

Nov. 18, 1924.

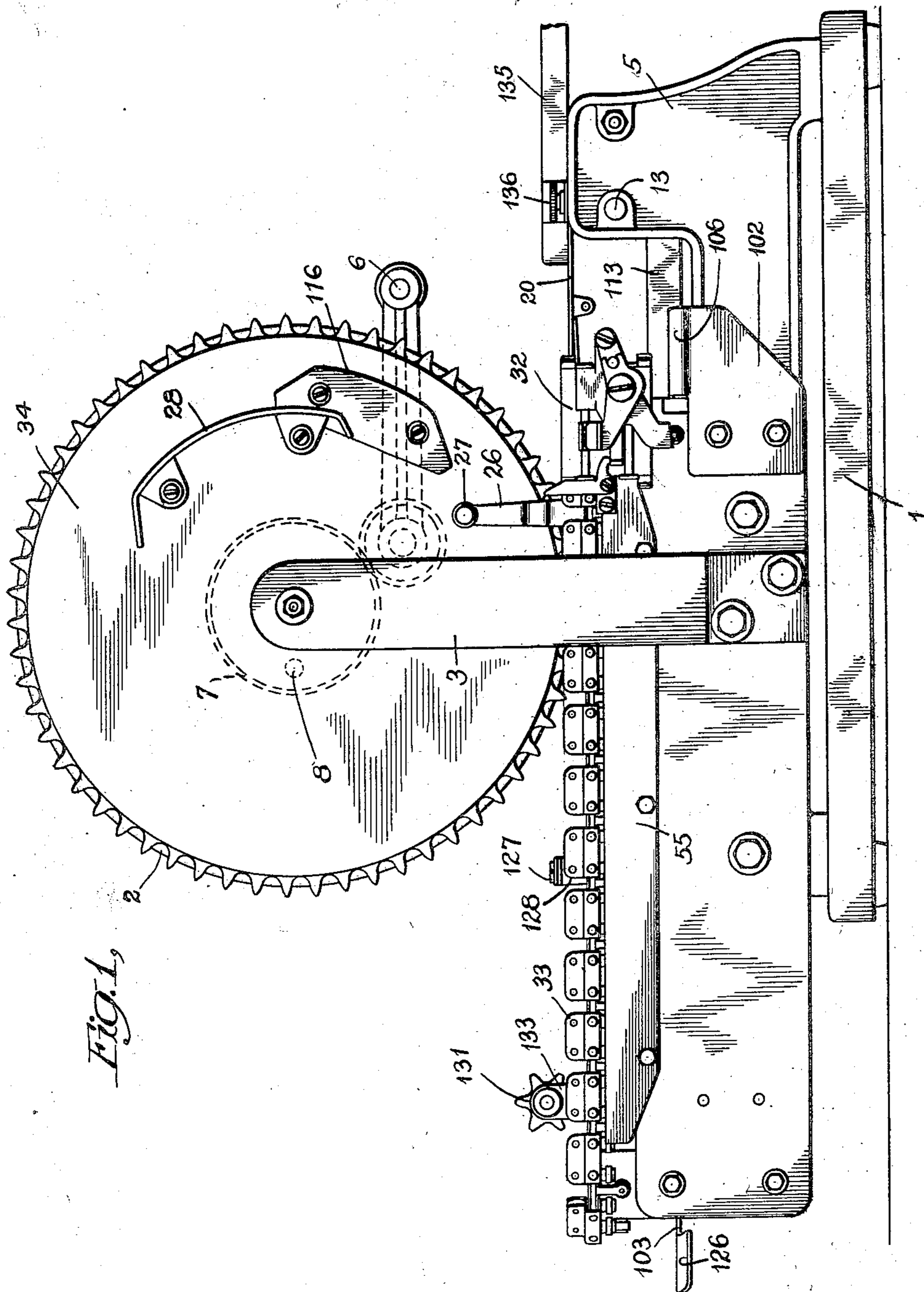
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E. J. BRASSEUR

STENCIL DUPLICATING MACHINE

Filed June 7, 1922

7 Sheets-Sheet 1



Inventor
Ernest J. Brainerd
By his Attorney J. Edwards

Nov. 18, 1924.

