Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 1

Fig. 1.

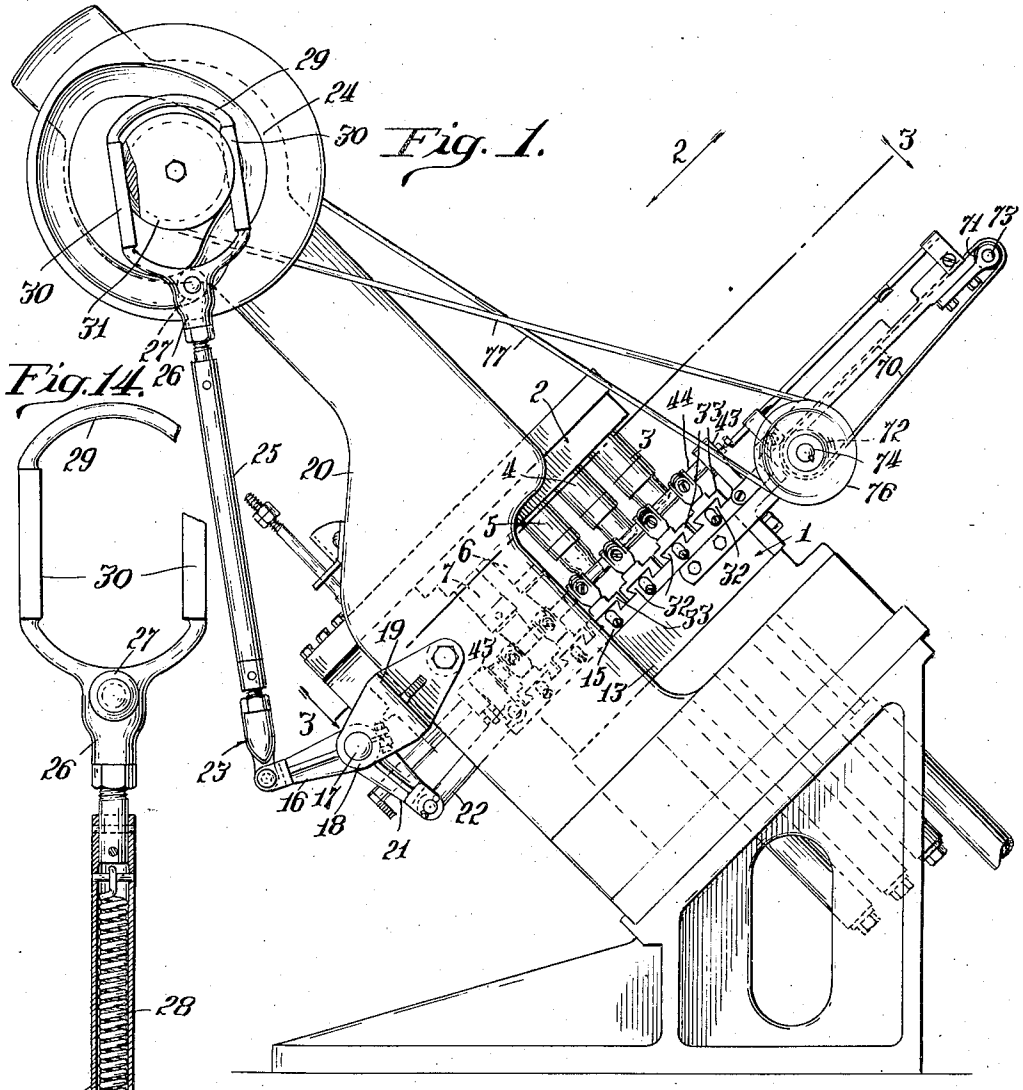
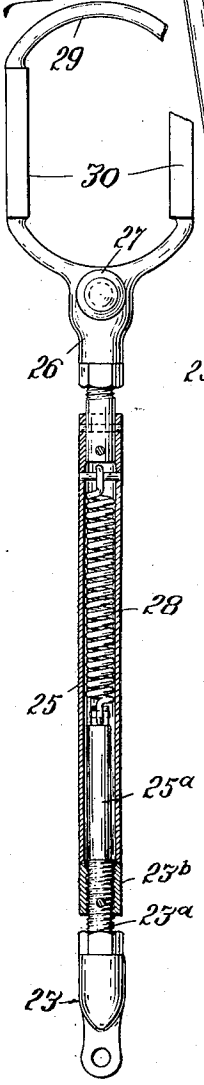


Fig. 14.



Inventor

Edward H. Fabrice

By Rudolph Mueller

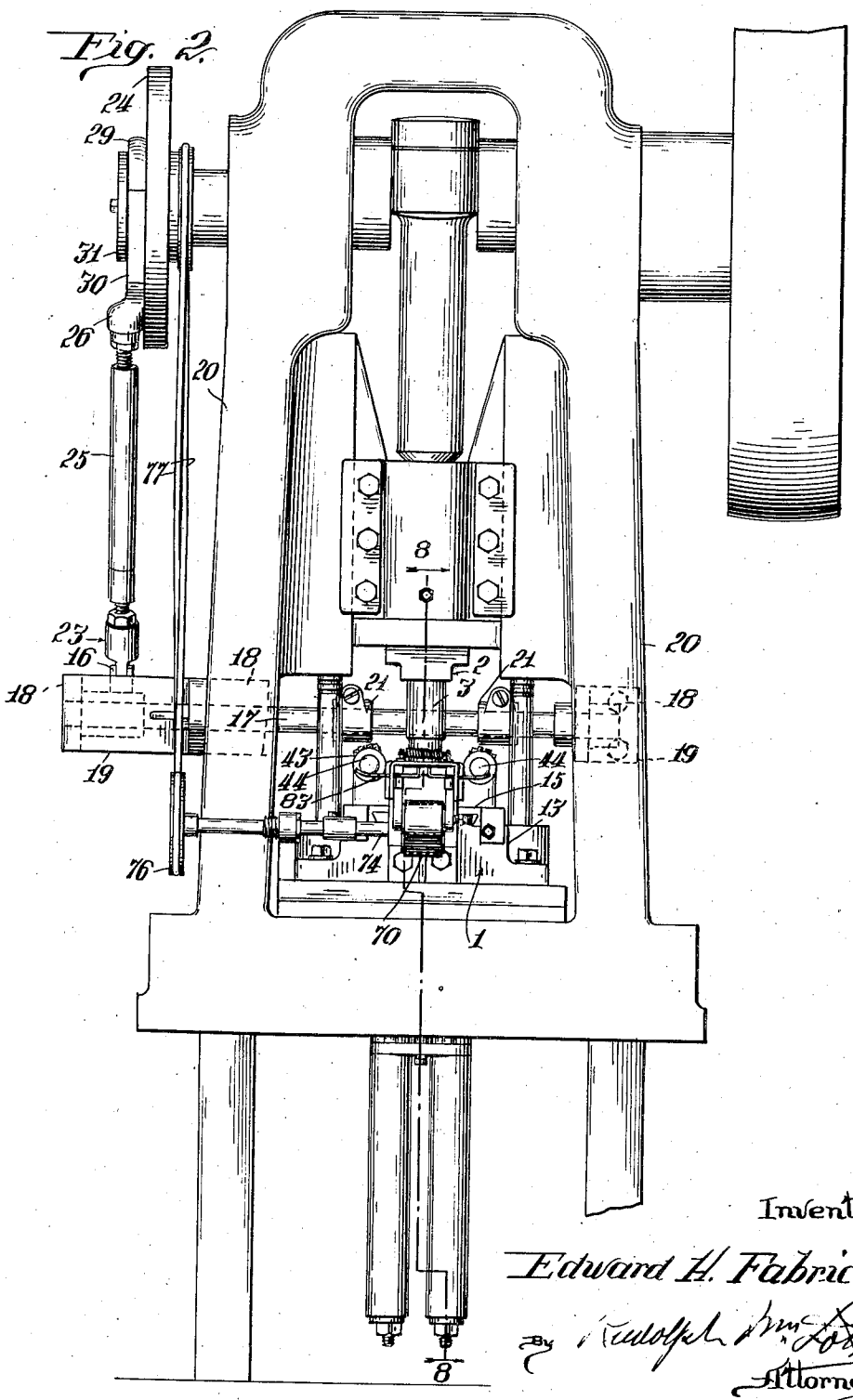
Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 2

