as to advance the same the proper distance after each punching and rim-forming operation. When it is desired to stop the press, the operator removes his foot from the lever 13, whereupon the spring 14 restores said lever to its original or normal position, (seen in Figs. 1 and 2,) thus causing the lever 10 to again occupy a position in the path of the bolt 8, whereupon the latter will be brought in contact with the flaring face 10′ of the lever 10 and be caused to move in the present instance to the left, (see Fig. 1,) and thereby be removed from engagement with the clutch member 7, whereupon the shaft 2 and its adjuncts, as well as all other parts receiving motion therefrom, will come to a stop, it being understood that the operator keeps the lever 13 depressed as long as the press is to be kept in operation.

When the smallest size of punches and dies are employed, the punches are in the position indicated by dotted lines at *e′* in Fig. 24, and the dies seen in Fig. 38 are in alinement with the same, it being understood that said dies are fitted into a plate 115×, (seen in Figs. 22 and 38,) said plate being bolted or otherwise secured in the bed 116 of the press. (See Figs. 1 and 2.)

117 (see Fig. 22) designates a plate secured to the plate 115× in order that its upper face 118 may be flush with those portions of the dies 111 which project above the plate 115×, so as to cause a sheet 58 to rest snugly upon said dies.

When it is desired to employ a larger size of punches and dies, the plate 33′, (seen in Fig. 1,) similar in construction but of greater

thickness than the plate 33, (seen in Figs. 14 and 15,) is removed from the press after slackening the nuts 31 on the studs 30, and another plate, similar in construction to the plate 33', but of less thickness, is inserted in the space formerly occupied by the plate 33', whereupon the sleeves 26 may be moved farther apart, it being understood that said sleeves are three in number, and the remarks made relatively to one of these apply to all. When the sleeves 26 are moved farther apart, it becomes necessary to remove the smaller cutting members or punches 46, one of which is seen in Fig. 37, from said sleeves, and other cutting members similar in construction to the one seen in said Fig. 37, but of larger diameter, are inserted in the sleeves 26.

When the cutting members or punches 46 are of a certain increased diameter—for instance, as indicated by dotted lines at *f* in Fig. 24—it is to be understood that the sleeves 26 are in their extreme outward position in the cross-head 17, in which case no plate such, for instance, as that seen in Fig. 1 and bearing the numeral of reference 33' is employed, as the sleeves are drawn tightly against the outer walls of the recesses 25 by tightening the nuts 31.

It will be noted on referring to Figs. 1 and 10 that the recesses 25 are of greater length in a horizontal direction than the thickness of the sleeves 26, thus permitting the latter to be moved either toward or away from each other, according to the diameter of the cutting members or punches 46.

The slots 38 in the triangular knuckle-yoke 36 permit the plungers 37 to be moved either toward or away from each other to correspond with the several adjustments of the sleeves 26, within which the same are placed and caused to reciprocate by the crank 4, as hereinbefore described, it being apparent that in order to shift the plungers 37 it will be necessary to first slacken the nuts 39, which is accomplished by rotating said plungers, which are provided with the angular portions 37', to which a wrench may be applied for the purpose. In Fig. 25 the plunger 37, to the right, is shown in the position it occupies when the sleeves 26 are in the positions indicated in dotted lines at *e'* in Fig. 24, and when the sleeves 26 are in the positions seen at *f* in Fig. 24 the plungers 37 are in the positions seen to the left in Fig. 25.

The sleeves 26 may be either raised or lowered in the cross-head 17 for the purpose of adjustment by the manipulation of the nuts 42 and 43, which secure said punches to the cross-head 17.

The pins 47, (seen in Fig. 17,) which enter the slots 46' in the washers 44', (seen in Figs. 32, 34, and 35,) prevent said washers from turning when the nuts 43 are rotated, and, furthermore, permit said washers to be moved in unison with the punches 26 when these latter are moved either toward or away from each other for the purpose hereinbefore described.

When the dies 111 of the type illustrated in Fig. 38 are to be placed in the press, the plate $115^{\times}$, in which said dies are secured, is bolted to the bed 116 of the press, and when blanks of extra-large size are to be punched and flanged dies $117^{\times}$ of the type illustrated in Fig. 39 are employed, said dies being bolted directly to the bed 116 of the press, it being understood that said dies $117^{\times}$ are three in number and are secured in position in the press independently of each other, and not three at one time, as in the case of the dies 111. (Seen in Fig. 38.) Assuming that when the several parts seen in Fig. 4 are in their adjusted positions relatively to dies 111 of the diameter seen in Fig. 38, it is to be understood that should dies of larger diameter be required it then becomes necessary to remove said dies from the press and replace them by ones of larger diameter. This will necessitate the wrist-pin 69 being moved farther from the axis of the disk 66, which will, as is evident, impart a greater throw to the link 71, and consequently impart a greater degree of revolution to the train of gearing seen in Fig. 4, thus causing the feed-rollers hereinbefore described to increase the amount of feed imparted by the same to a sheet 58.