1,516,227

E. J. BRASSEUR

STENCIL DUPLICATING MACHINE

Filed June 7, 1922

7 Sheets-Sheet 2

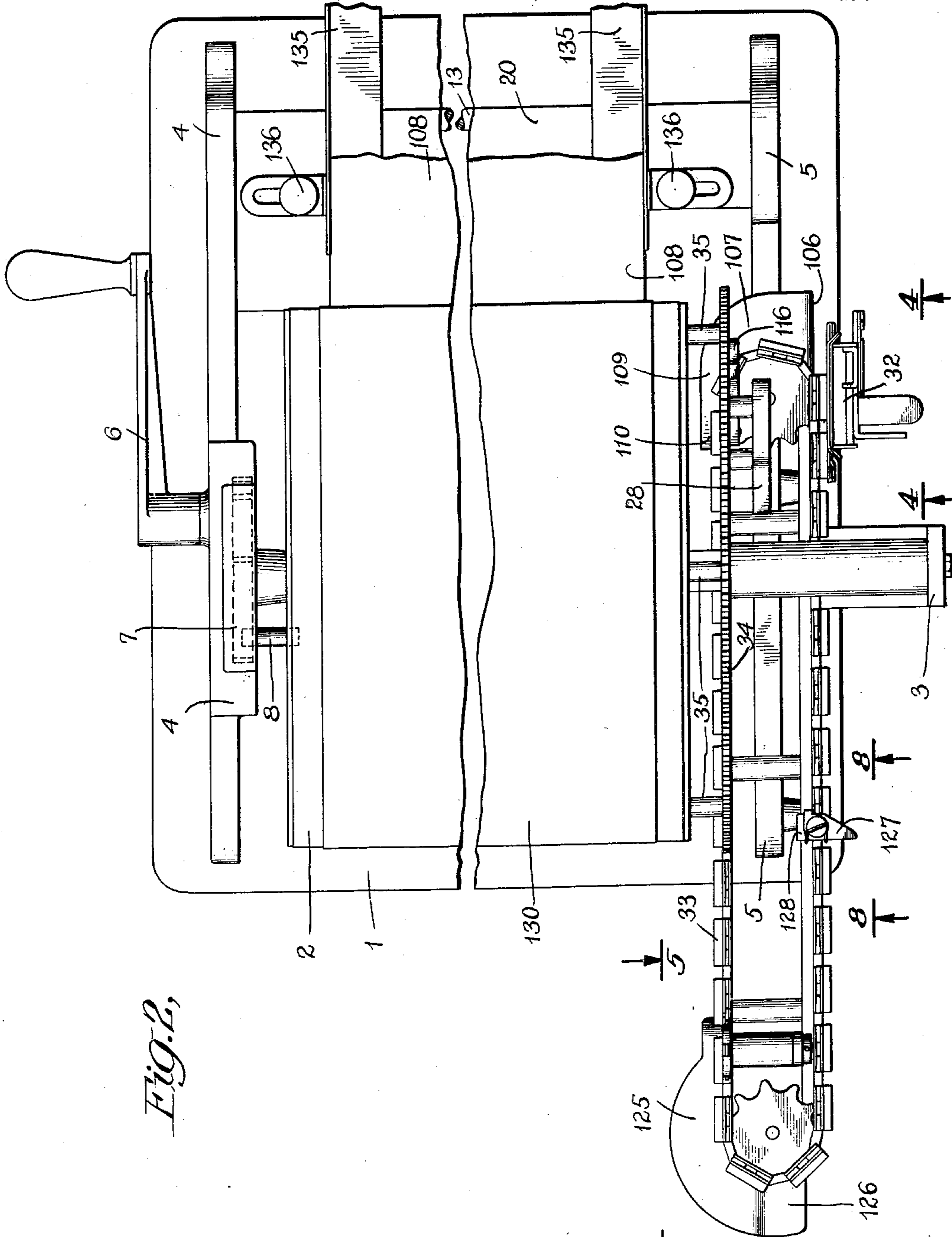


Fig. 2,

Inventor
E. J. Brasseur
By his Attorney
J. Edwards

Nov. 18, 1924.