Fig. 2.



Inventor

Edward H. Fabrice

By Rudolph Mueller

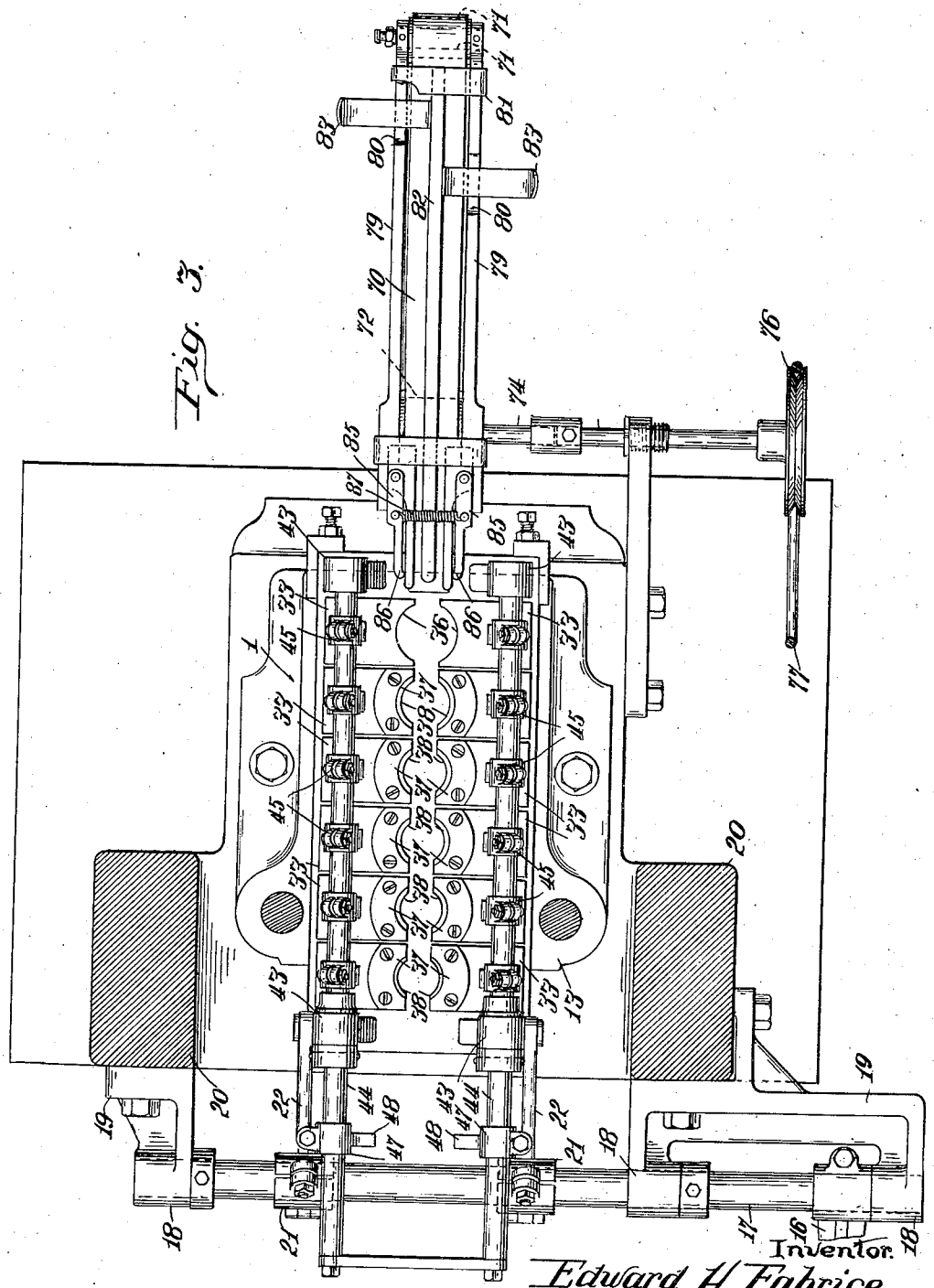
Attorney

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 3

Fig. 3.



Inventor.
Edward H. Fabrice
By Rudolph Bros. & Low
Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 4

Fig. 4.

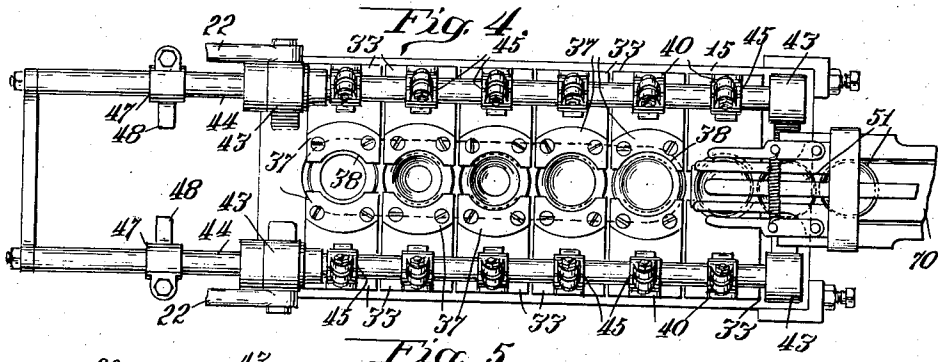


Fig. 5.