As it is of the greatest importance that a sheet 58 should be presented to the punches at the proper time, it becomes necessary that the feed-rollers 96 and 101 should be moved farther from said punches, so as to compensate for the increase in the amount of feed imparted to a sheet 58. In order to accomplish this end, the nuts 92 and 103 are slackened, whereupon the journal-boxes 97 may be moved away from the punches 46, whereupon the gear-wheel 94 will leave the idler 89, and in order to cause said idler to again mesh with the gear-wheel 94 the quadrant 90 is turned upon its axis, so as to cause the gear-wheel 89 to mesh with said gear-wheel 94, after which the nut 92 is tightened, so as to retain said quadrant in its adjusted position.

The bolt 105 may be employed as a gage against which the journal-boxes 97 abut when said bolt has been adjusted relatively to a punch and die of a predetermined size.

119 designates an arm loosely mounted on the axis 120 of the gear-wheel 78, (seen in Figs. 41, 43, and 44,) said arm 119 having journaled thereon a pinion 121, which meshes with the gear-wheel 78, it being noted that the pinion 121 engages also with a check-pawl 122, pivoted to the arm 119, said check-pawl 122 being held against the teeth of the pinion 121 by a spring 123. It will be apparent that when the rod 71 (seen in Figs. 41, 43, and 44) is moving in the direction indicated by the arrow *m* in Fig. 41 the arm 119 will be caused to move in the direction indicated by the arrow *n*, whereupon the pinion 121 will be rotated in the direction indicated by the arrow *p* by reason of its engagement with the gear-wheel 78, which latter during the downward stroke of the rod 71 remains stationary.

When the rod 71 is moving in the direction indicated by the arrow *r* in Fig. 43, the arm 119 will be caused to move in the direction indicated by the arrow *s*, it being noted that the check-pawl 122 is engaged with a tooth in the pinion 121 in such a manner that said pinion cannot rotate when the rod 71 is moving in the direction indicated by the arrow *s*, whereupon it will be apparent that said pinion 121 acts substantially as a dog relatively to the gear-wheel 78, and will consequently rotate the latter in the direction indicated by the arrow *t* in Fig. 43, and the gear-wheel 78 will then impart motion to the train of gearing hereinbefore referred to, and thus transmit motion to the feed-rollers 83, 88, 96, and 101 for the purpose hereinbefore described.

In Fig. 45 the arm 124, which corresponds to the arm 119, (seen in Figs. 41 to 44, inclusive,) is provided with a plurality of check-pawls 125, which corresponds to the pawl 122, (seen in Fig. 43,) it being apparent that when several pawls are employed an exceedingly-fine adjustment of feed may be imparted to the rollers 83, 88, 96, and 101.

It will be apparent that changes may be made by those skilled in the art which may come within the scope of my invention, and I do not therefore desire to be limited in every instance to the exact construction I have herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a die-press, a slide, punches actuated thereby, a crank-shaft, plungers movable in said punches and actuated by said crank-shaft, a guide for directing and supporting the material to be punched, feeding devices located in front of and behind said punches, and means for adjusting one set of said feeding devices.

2. In a die-press, a slide, means for reciprocating the latter, punches movable in unison with said slide, plungers located within said punches, means for actuating said plungers at the proper intervals, a guide, feeding-rolls located in front of and behind said punches, means for adjusting one set of said feeding-rolls and means for permitting the material to be fed automatically.

3. In a die-press, a plurality of punches and plungers, means for actuating the same, feeding-rolls located in the front of and behind said punches, means for adjusting one set of said feeding-rolls, and means for imparting to said feeding-rolls an intermittent movement.

4. In a die-press, the combination of a crank-shaft having cam-faces thereon, a slide actuated by said cam-faces, tension devices for holding said slide in position, punches movable in unison with said slide, a yoke carrying plungers located within said punches, a pitman connecting said yoke to said crank-shaft, a guide for the material to be punched and means for regulating the feeding of said material to said punches.