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E. J. BRASSEUR

STENCIL DUPLICATING MACHINE

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7 Sheets-Sheet 4

Fig. 5,

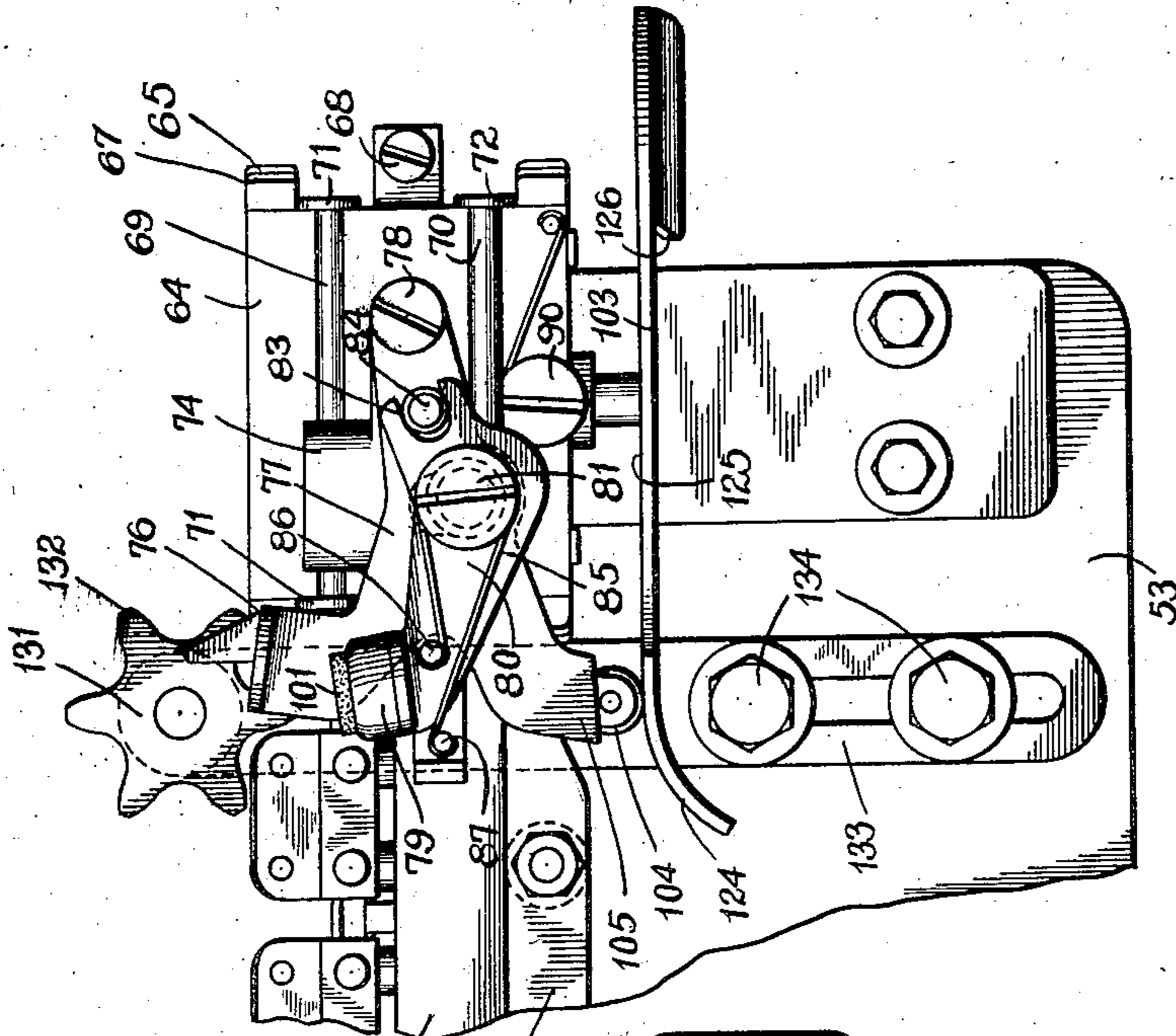
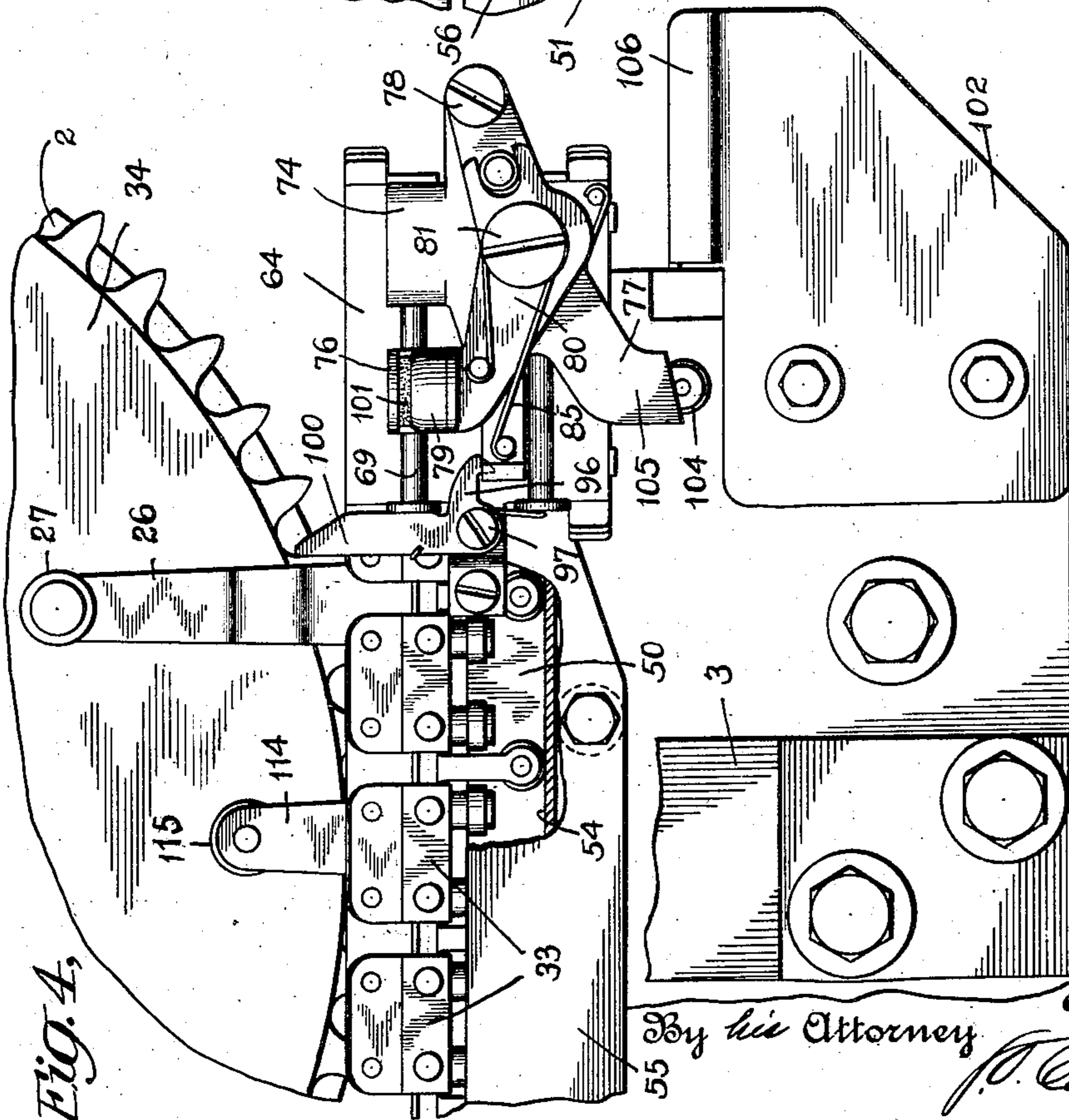