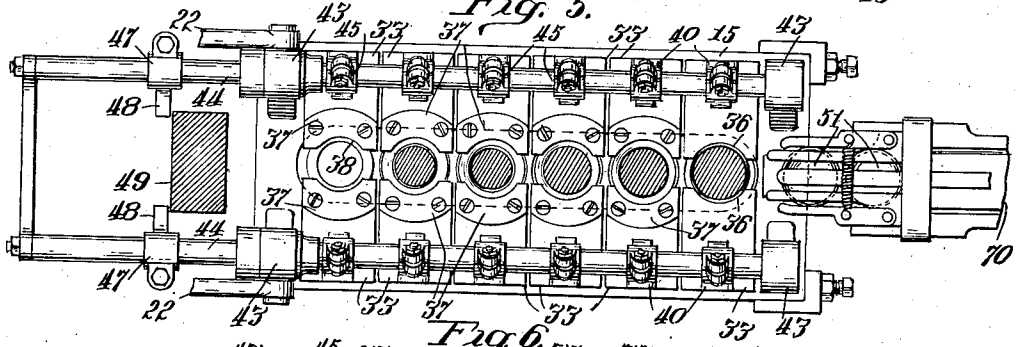


Fig. 6.

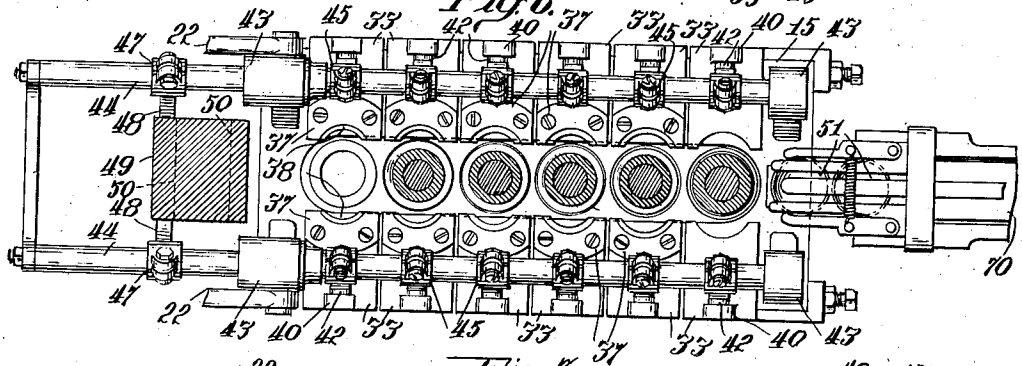
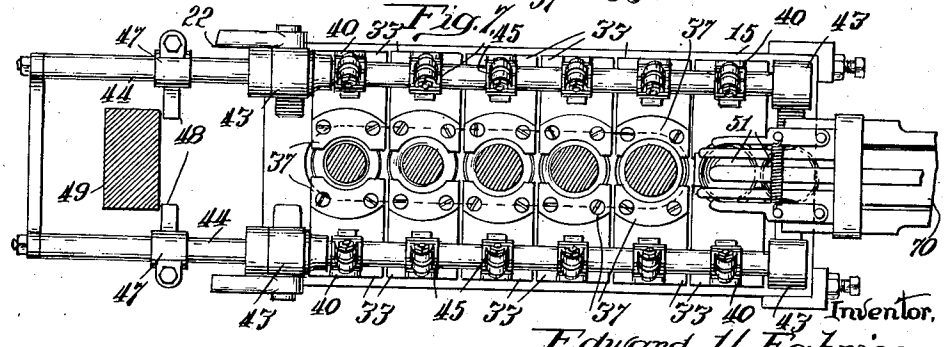


Fig. 7.



Inventor,
Edward H. Fabrice
By Rudolph Immel
Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 5

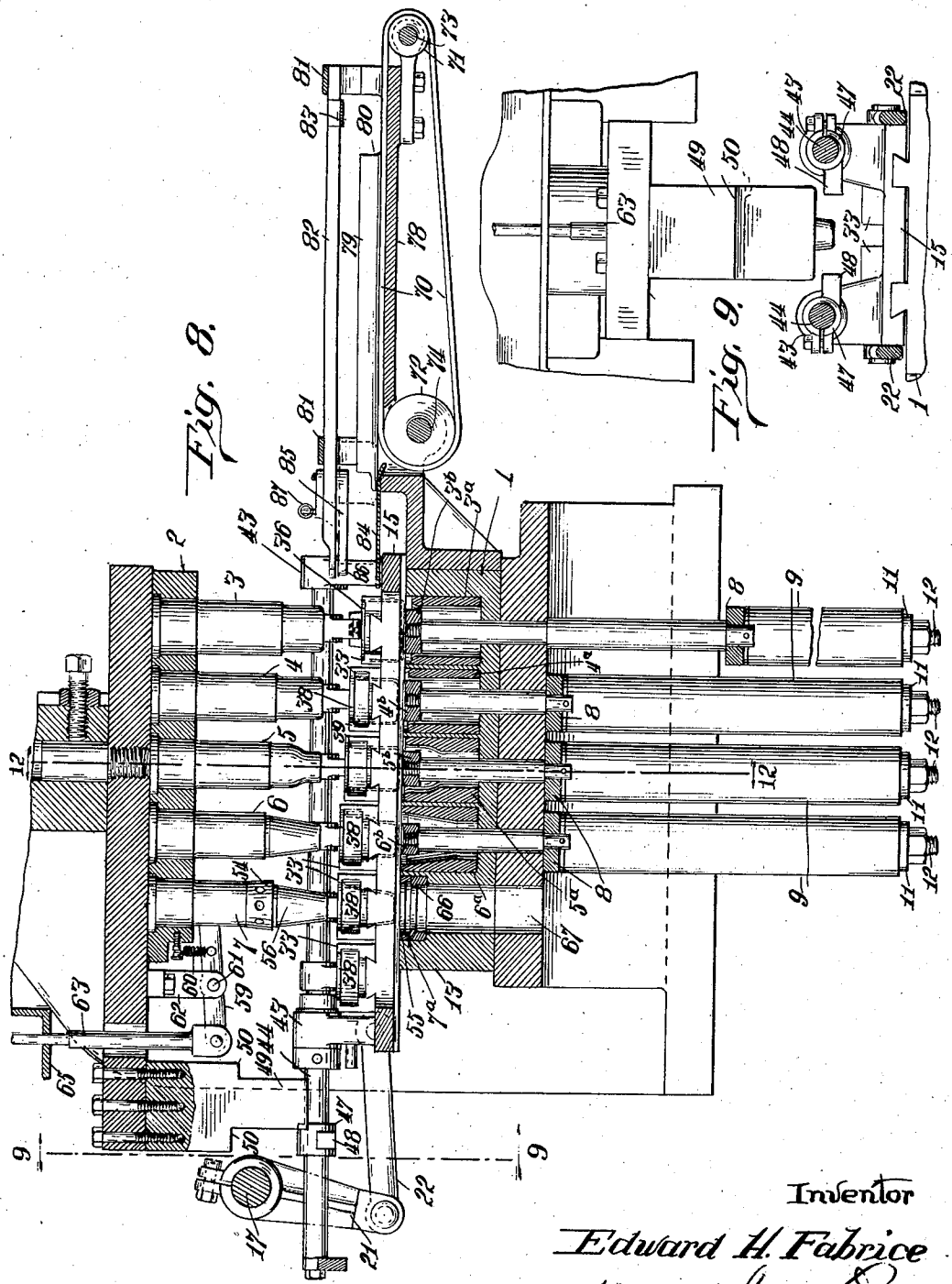


Fig. 8.