5. In a die-press, a crank-shaft having cams thereon, a disk carried by said shaft, and having a slot therein, a wrist-pin provided with a pointer and adjustable in said slot, a connection from said wrist-pin to a train of gearing, means for imparting an intermittent motion to said gearing, a plurality of punches, plungers therefor, means for actuating said punches and plungers, and rollers located in front of and behind said punches, said rollers being actuated intermittently by said gearing, in combination with means for adjusting one set of said rollers.

6. In a die-press, a plurality of punches located in triangular arrangement relative to each other, sleeves to which said punches are secured, means for moving said sleeves toward or away from each other, means for adjusting said punches, plungers for said punches and means for operating said punches and plungers.

7. In a die-press, the combination of punches, plungers therefor, means for reciprocating each of the latter, feed-rollers located in the rear and front of said punches, means for adjusting the rotation of said feed-rollers whereby the latter may cause the proper length of metal to be fed to the punches in a given time, and means for enabling one set of said rollers to be moved toward or away from said punches.

8. In a die-press, the combination of punches, plungers therefor, feed-rollers for said punches located in front of and behind the latter, dies adapted to aline with said punches, and means for enabling one pair of feed-rollers to be moved nearer to or farther from said dies according to requirements.

9. In a die-press, a guide, a plurality of punches, plungers therefor, means for reciprocating said punches and plungers, a slide, an adjustable bolt movable in unison with said slide, means operated by said bolt whereby the sheet to be punched is retained in said guide, and prevented from reaching said feed-rollers until the proper time, and means for automatically releasing said sheet and permitting the latter to reach the feed-rollers.

10. In a die-press, the combination of punches and plungers movable therein, a guide wherein the material to be punched is supported, posts supported on said guide, a rock-shaft mounted in said posts, tension devices for said rock-shaft, a finger projecting from said rock-shaft, means for rocking said finger and shaft at the proper intervals, other fingers adapted to project toward said slide and serve as stops for the material to be punched and means for automatically operating said fingers.

11. In a die-press, the combination of a crank-shaft, having cams thereon, a cross-head having rollers mounted therein and adapted to contact with said cams, rods connected with said cross-head, lugs through

which said rods pass, tension devices bearing on said lugs for retaining said cross-head always in the proper position relative to said cams, a plurality of punches, fastening devices common to said punches and cross-head, a yoke carrying plungers movable in said punches, a pitman common to said yoke and crank-shaft, and dies for supporting the material to be punched.

12. In a die-press, the combination of punches and plungers therefor, means for actuating said punches and plungers, a guide consisting of parallel guide-rails, means for permitting said rails to be adjusted toward and away from each other, cross-bars for said guide, ways in the latter for supporting and directing the sheet of metal to be punched, a stripping-plate attached to said guide and provided with openings through which said punches pass, posts carried by said guide and having a rock-shaft adjustably supported therein, tension devices for said rock-shaft, fingers carried by the latter and adapted to control the passage of the material toward the punches, and means for operating said fingers.

13. The combination of a slide, punches adjustably mounted therein, means for securing said punches in position, a plurality of plungers movable in said punches, means for adjusting the distance of said plungers toward and away from each other, a guide, means for adjusting the width of said guide, feeding devices located in the front of and behind said punches, and means for adjusting the position of said feeding devices.

14. In a die-press, punches, plungers therefor, dies in alinement therewith, means for adjusting the distance between said punches and plungers, washers carried by said punches and having slots therein, nuts for holding said punches in position, a cross-head, a cap therefor, pins projecting from said cross-head and engaging said slots, whereby said washers are prevented from turning when said nuts are tightened, and means for actuating said plungers and punches.

15. In a die-press, a crank-shaft, punches and plungers actuated thereby, a slotted disk carried by said shaft, a wrist-pin adjustably secured in said slot, and carrying a pointer, a scale adjacent the latter, dies in alinement with said punches and plungers, a set of feed-rolls in the front and rear of said punches, a train of gearing, clutch mechanism for intermittently operating said gearing, and means for adjusting the distance between the front feed-rolls and said dies.

16. In a die-press, a set of punches, and plungers therefor, each adjustably arranged in triangular order, dies for said punches having an inwardly-projecting rim adapted to coact with said plungers, a set of feed-rolls, located in front of and behind said dies, and means for adjusting the distance of the front feed-rolls from said dies.

17. In a die-press, a set of punches, plungers therefor, each adjustably arranged in angular order, dies for said punches, adjusting-plates for said punches, feed-rolls located in the front of and behind said dies, and means for adjusting the distance of the front feed-rolls relative to said dies.

18. In a die-press, a slide, means for reciprocating the latter, punches movable in unison with said slide, plungers located within said punches, means for actuating said plungers at the proper intervals, a guide, a stripper-plate thereon, dies suitably supported, feeding-rolls located in front of and behind said dies and means for adjusting the front feed-rolls toward and away from said dies.