Fig. 4,



Inventor

E. J. Brasseur

By his Attorney

J. P. Edwards

Nov. 18, 1924.

1,516,227

E. J. BRASSEUR

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7 Sheets-Sheet 5

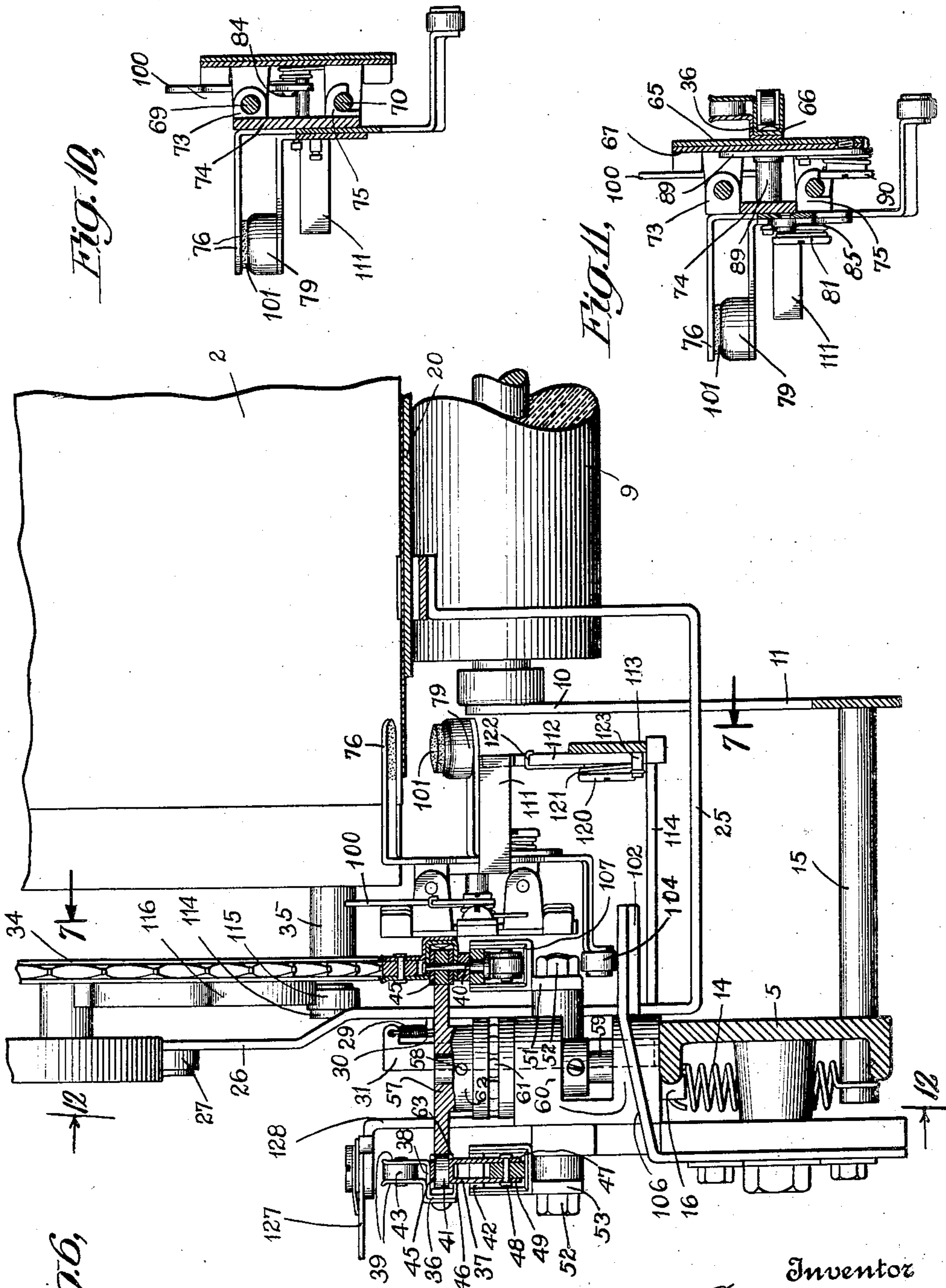


Fig. 6,

Fig. 10,

Fig. 11,

Inventor
Emmet J. Brasseur
 By his Attorney
J. Edmunds

Nov. 18, 1924.

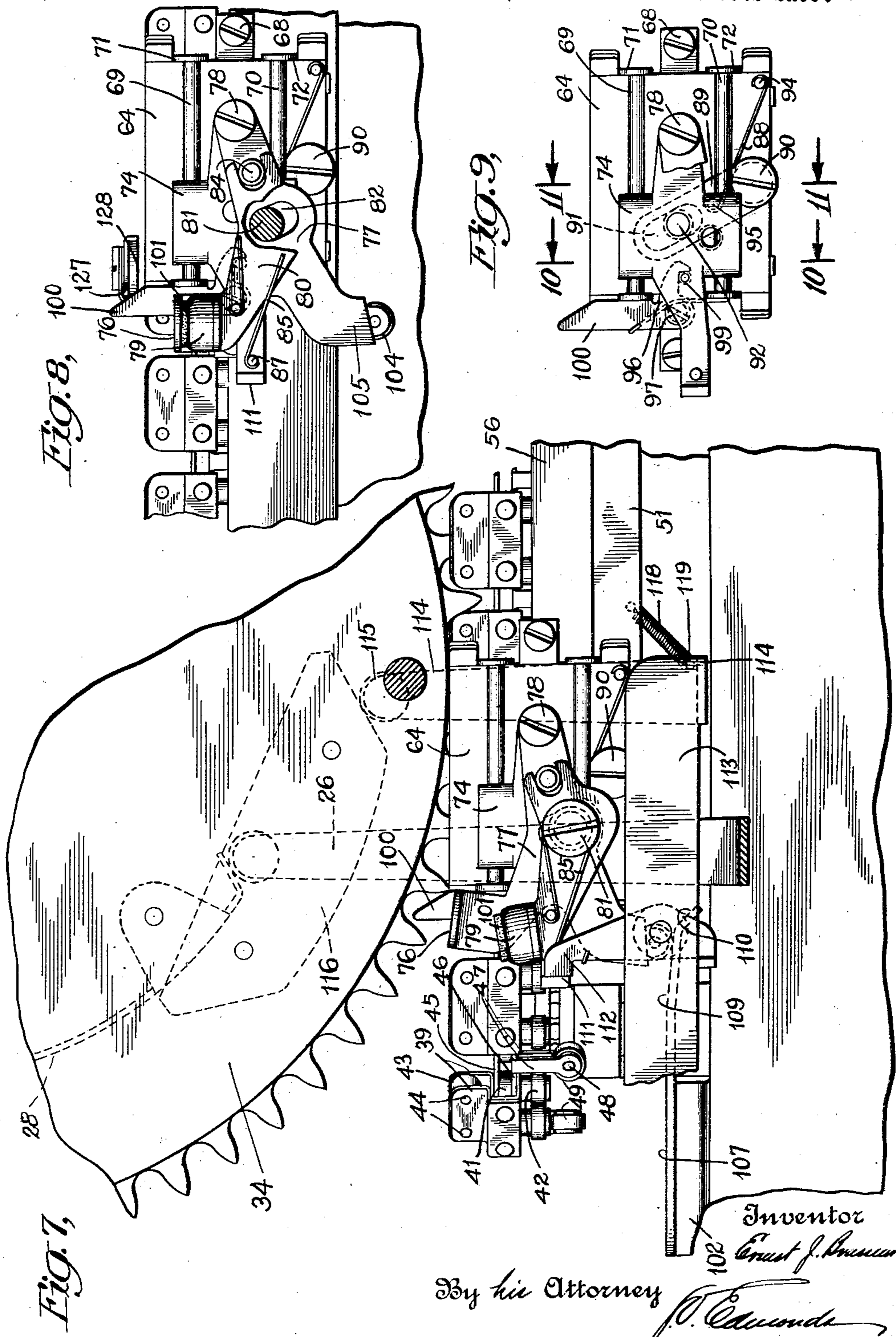
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E. J. BRASSEUR

STENCIL DUPLICATING MACHINE

Filed June 7, 1922

7 Sheets-Sheet 6



Nov. 18, 1924.