Fig. 9.

Inventor

Edward H. Fabrice

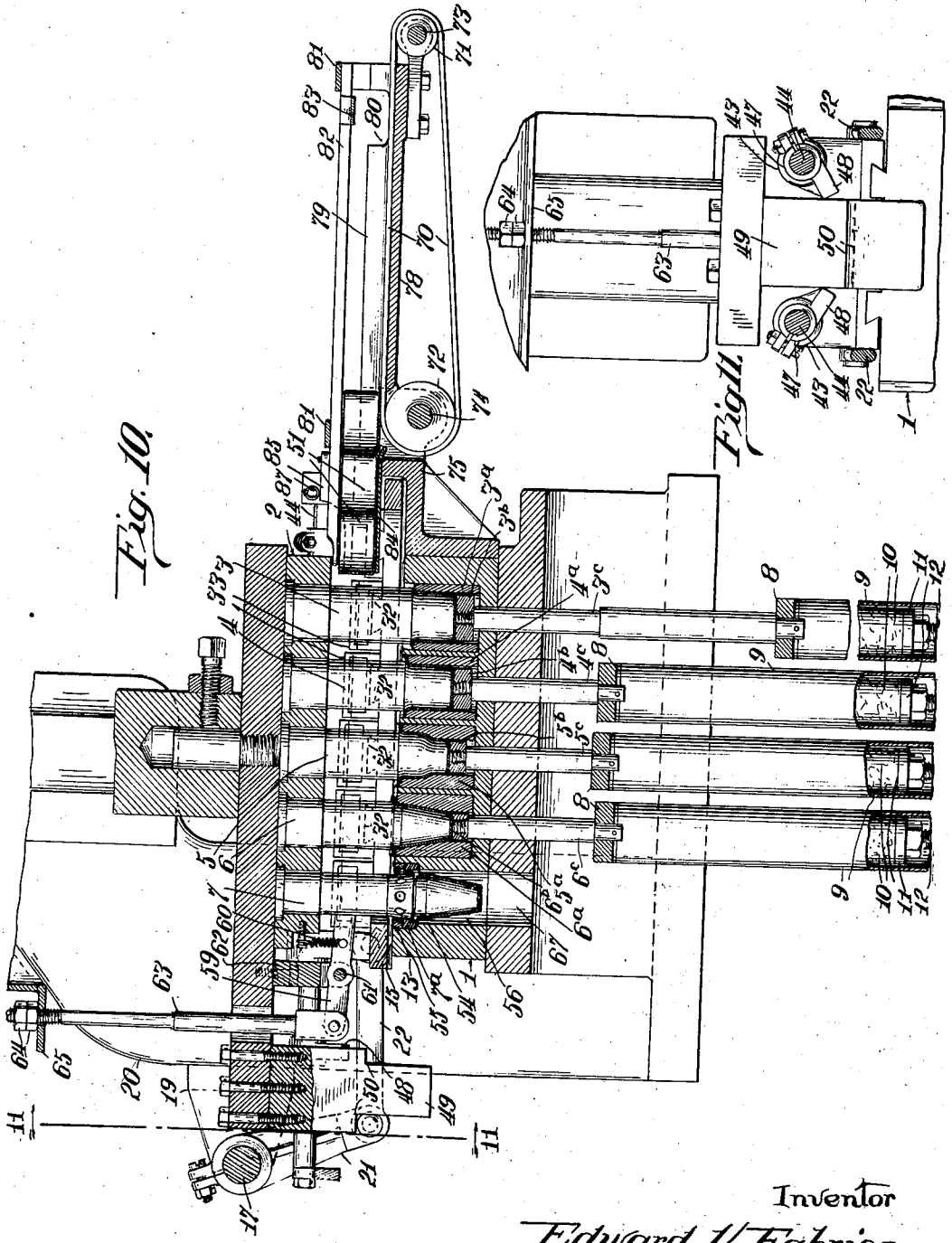
By Rudolph Mc Loth

Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 6



Inventor

Edward H. Fabrice

By Rudolph Dm. Fox

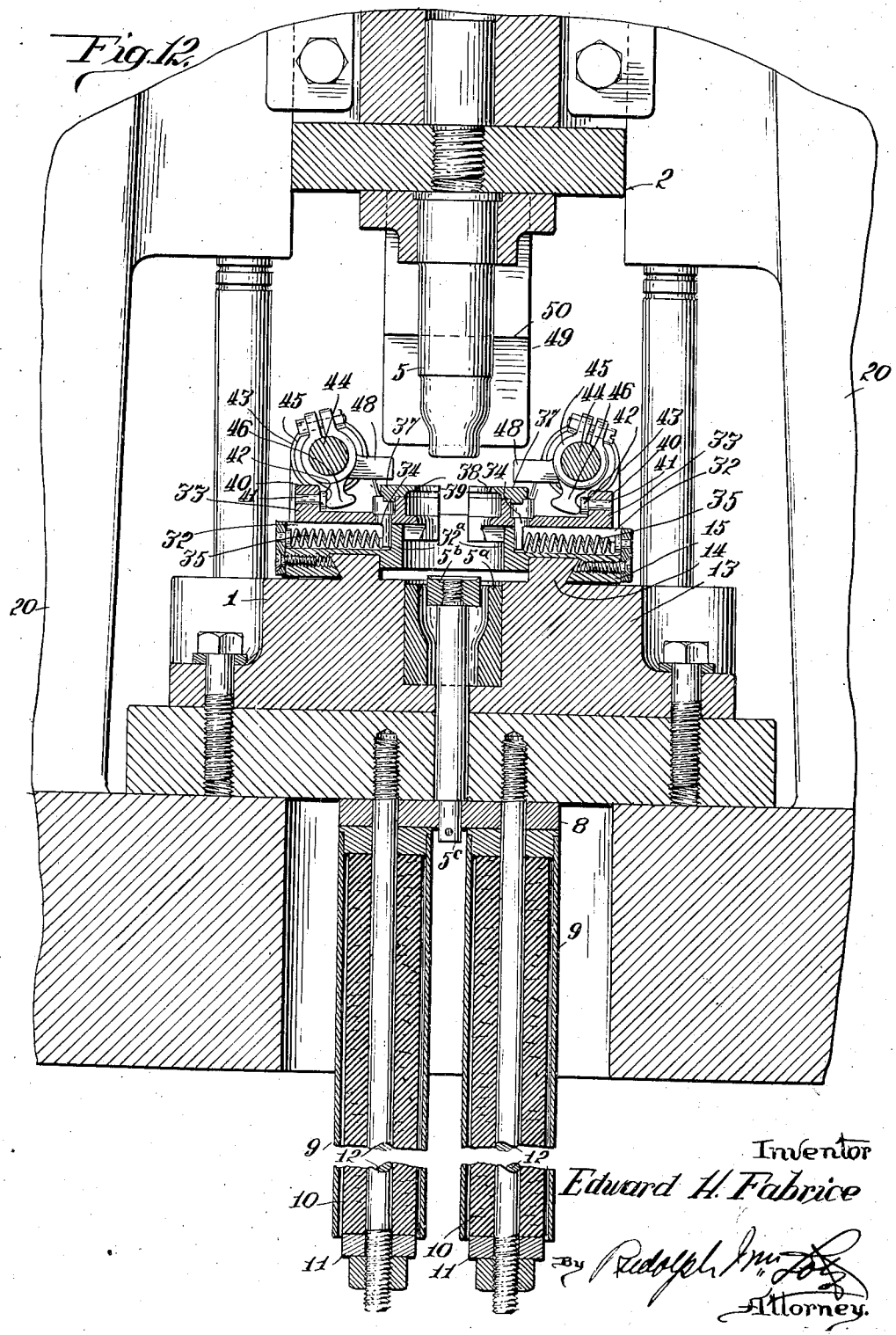
Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 7

Fig. 12.