19. In a die-press, a plurality of punches and plungers, dies for said punches, adjusting-plates of different sizes for said punches, having openings therein for the fastening devices, and means for operating said punches and plungers.

20. In a die-press, a plurality of punches and plungers, dies for said punches, removable adjusting-plates of different sizes for said punches, said plates having openings therein for the fastening devices, means for operating said punches and plungers, dies for said punches, feed-rollers in front of and behind said dies and means for moving the front feed-rollers toward or away from said dies.

21. In a die-press, a plurality of punches and plungers, means for actuating the same, feeding-rolls located in front of and behind said punches, a train of gearing for actuating said rollers, an arm adjacent to a member of said gearing, a pinion carried by said arm, a check-pawl engaging said pinion, a link connected to said arm and means for reciprocating said link.

22. In a die-press, a plurality of punches and plungers, means for actuating the same, feeding-rolls located in front of and behind said punches, a train of gearing for actuating said rolls, an arm adjacent to a member of said gearing, a pinion carried by said arm, a plurality of spring-pressed pawls suitably supported and engaging said pinion, a link connected to said arm and means for actuating said link.

23. In a die-press, a plurality of sleeves, punches secured thereto, said sleeves being arranged in triangular order, plungers in said sleeves, dies alining with said punches and plungers, said dies being arranged in triangular order whereby waste of the material punched is reduced to a minimum and the output of the press increased, feeding devices for said dies, and means for actuating said punches and plungers.

24. In a die-press, a plurality of sleeves, punches carried thereby, adjusting-nuts for said sleeves and punches, a slide in which said sleeves are adjustably secured, plungers movable in said sleeves, a guide for the material to be punched, dies for said punches and plungers and adjustable feed-rollers for said press.

25. In a die-press, a plurality of punches,

plungers therefor, dies, feed-rollers, a guide, means for retaining the sheet to be punched in said guide, means for preventing said sheet from reaching said feed-rollers until the proper time, and means for automatically releasing said sheet and permitting the latter to reach said feed-rollers.

26. In a die-press, dies arranged in triangular order, plungers and punches alining with said dies, a guide having adjustable guide-rails, and cross-bars for said rails.

27. In a die-press, three dies arranged in triangular order, punches and plungers alining with said dies, and means for actuating said punches and plungers.

28. In a die-press dies arranged in triangular order, punches and plungers alining with said dies, means for actuating said punches and plungers, feed-rolls located in front of and behind said dies, and means for adjusting one set of said feed-rolls.

29. In a die-press, a set of three dies arranged in triangular order, punches and plungers alining with said dies, means for actuating said punches and plungers, a guide, feed-rollers, located in front of and behind said dies, and means for adjusting one set of said feed-rollers.

30. In a die-press, dies arranged in triangular order, plungers and punches alining with said dies, guides having adjustable guide-rails, cross-bars for said rails, means for retaining the sheet to be punched in said guide, means for preventing said sheet from reaching the punches until the proper time, and means for automatically releasing said sheet and permitting the latter to reach said punches.

31. In a die-press, a punch, a plunger therefor, a die, a guide for the sheet to be punched, means for retaining the sheet to be punched in said guide, means for preventing said sheet from reaching said punch until the proper time, and means for automatically releasing said sheet and permitting the latter to reach said punch.

32. In a die-press, a plurality of punches arranged in triangular order, plungers therefor, dies also arranged in triangular order, feed-rollers located in front of and behind said dies, a guide, adjustable guide-rails therefor, means for retaining a sheet to be punched in said guide, means for preventing said sheet from reaching said feed-rollers until the proper time, means for automatically releasing said sheet and permitting the latter to reach said feed-rollers, and means for adjusting one set of said feed-rollers.

33. In a die-press, dies arranged in triangular order, punches and plungers alining with said dies, means for actuating said punches and plungers, feed-rollers located in front of and behind said dies, and means for moving one set of feed-rollers toward or away from said dies.

34. In a die-press, three dies arranged in triangular order, punches and plungers alining with said dies, means for adjusting said dies, punches and plungers relative to each other, and means for actuating said punches and plungers.

35. In a die-press, three dies arranged in triangular order, punches and plungers alining with said dies, means for adjusting said dies, punches and plungers relative to each other, and for maintaining them in the same angular relation, and means for actuating said punches and plungers.

WILLIAM J. GORDON.

Witnesses:
JOHN A. WEIDERSHEIM,
E. HAYWARD FAIRBANKS.