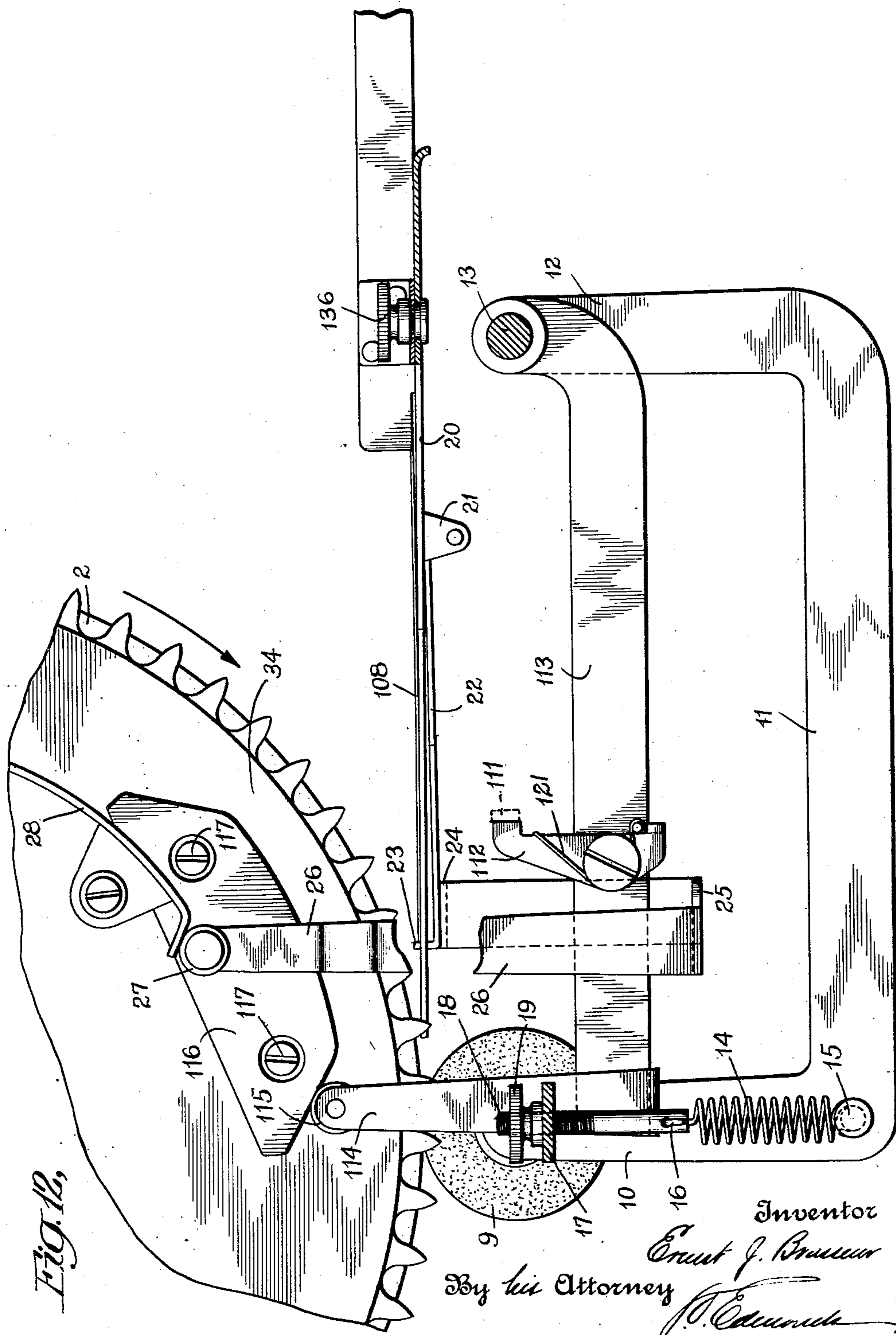
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E. J. BRASSEUR

STENCIL DUPLICATING MACHINE

Filed June 7, 1922

7 Sheets-Sheet 7



Inventor

Ernest J. Brasseur

By his Attorney

28 J. Edwards

Patented Nov. 18, 1924.

1,516,227

UNITED STATES PATENT OFFICE.

ERNEST J. BRASSEUR, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

STENCIL-DUPLICATING MACHINE.

Application filed June 7, 1922. Serial No. 566,472.

To all whom it may concern:

Be it known that I, ERNEST J. BRASSEUR, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Stencil-Duplicating Machines, of which the following is a specification

This invention relates to stencil duplicating machines.

This application and an application filed by me on even date herewith, Serial Number 566,473 both relate to the same subject matter and both show broadly my invention in so far as the same relates to mechanism for feeding, stripping, and securing registration of sheets, and to the means for driving the various parts of the machine. In my said other application Serial Number 566,473 I have disclosed and claimed certain specific embodiments of my said broad invention.

My aim is to provide a stencil duplicating machine which is durable in construction, easy to operate, one which operates smoothly and efficiently with a minimum of noise, and at a high speed, if desired, one which gives accurate registration in printing, positively feeds the sheets successively into the printing couple for printing, positively strips each sheet from the printing couple, and operates efficiently and surely upon sheets within an unusually wide range of widths and thicknesses. More particularly, one of the objects of my invention is to provide a sheet stripping mechanism which operates positively to strip each sheet from the printing mechanism. Another object of this invention is to provide a stripping mechanism which also operates to feed sheets successively into the printing mechanism for printing. A further object of this invention is to provide a duplicating machine equipped with feeding and stripping mechanism whereby printing registration is secured with the utmost accuracy. A further object of this invention is to provide, for duplicating machines and the like, feeding and stripping mechanism which is durable in construction, positive and accurate in operation, and which will operate surely and efficiently upon sheets within a wide range of width and thickness. A further object of this invention is to provide simple and efficient driving means for operating the machine and for maintaining the desired synchronism in the movement of

the various parts. Other objects will be in part obvious and in part pointed out hereinafter.

In accordance with my invention, as disclosed both herein and in my said co-pending application, I provide a sheet-gripping device which, during the operation of the machine, moves to a point adjacent the feed table or apron where it grasps a sheet thereon and then, while carrying the sheet along, moves to and beyond the printing couple to feed the sheet thereto and to positively strip the sheet therefrom, and when it has carried the sheet to a certain point, it drops the sheet and returns to its original position to grasp the next sheet placed on the feed table and repeat the above cycle of operations. The movement past the printing couple is preferably tangential to the members of the printing couple where they co-act to print a sheet, and the movement is synchronized with the movement of the printing couple. The gripping device includes operable means for gripping and for releasing a sheet, said means preferably comprising jaws which are operable into closed position to grasp a sheet between them and which are operable into open position to release a sheet held in the jaws or to straddle a sheet without gripping it. I provide means for moving the gripping device as above indicated periodically and in established synchronism with the movement of the printing couple and other parts of the machine, and I also provide means whereby, as the gripping device moves along its path the gripping means are operated to first straddle and then grasp a sheet on the feed table or apron each time the device reaches a certain point, and to maintain the hold until the sheet has been fed forwardly into the printing couple for printing, and beyond the printing couple so as to be stripped therefrom and brought to a certain point where said means operate the gripping means to release and drop the sheet. The gripping device is preferably mounted on an endless chain at one side of the machine. The chain may be driven continuously during the operation of the machine by means of a sprocket which meshes therewith and which rotates in the proper synchronism with the printing cylinder, so that when sheets are successively placed in a predetermined position on the feed table or apron, each sheet thereon is grasped at the

same place by the gripping device, and the printing on each sheet will be in the same relative position thereon. The mechanism is adjustable so that the position of the printing on a sheet may be accurately predetermined, and which adjustment maintains for all successive sheets and until the stencil is changed or a readjustment is made. This is termed securing registration in printing.