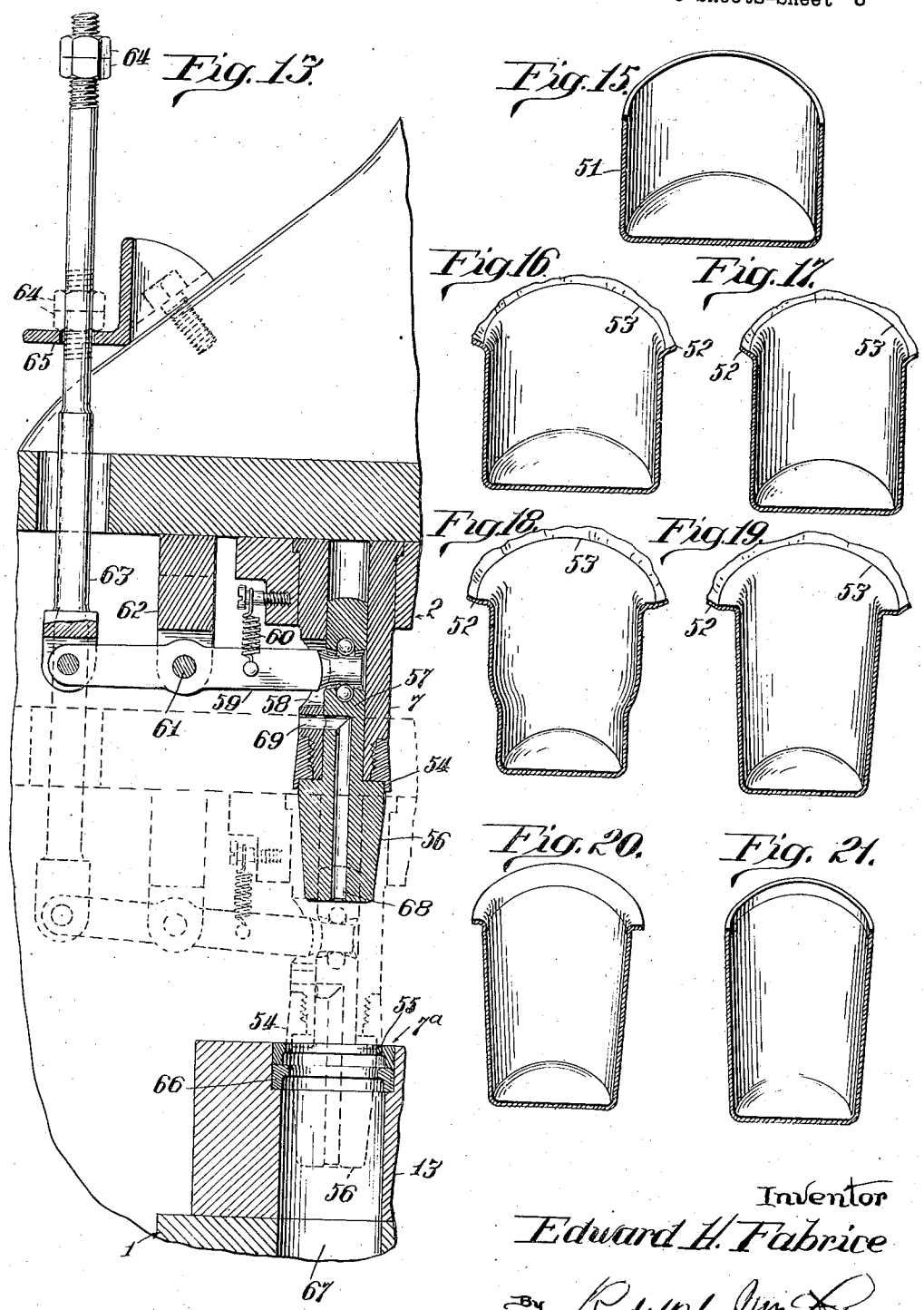


Inventor
Edward H. Fabrice
By Rudolph Inv. Co.
Attorney.

Jan. 8, 1935. E. H. FABRICE 1,987,101

SHEET METAL DRAWING MACHINE

Filed June 25, 1932 8 Sheets-Sheet 8



Inventor
Edward H. Fabrice
By Rudolph Wm. Folz
Attorney.

Patented Jan. 8, 1935 1,987,101

UNITED STATES PATENT OFFICE

1,987,101

SHEET METAL DRAWING MACHINE

Edward H. Fabrice, Chicago, Ill., assignor to Fabart Instrument Company, Chicago, Ill., a corporation of Illinois

Application June 25, 1932, Serial No. 619,199

8 Claims. (Cl. 113—38)

This invention relates to improvements in feeding devices for multi-die punch presses wherein a multiplicity of operations are performed at each operation, and wherein each of the several operations constitutes a step in the completion of each of a number of the articles to be produced which corresponds to the number of sets of dies of the press.

The main object of the invention is to provide a feeding mechanism for presses of the above type which will simultaneously feed the devices to be and being operated upon by the successive sets of dies, progressively through the press in synchronism with the strokes of the press plunger in such a manner as to prevent any part of the said feedng mechanism from becoming disposed in the path of any of the dies in the event that said feeding mechanism shall become jammed from any cause.

A further object of the invention is to provide a feeding mechanism of the type specified which will clear the dies of waste material cut off from the articles being acted upon by the dies.

The invention relates more particularly to metal drawing presses and is herein illustrated as embodied in a gang-die press of that character without limitation to embodiment thereof, in such modified form as may suit the conditions presented, in presses of other specific types and the sets of dies thereof.

A suitable embodiment of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a conventional punch press or drawing press equipped with mechanism constructed in accordance with the invention.

Fig. 2 is a front elevation of the same.

Fig. 3 is a plan section of the same on the line 3—3 of Fig. 1.

Figs. 4, 5, 6, and 7 are plan sections similar to Fig. 3, certain parts being omitted, and illustrating the progressive positions of the operating elements.

Fig. 8 is a fragmentary vertical longitudinal section taken on the line 8—8 of Fig. 2.

Fig. 9 is a fragmentary vertical transverse section taken on the line 9—9 of Fig. 8.

Fig. 10 is a view similar to Fig. 8, showing the operating parts in another position.

Fig. 11 is a fragmentary vertical transverse section taken on the line 11—11 of Fig. 10.

Fig. 12 is a fragmentary vertical transverse section taken on the line 12—12 of Fig. 8.

Fig. 13 is a fragmentary vertical longitudinal section, on an enlarged scale, showing certain details of the mechanism.

Fig. 14 is a detail longitudinal sectional view showing an operating plunger of the machine.

Figs. 15 to 21, inclusive, are perspective sectional views of a capsule showing the successive steps performed by the machine of this invention from the moment of introduction of a cup or capsule to its completion.

Referring to Fig. 1, it will be noted that the press employed is of the conventional tilted type which is equipped with a bed plate 1 and a plunger plate 2 which carries the male drawing dies for cooperation with the female dies, which are mounted upon the bed plate 1 by means of the customary carrier block for the said female dies. It will be obvious that any other suitable type of press other than that herein illustrated may be employed.

In the instance illustrated, the plate 2 is equipped with plungers 3, 4, 5, 6, and 7, respectively, carrying five male die members, but this number may be increased or diminished in accordance with the depth to which the work is to be drawn and the number of successive steps required to effect such drawing and the final trimming and forming operations hereinafter described. The male dies carried by the plungers 3 to 6, inclusive, are hereinafter referred to by said reference numerals.

Female die members, 3^a to 7^a, respectively, are associated with the respective male die members carried by the plungers 3 to 7, inclusive, and each of the said female die members, except the die member 7^a, is equipped with a spring-actuated ejector plate, 3^b to 6^b, inclusive, said plates being mounted upon plungers 3^c to 6^c, inclusive. Each of the latter is secured at its lower end to a bridge plate 8, as best shown in Fig. 12. Each of these bridge plates 8 carries a pair of tubes 9 in which rubber springs 10 are disposed, the latter being of hollow cylindrical form and bearing at their lower ends upon collars 11 which move telescopically within the tubes 9 as the latter move downwardly and which are rigidly mounted upon the lower ends of suspension rods 12 secured to the bed plate 1 of the press.

The respective female dies 3^a to 7^a, inclusive, are mounted in a carrier plate 13 which is bolted to the bed plate 1, and is equipped on its upper face with a pair of guide ribs 14 upon which a carriage 15 is slidable.

The said carriage 15 is reciprocated by means of a lever 16 which is rigid with a rock shaft 17 journalled in bearings 18 in brackets 19 mounted upon the side bars 20 of the press frame. A pair of arms 21, rigidly secured to the rock shaft 17, are connected with the said carriage by means of

links 22. The said arm or lever 16 is pivotally secured to one end of the reciprocating plunger 23 which is actuated by means of the groove-cam 24 mounted upon the drive shaft of the press.

The said plunger 23 comprises the lower end portion or member designated by said reference numeral which is provided with a threaded shank 23^a carrying an adjustable sleeve 23^b which constitutes a stop-member for limiting the movement of the tube 25 in one direction. The tube 25 is rigidly secured to a head 26, at its upper end, and receives the shank 25^a which is integral with the shank 23^a, in its lower end. A tension spring 28 is disposed within the tube 25 and is secured to the inner end of the shank 25^a and to the head 26, the latter being integral with the loop-member 29. The loop-member 29 is equipped with parallel side rails 30 which engage in the annular groove of a guide roller 31, rigid with the drive shaft of the press, which prevents appreciable lateral movement of the head 26. The head 26 carries the anti-friction roller 27 which engages in the groove of the cam 24 to cause the plunger 23 to be reciprocated by rotation of the said cam.

The said carriage 15 is equipped with lateral guides 32 (see Fig. 1) for a series of pairs of reciprocable plates 33 having downwardly projecting flanges 34 which are opposed to the side plates 32^a of the carriage 15 and form a series of pockets in which compression springs 35 are mounted. Said springs 35 serve to maintain the plates 33 normally at the inner limits of their movements.

In the instance illustrated, six pairs of said plates 33 are shown (Figs. 3 to 7), it being necessary that the number of said pairs of plates 33 shall exceed the number of sets of dies by one for reasons hereinafter explained. The foremost pair of said plates is provided with opposed concave recesses 36 in which partially completed cups to be drawn to a greater depth are received from the feed mechanism, which is hereafter described. The remaining pairs of plates are equipped at their inner ends with opposed gripping members 37, which are provided in their opposed inner ends with arcuate flanges 38 which carry inwardly extending arcuate lips 39 for engaging or gripping the cups or capsules.

At the outer ends of the said plates 33, there are upwardly extending flanges 40, each equipped with a horizontal opening in which a replaceable pin 41 is received, each of said pins being provided with a wearing head 42.

The carriage 15 is equipped at its ends with bearings 43 for a pair or rock shafts 44 which rotate simultaneously in opposite directions. Each rock shaft 44 is equipped with a series of collars 45 rigidly secured thereto, and each of said collars 45 is equipped with a cam projection 46 for engaging the wearing head 42 of a pin 41 for forcing the pairs of plates 33 simultaneously outwardly against the action of the said springs 35. Said shafts 44 are also equipped with collars 47 which are equipped with arms 48 by means of which said shafts are rocked.

Rigid with the rear end of the plunger of the press is a cam member 49 having parallel side faces and a lower end portion, which is of less thickness than its upper portion, thus to provide a pair of shoulders 50 for engaging the arms 48 of the collars 47 for rocking said shafts 44 in one direction, against the action of the springs 35 as the plunger of the press moves downwardly.

By reference to Figs. 4 to 7, inclusive, it will be noted that a series of cups 51 is disposed in the feed mechanism and that one of said cups, as shown in Fig. 4, is disposed above the first of the series of pairs of plates 33 and in position to be engaged between the first of said series of pairs of plates 33 in the arcuate recesses 36 thereof.

As the rock shafts 44 are disposed to permit said plates to approach each other to engage a cup or capsule 51, responsively to the action of the springs 35, said first capsule will be engaged between said first pair of plates 33. This engaging movement of the first pair of plates 33 is followed by a backward movement of the carriage 15 and of all of the pairs of plates 33 carried thereby so that, upon the completion of this backward movement, the first cup or capsule 51 will become disposed over the first female drawing die 3^a of the press and in axial alignment with its companion male die 3.

Substantially instantly following the completion of this backward movement of the carriage 15, the press plunger moves downwardly and causes the rearward shoulder 50 of the cam member 49 to engage the arms 48 of the collars 47 to rock said shafts 44 and separate the plates 33 to release the cup or capsule 51 at substantially the instant that the same is engaged by or becomes disposed upon the male die 3 and is carried into the female die 3^a by said male die 3.

During the action of the dies 3 and 3^a upon the capsule 51, the carriage 15 moves back to its initial position to receive another capsule 51 and as soon as the male die 3 has brought the first capsule out of the female die 3^a with the aid of the ejecting plate for the said female die, the said plates 33 are again brought into position to engage the first capsule and also the next succeeding capsule 51 to be drawn. At the moment that said plates have engaged the said capsule 51, the ejector plates will have completed their upward movement and said first-mentioned capsule will be free of the female die 3^a. The male dies now continue their upward movement, thus causing the capsules to be stripped therefrom and thereupon the carriage 15 again moves rearwardly to transfer the first-mentioned capsule 51 from the position for action thereon by the dies 3 and 3^a to position for action thereon by the dies 4 and 4^a, while the next succeeding capsule is brought into position to be acted upon by the dies 3 and 3^a.