The actuation of the gripping device to grasp the paper at the proper time, to maintain the hold on the sheet until it has been fed into the printing couple for printing and has been stripped therefrom, and to release the sheet at the desired place, is obtained by means of one or more cams suitably positioned along the path of travel of the gripping means. The cams are adapted to coact with a projection or roller carried on the gripper and connected with the jaws to effect their closing and opening.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings, forming a part of this application, and illustrating one possible embodiment of my invention. In the drawings, Fig. 1 is a side elevation of a rotary duplicating machine embodying my invention; Fig. 2 is a top view of the same; Fig. 3 is an enlarged top view of a portion of the machine, showing the gripping device in position to grasp a sheet on the feed table, certain parts being broken away and others being omitted for the sake of clearness; Fig. 4 is an enlarged side view of a portion of the machine including the gripping device, taken on the line 4—4 of Fig. 2; Fig. 5 is an enlarged side view of a portion of the machine, taken on the line 5—5 of Fig. 2, and shows the gripping device open to release a sheet; Fig. 6 is an enlarged sectional view taken on the line 6—6 of Fig. 3; Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 6; Fig. 8 is an enlarged side view of a portion of the machine, taken on the line 8—8 of Fig. 2, and shows the gripping device and means for unlatching it on its carrier; Fig. 9 is a detail view of the gripping device with the gripping means broken away to more clearly bring out certain details of the construction; Fig. 10 is a sectional view of the gripping device taken on the line 10—10 of Fig. 9; Fig. 11 is a sectional view of the gripping device taken on the line 11—11 of Fig. 9, and Fig. 12 is a sectional view taken on the line 12—12 of Fig. 6, the gripping device, chain and chain track being omitted.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring to the drawings, the duplicating machine illustrated is of the rotary type and comprises the frame 1, printing cylin-

der 2 rotatably mounted between an upright or standard 3 at one side of the frame and an upwardly extended sidepiece 4 at the other side of the frame. Adjacent upright 3 is side piece 5. Cylinder 2 is driven by means of crank handle 6 operating through a train of gears 7, one of which gears is concentric with the cylinder 2 and is maintained in driving connection therewith by means of pin 8 which eccentrically engages both the gear and the side of the cylinder 2. In the usual place below the cylinder is the impression roller 9, removably carried between the outer ends 10 of two U shaped levers 11, which are pivotally mounted at their other ends 12 on a shaft 13, which is supported horizontally between the two sides 4 and 5 of the frame 1. The impression roller 9 is normally pressed toward the printing cylinder 2 by means of a spring 14 which at one end is fastened to a pin 15 carried on one of the levers 11 and at its other end is secured to a pin 16 which extends through a perforation in a bracket 17 on the side 5 of the frame and has a threaded portion 18 engaged by a thumb nut 19 whereby the upward pressure of the roller 9 may be varied in accordance with the thickness and character of the sheets being printed.

The frame 1 of the machine supports the usual flat feed table or apron 20 which receives the sheets to be printed and from which said sheets are taken by the feeding mechanism and fed into the printing couple. Depending lugs 21 on the bottom of this table 20 pivotally support a plate 22 which presents a plurality of stop fingers 23 through perforations in table 20 and into the path of each sheet 108 when fed thereto to arrest each sheet in a predetermined position thereon, and to determine the alignment of its forward edge with the printing couple. At one side of plate 20 and near its forward edge, there is secured as at 24, one end of a laterally extending U-shaped member 25, the opposite end of which extends upwardly at one side of the machine as at 26, and carries a roller 27 which is adapted to coact periodically with a cam 28 to move and hold the stop fingers 23 downwardly out of the path of a sheet 108 on the table 20. The roller 27 and the fingers 23 are normally held in their uppermost positions by means of a spiral spring 29 which is secured to a pin 30 on member 25, and to a bracket 31 on side piece 5 of the frame 1.

I provide means adapted to operate in synchronism with the printing mechanism for successively feeding sheets from the table 20 into the printing couple for printing and for stripping each sheet from said couple. These means comprise a gripping device 32 which is mounted on an endless chain 33, located at one side of the machine,

the chain being driven continuously during the operation of the machine, by means of a sprocket wheel 34, which is concentrically secured to the side of cylinder 2 by posts 5 35, and is constantly in mesh with the chain.

This chain is of the roller type and is built up of a series of members, each consisting of a metallic frame portion 36 providing two spaced horizontal flanges 37 and 10 38, and two spaced vertical flanges 39 above the upper horizontal flange 38. Two spaced pins 40 extend through the horizontal flanges 37 and 38. Each pin 40 carries a horizontal roller 41 between the flanges 37 and 15 42 below flange 37. Two spaced vertical rollers 43 are mounted between the vertical flanges 39 on pins 44 which extend between these flanges. Each of these chain mem- 20 bers is connected to adjacent chain members on each side by means of pairs of spaced links 45 and 46 which pivotally engage adjacent pins 40 of adjacent chain members. Links 45 are over horizontal rollers 41. 25 Links 46 are between the horizontal rollers 41 and the flange 37, and present two spaced downwardly extending arms 47, with a pin 48 extending between them at their ends, and a vertical roller 49 on the pin. This 30 chain is supported and guided along the feed table and past the printing couple by a suitable track consisting of a U-shaped groove 50 provided along the upper edge of a properly positioned metal plate 51 which 35 is secured to the side piece 5 of the frame 1 by bolts 52. A return track for the chain is provided by a similar plate 53 supported on the frame parallel to and suitably spaced from plate 51. The groove 50 of each plate 40 opens upwardly. The depending rollers 49 of the chain run along the bottom 54 of the grooves 50, thus supporting the chain. The rollers 41 and 42 are run in the channels 53 between its sides 55 and 56, which thus form 45 confining and guiding tracks for the chain. At each end of the tracks provided by members 51 and 53 I mount a horizontal sprocket wheel 57 for guiding the chain around the corners. As shown, each sprocket wheel 57 50 is pinned, as at 58, to the upper end of a pin 59 which is rotatably held in a pair of brackets 60 formed on or secured to the side 5 of the frame 1. Preferably an anti-friction device 61 is provided between the hub 62 of the sprocket 57 and the upper bracket 60. 55 The teeth 63 of each sprocket wheel 50 mesh between the rollers 39 of the chain thus supporting and guiding the chain around the corners and holding it against displacement.

60 During the operation of the machine chain 33 is adapted to carry the sheet-gripping device 32 periodically into position to grasp a sheet on table 20, and to move the gripper 32, with the sheet gripped therein, past the 65 printing couple to the place where the grip-

per releases the sheet, and then to return the gripper to its original position to grasp the next sheet fed to table 20.

Sheet-gripping device 32, as shown, comprises operable sheet gripping means slid- 70 ably mounted on a base or carrier 64. Carrier 64 comprises a supporting plate 65, which is centrally secured to the frame 36 of one of the chain members by means of rivets 66, and a base plate 67 which is sim- 75 ilar in shape to plate 65 and is secured thereto by means of rivets or screws 68. Base plate 67 is provided with two spaced horizontal rods 69 and 70, carried respectively in 80 ears 71 and 72 formed on the plate 67. Rod 69 extends through perforations in a pair of spaced ears 73 of a member 74, which also has a pair of spaced hooks 75 engaging about the rod 70, member 74 being thus slid- 85 ably supported on rods 69 and 70 of carrier 64. The operable gripping means of the gripping device include jaws which may be opened and closed, there being an upper jaw 76 formed by an outwardly projecting por- 90 tion of a member 77 which is pivotally mounted on member 74 by means of screw 78, and a lower jaw 79, formed by an outwardly extending portion of a member 80 95 which is pivotally secured to the member 74 by means of screw 81, which extends through a slot 82 (see Fig. 8) provided in member 77. Member 80 is in the form of a bell crank 100 lever with the end opposite the jaw 79 bifurcated as at 83 and in engagement with a pin 84 carried on member 77, so that upward movement of the pivoted member 77 will 105 cause the jaws to open by moving jaw 76 upwardly and jaw 79 downwardly, and downward movement of member 77 will cause the jaws to close by drawing them to- 110 gether. The jaws are normally kept closed by a coil spring 85 which is wound about the screw 81 and has one end in engagement with a pin 86 on the member 80 and the other 115 end in engagement with the pin 87 on the member 74. Plate 74 and the gripping members carried thereon are normally held forwardly on the carrier 64 by means of a 120 spring 88 and a lever 89, lever 89 being at one end pivotally secured to carrier 64 by screw 90, and having a slot 91 at its other 125 end engaged by a pin 92 on plate 74, and spring 88, being coiled about the screw 90 and at one end engaging a projection 94 on the carrier 64, and at its other end engag- 130 ing a pin 95 on lever 89.

I provide means for latching the gripping means in retracted or rearward position on carrier 64, and to this end I provide a latch 96 pivotally held on the carrier by screw 97 125 and held in latching position by a spring 98 coiled about screw 97. The latch 96 is adapted to engage a pin 99 provided on member 74 so that whenever the gripping means are slid rearwardly along the carrier 130

sufficiently to bring pin 99 under latch 96 the gripping means will become latched in this retracted position on the carrier. When the latch 96 is tripped, as by moving its arm 100 against the action of spring 98, the gripping means are moved forwardly into normal position on carrier 64 by the action of lever 89 and spring 88.

I provide means for automatically operating the gripping means at the proper times as the device is carried around by chain 33 to grip a sheet and to release a gripped sheet. I preferably roughen the under surface of the upper jaw 76 and provide the lower jaw 79 with a pad 101, in order that when the jaws close on a sheet it will be gripped positively and without slipping, and so held until the jaws are opened to release the sheet.

The opening and closing of the jaws is accomplished by means of one or more cams 102 and 103 which are adapted to co-act with a roller 104 provided at the end of a depending portion 105 of the member 77 which carries the upper jaw, these cams being disposed in the path of the roller 104, as the gripper is carried along by the chain. Cam 102 is disposed at the inner end of the chain and extends a distance along the feed table. Cam 102 has an inclined cam surface 106 which co-acts with roller 104 to open the jaws of the gripping means as the gripper is carried around the end of the chain. Following surface 106 is a horizontal surface 107 which serves to hold the jaws open so that as the gripper moves the jaws will straddle a sheet 108 on the feed table without danger of pushing the sheet aside or otherwise displacing it. Following surface 107 is a straight, slightly declining surface 109 which allows the jaws to be closed to a certain extent without gripping the sheet, and beyond surface 109 there is a sharply declining surface 110 which allows the roller 104 to drop quickly to its lowest position and effects a quick and positive closing of the jaws on the sheet 108 without slipping. A portion of table 20 is broken away to allow the jaws to close on the sheet and to carry it along. By this means the jaws are widely opened as they move to overlap a sheet, yet the final closing movement is small, thus decreasing any tendency to rebound or slip on the sheet, and insuring the gripping of each sheet at the same place. The gripper may be moved continuously over these cam surfaces or its movement may be interrupted, if desired, just before the final closing movement of the gripping means. This interruption may be effected by providing a horizontally extending finger 111 on member 74 of the gripping device and by providing a stop lever 112, which is normally in the path of travel of finger 111, and whereby the gripping means are held

stationary until carrier 64 has moved forwardly a sufficient distance with the continuously moving chain to cause latch 96 to latch the gripping means in retracted position on the carrier 64. Stop 112 is carried on a lever 113, which at one end is pivoted on the shaft 13, and at its other end is provided with an outwardly and upwardly extending arm 114 carrying at its upper end a roller 115 which is adapted to co-act periodically with a cam 116, secured on the side of sprocket 34 by means of screws 117, and whereby lever 113 is depressed and stop lever 112 is withdrawn from the path of the gripping means. Stop 112 is so withdrawn immediately after the gripping means have been latched in retracted position to prevent the forward movement of the gripping means. By reason of the fact that roller 104 immediately rides down cam surface 110, the gripping of the sheet is quick and positive. The temporary arresting of the progress of the gripping means in this manner aids in effecting the gripping of each sheet positively and without slipping or rebound of the jaws, and the gripping of each sheet in the same place, thus aiding in securing registration in printing. A spring 118 extending between a pin 119 on arm 114 of lever 113 and the inside track member 51 normally keeps roller 115 in the path of cam 116 and the stop 112 in the path of finger 111 of the gripping means. In order to permit backward movement of the gripping device, should the machine be operated, inadvertently or otherwise, in reverse direction, stop 112 is pivotally mounted on lever 113 by means of screw 120, the stop being held yieldingly in operative position by means of a spring 121, which at one end engages the stop 112 and at its other end engages the pin 123 on the lever 113.