By reference to Fig. 15, it will be noted that the cup or capsule 51 is initially devoid of an annular lip at its mouth, and by reference to Fig. 10 and Fig. 3, it is apparent that such an annular flange 52 (Fig. 16) is formed by the die members 3 and 3^a. As shown in Figs. 17 to 19, inclusive, said flange 52 is somewhat extended by the dies 4 and 4^a to 6 and 6^a, inclusive. A part of this flange 52 is trimmed off along the line 53, Figs. 16 to 19, inclusive, so as to leave a true circular edge on said flange concentric with the plunger 7. The last-mentioned dies also act to draw up said flange as shown in Fig. 21 so that it becomes aligned with and a continuing part of the circumferential wall of the capsule.

The dies associated with the plunger 7 are, therefore, hereinafter termed the trimming dies and, in order that they may also act to bend the flange 52 to the position shown in Fig. 21, they may also be termed forming dies.

In order to accomplish these functions, the plunger 7, shown in detail in Fig. 13, comprises a sleeve which is rigid with the plunger plate 2 of the press. The plunger 7 carries the male trimming die 54 which cooperates with the female

trimming die 55 to shear the flange 52 along the line 53.

The male forming die 56 for bending or forming the trimmed flange 52, as above indicated, is equipped with a shank 57 telescopically engaged in the plunger 7. The latter is provided with a slot 58 at one side for the passage of one end of a lever 59 which engages in an opening in the shank 57 of the die 56. The die 56 is maintained normally disposed at the upper limit of its movement by means of the spring 60 engaging the lever 59 between the end thereof engaged with the said shank 57 and the pivot pin 61 for said lever which is mounted in a bracket 62 rigid with the press frame. The said pin 61 engages the lever 59 between its ends, and the other end of said lever is pivotally engaged with a plunger 63 which is equipped with a suitable stop-collar 64 at its upper end for engaging a stop-member 65 mounted on the press frame as said plunger 7 approaches the lower limit of its movement.

As said plunger 7 reaches the position wherein the die 54 has cooperated with the die 55 to trim the flange 52 of the capsule, the stop-collar 64 will be in contact with the stop-member 65 and thus the member 56 will be caused to move dowr - wardly more rapidly than the plunger 7 durirg the balance of the downward stroke of the latter, and will thus carry the capsule through the female forming die 66 disposed below the die 55. The said capsule is then stripped from the member 56 and drops through the opening 67 into a suitable receptacle provided to receive the same.

In order to facilitate the release of the finished capsule from the die 56, the latter is provided with a central opening 68 connecting with a lateral opening 69 for the admission of atmospheric or compressed air, as desired.

The feed mechanism comprises a conveyor belt 70 trained over pulleys 71 and 72 carried by shafts 73 and 74, respectively, journalled in bearings on a bracket 75 mounted upon the front of the die carrying plate for the female dies. A sheave 76 is rigid with the shaft 74 and is geared to a sheave rigid with the drive-shaft of the press by means of the belt 77 which, as shown in Fig. 1, is crossed in order to drive the sheave 76 in the opposite direction of rotation from that of the drive-shaft of the press.

The belt 70 is trained, in part, over a plate 78 which is equipped with side flanges 79. Each of the flanges 79 is provided with a recess 80, said recesses being offset from each other.

Mounted upon the forward ends of the flanges 79 is an inverted U-shaped member 81 which supports the forward end of a bar 82 overhanging the conveyor belt 70, and is supported at its other end portion by a similar member 81.

Secured to the bar 82 and overhanging the respective recesses 80 is a pair of flat springs 83 which are flexed upwardly by an operator or operators as capsules are inserted through said recesses 80 to rest upon the conveyor belt 70.

Disposed beyond the rear pulley 72 is a flat plate 84 upon which the capsules 51 become successively disposed, the same being engaged at diametrically opposite sides between a pair of fingers 85 which are pivotally secured at one end each to the upper edges of the flanges 79. Said fingers have arcuate free end portions 86 constituting stops for limiting the travel of the capsules 51 under the influence of the belt 70, said arcuate end portions being so disposed that when the carriage 15 is at the forward limit of its movement, the capsules 51 disposed in engagement with the said arcuate ends of said fingers will be in alignment with the arcuate recesses of the forward pair of plates 33 for engagement by the latter. The said fingers are held yieldingly at the inner limits of their movement by means of a light spring 87. The capsule engaged with said fingers and said forward plates 33 is withdrawn from engagement with said fingers as said carriage 15 moves to the rearward limit of its movement.

The operation of the mechanism is as follows:

Capsules are fed upon the belt 70 through the recesses 80 in the flanges 79 until a sufficient number thereof is disposed upon said belt to cause the first thereof to become disposed in engagement with the arcuate end portions of the said fingers 85, it being understood, of course, that the feeding of the capsules will continue as fast as the same are disengaged from said fingers 85 by the forward plates 33 of the carriage 15.

A partial brief description of the operation of the said pairs of plates 33 has been hereinbefore recited and for the purpose of further description, it will be assumed that six capsules have been fed to the dies successively, the first one beirg ejected at the moment that the fifth capsule is subjected to the action of the dies 3 and 3^a.

From this time on each descent of the dies 3 to 7, inclusive, will effect four drawing operations and one trimming, forming, and ejecting operation as hereinabove described.

The movement of the press plunger must obviously be synchronized with the movement of the carriage 15 and the plates 33 thereof so that the gripping members of said plates 33 will engage the capsules at the instant that the punch press plunger shall have attained the position at which the male die members are about to cause the bottoms of the capsules to leave contact with the ejector plates of the female die members. The said grippers thus act to strip the capsules from the male die members and as soon as the latter are completely withdrawn from said capsules, the carriage will move to the rearward limit of its movement and carry the set of capsules with it for further subjection to die action and ultimate ejection. Obviously, during the period at which the male die members again receive the capsules and during the interval of subjection of the latter to the action of said dies, the pairs of plates 33 will be moved apart precedent to the next forward movement of the carriage 15 responsively to the action of the grooved cam 24 and the plunger 23.

The forward movement of the carriage 15 and the outward or capsule release movement of the plates 33 are both positive movements, whereas the feed movement of the carriage 15 and the capsule gripping movement of the plates 33 are rendered yielding by the spring 28 within the tube 25 of the plunger 23 and by the springs 35. The yielding actuation of the carriage 15 is very important for the reason that it sometimes happens that a capsule becomes misplaced between opposed plates 33 or is not properly engaged by a male die or becomes canted, etc., and thus interferes with the feeding stroke of the carriage 15.

In such event, the plunger 23 will elongate in an obvious manner, to prevent breakage of any part which would be effected in the absence of the yielding nature of the actuating mechanism for the carriage 15.

It will be noted, by reference to Figs. 9 to 11, that the member 49 for actuating the rock shafts 44 of the carriage 15, is of dimensions between

the plane of the upper portions of its front and rear faces greater than the length of stroke of the carriage 15, the shoulders 50 of the member 49 being far enough rearwardly to cause the arms 48 of the rock shafts 44 to become disposed in the path of the lower end portion of the member 49, then said arms will be engaged by the forward shoulder 50 of the member 49 and will cause the rock shafts to be turned to effect separating movement of the plates 33 to throw the latter entirely out of the paths of the dies 3 to 7, inclusive, and thus prevent breakage which would otherwise result.

The rearmost or sixth pair of plates 33 serves to clear the press of the edge portions of the flanges of the capsules which are trimmed or cut off by the trimming die 54 and remain disposed upon the latter.

It will be noted, by reference to Fig. 10, that the concave ends of the said rearmost pair of plates 33 are grooved between the upper and lower faces of the said plates. At the moment that the dies 3 to 6 become disposed in the position at which the capsules disposed upon the dies 3 to 6, inclusive, wherein said capsules are engaged by the corresponding pairs of plates 33, the ring of metal carried by the die 54 will be disposed in the path of the grooves of the rearmost pair of said plates 33 and will be engaged therein and stripped from the said die. The ring is then carried to the rear and is released in an obvious manner.

I claim as my invention:

1. In a plunger press of the multi-stage type equipped with a plurality of sets of dies, a feed mechanism comprising a reciprocable carriage, means actuated by the plunger actuating mechanism of the press for reciprocating the said carriage, article engaging devices mounted on said carriage for spring actuated movement laterally of the path of travel of said carriage in a direction to engage articles operated upon by said dies, means on said carriage for actuating the said devices to article releasing position, and a member rigid with the press plunger for actuating said means at all points in the travel of the said carriage.

2. A multi-stage drawing press including a reciprocable carriage associated with the dies thereof, a plurality of pairs of opposed article engaging devices mounted on the said carriage and constituting a total number of pairs thereof exceeding the number of dies by one, one of said pairs being adapted to feed articles to the first of said dies and another thereof adapted to free said press of metal trimmed from the article by the last of said dies, springs for normally maintaining said devices in article engaging position, a pair of parallel rock-shafts mounted on said carriage and extending parallel with the path of travel thereof, a series of arms on said rock-shafts for moving said devices out of article engaging position, and including a pair of arms for actuating said shafts, a reciprocable member rigid with the press plunger for engaging the last-named arms during the active stroke of the said plunger to move said devices against the action of said springs.

3. A multi-stage drawing press including a reciprocable carriage associated with the dies thereof, a plurality of pairs of opposed article engaging devices mounted on the said carriage and constituting a total number of pairs thereof exceeding the number of dies by one, one of said pairs being adapted to feed articles to the first of said dies and another thereof adapted to free said press of metal trimmed from the article by the last of said dies, springs for normally maintaining said devices in article engaging position, a pair of parallel rock-shafts mounted on said carriage and extending parallel with the path of travel thereof, a series of arms on said rock-shafts for moving said devices out of article engaging position, and including a pair of arms for actuating said shafts, a reciprocable member rigid with the press plunger for engaging the last-named arms during the active stroke of the said plunger to move said devices against the action of said springs at all points in the travel of said carriage, and means whereby travel of said carriage in one direction may be interrupted by obstruction.

4. A multi-stage drawing press including a reciprocable carriage associated with the dies thereof, a plurality of pairs of opposed article engaging devices mounted on the said carriage and constituting a total number of pairs thereof exceeding the number of dies by one, one of said pairs being adapted to feed articles to the first of said dies and another thereof adapted to free said press of metal trimmed from the article by the last of said dies, springs for normally maintaining said devices in article engaging position, a pair of parallel rock-shafts mounted on said carriage and extending parallel with the path of travel thereof, a series of arms on said rock-shafts for moving said devices out of article-engaging position, and including a pair of arms for actuating said shafts, a reciprocable member rigid with the press plunger for engaging the last-named arms during the active stroke of the said plunger to move said devices against the action of said springs at all points in the travel of said carriage, and means whereby travel of said carriage in one direction may be interrupted by obstruction, and feeding mechanism for successively disposing articles to be acted upon into the path of the first pair of said devices for engagement thereby.

5. In a multiple die press, article feeding mechanism comprising a reciprocable carriage, a cam on the plunger actuating shaft of said press, a rockshaft on said press, a connecting rod associating said cam with said rockshaft and having a spring associated therewith for causing said rockshaft to be actuated yieldingly in one direction, means connecting said rockshaft with said carriage for reciprocating the latter, article gripping means on the said carriage, rockshafts on said carriage for actuating said gripping devices in one direction, springs for actuating said gripping devices in the other direction, arms on said rockshafts and a plunger rigid with the press plunger for engaging said arms to rock said shafts in one direction.

6. In a multiple die press, article feeding mechanism comprising a reciprocable carriage, a cam on the plunger actuating shaft of said press, a rockshaft on said press, a connecting rod associating said cam with said rockshaft and having a spring associated therewith for causing said rockshaft to be actuated yieldingly in one direction, means connecting said rockshaft with said carriage for reciprocating the latter, article gripping means on the said carriage, rockshafts on said carriage for actuating said gripping devices in one direction, springs for actuating said gripping devices in the other direction, arms on said rockshafts and a plunger rigid with the press plunger for engaging said arms to rock said shafts in one direction, said plunger including a member

arranged to engage said arms to rock said last-named rockshafts in one direction in the event that said carriage fails to complete its normal stroke of travel in one direction.

7. In a multiple die press, article feeding mechanism comprising a reciprocable carriage, a cam on the plunger actuating shaft of said press, a rockshaft on said press, a connecting rod associating said cam with said rockshaft, said rod being composed of a pair of telescopically interengaged members, a spring interposed between said member for causing elongation of said rod in the event of abnormal resistance to rotation of said rockshaft in one direction, means connecting said rockshaft with said carriage for reciprocating the latter, article gripping means on the said carriage, rockshafts on said carriage for positively actuating said gripping devices to article releasing position, springs for actuating said gripping devices in the other direction, arms on said rockshafts and a plunger rigid with the press plunger for engaging said arms to rock said shafts in one direction.

8. In a multiple die press, article feeding mechanism comprising a reciprocable carriage, a cam on the plunger actuating shaft of said press, a rockshaft on said press, a connecting rod associating said cam with said rockshaft, said rod being composed of a pair of telescopically interengaged members, a spring interposed between said member for causing elongation of said rod in the event of abnormal resistance to rotation of said rockshaft in one direction, means connecting said rockshaft with said carriage for reciprocating the latter, article gripping means on the said carriage, rockshafts on said carriage for positively actuating said gripping devices to article releasing position, springs for actuating said gripping devices in the other direction, arms on said rockshaft, and a plunger rigid with the press plunger for engaging said arms to rock said shafts in one direction, said plunger including a member arranged to engage said arms to rock said last-named rockshafts in one direction in the event that said carriage fails to complete its normal stroke of travel in one direction.

EDWARD H. FABRICE.