As shown in Fig. 12 the cams 28 and 116 are arranged to co-act with the cam rollers 27 and 116 to depress the levers 11 and 113 at substantially the same time, and thus simultaneously to withdraw the fingers 23 out of the path of the sheet 108 and stop lever 112 out of the path of the gripping means to permit of the forward feed of the sheet. There being no cam surfaces engaging roller 104 as the gripper moves past the printing couple the sheet 108, tightly gripped, will be carried or pulled by the gripper, as it moves along its path, into the printing couple for printing and away from the printing couple on the other side so as to be positively stripped therefrom. After the gripping device has carried the sheet 108 to a certain point beyond the printing couple roller 104 engages cam 103 which presents an upwardly inclined surface 124 in the path of roller 104 as it progresses and co-acts therewith to open the jaws 76 and 79 and to release the sheet 108 therefrom, thus

causing the sheet to be dropped at the desired place. Inclined cam surface 124 leads into a horizontal cam surface 125, the purpose of which is to maintain the jaws 76 and 79 open for such length of time as will insure the release of the sheet therefrom. The cam 103 is preferably provided with a downwardly inclined cam surface 126 at the end of the surface 125 to permit the gradual drop of the roller 104 and the restoration of the gripping means into their normally closed condition without objectionable shock to the parts. At a suitable place along the chain, and preferably along its outer path of travel, I provide a stop finger 127, which may be secured to a bracket 128 provided on the outside track member 53 for the chain. This finger 127 extends into the path of travel of the arm 100 of latch 96 of the gripping mechanism as it is carried along by the chain, so as to rock latch 96 and cause the gripping means to be released from their latched position in retracted position on carrier 64, and to be automatically moved to forward position on carrier 64 by the action of spring 88 and lever 89, as before described. The gripping device is thus restored to its normal position and is in condition to co-act again with cam 96 to grasp another sheet from the table 20 and to operate thereon as above described.

The sheet-gripping device is adapted to be moved in such predetermined synchronism with the printing cylinder that the impression placed on each sheet by the printing cylinder will be in exactly the same position as the impression placed thereby on each succeeding sheet. The mechanism, however, may be adjusted to correct faulty registration or to make adjustment for a different stencil and for different sheets. To drive the gripping device in such synchronisms with the printing cylinder sprocket wheel 34 has teeth 129 meshing between the upper vertical rollers 43 at the top of the chain, there being as many teeth as there are rollers 43, so that the chain and gripper thereon will be driven around the complete orbit for each revolution of the sprocket 34 and cylinder 2. The stencil sheet 130 is applied in the usual manner to the cylinder 2 and its position thereon is so arranged relative to the position of the gripping device 32 in its cycle of rotation that when the gripping device feeds a sheet 108 into the printing couple the stencil sheet will leave its impression upon the sheet at the places desired. On account of the synchronism above mentioned, so long as sheets are successively fed to the feed table 20 continued operation of the machine will cause the stencil sheet to leave its impression on each succeeding sheet in the same relative position thereon.

One or more small sprockets, such as 131, may be mounted at suitable points along the

chain, with teeth 132 meshing between the rollers 43 of the chain, thereby steadying the chain and preventing its becoming displaced. As shown, sprocket 131 is rotatably mounted in an adjustable bracket 133, which is secured to one of the track members 53 by bolts 134 and which holds sprocket 131 approximately over the cam surface 124 of cam 103 to prevent upward displacement of the chain and gripping device as the jaws are opened to discharge the sheet.

Preferably the usual lateral guide plates 135 are adjustably mounted as at 136 on the feed table 20 and serve to properly position the sheets thereon for feeding to the printing couple.

It will be apparent from the foregoing description that the printing of sheets is obtained by successively feeding the sheets to the feed table, either manually or mechanically, in the usual manner, and by turning the crank handle of the machine. One sheet is fed for each revolution of the printing cylinder. Each sheet is first straddled by the open jaws of the gripper as they swing around the inner end of the gripper chain. Then as the operation of the machine continues, the jaws come together to a certain extent, and, if the stop lever 112 is supplied the forward movement of the gripper is arrested until it has become latched in retracted position on its carrier. Then the sheet stopping fingers 23 and stop 112 are withdrawn by reason of the coaction between cam 28 and lever 25 and between cam 116 and lever 113 and the gripper, tightly gripping the sheet, feeds the sheet into the printing couple for printing, the relative adjustment of the cylinder and the stencil thereon with respect to the chain being such that when the sheet so fed passes through the printing couple the stencil will leave its imprint in the desired place thereon. If the imprint is found to be out of alignment or registration on the sheets, exact alignment and registration may be secured by adjusting the stencil sheet on the cylinder. After feeding the sheet into the printing couple the gripper then carries the sheet away from the printing couple on the other side to positively strip the sheet therefrom, and carries the sheet along until roller 104 engages cam 103, at which point the sheet is released from the gripper and dropped. If the sheet has not passed entirely through the printing couple its forward feed will be completed by the contact of the printing couple therewith. Continued operation of the machine now carries the gripping device around the end of the chain and back on the other side into position to be brought around the inner end of the chain and to pick up the next sheet fed to the feed table. Meanwhile, the gripping

device has been engaged by trip lever 127 and the gripping means restored to their original position on the carrier of the gripping device. Also during this return movement of the gripping device the next succeeding sheet has been fed to the feed table. Thus, so long as sheets are successively fed to the feed table, it is only necessary to turn the crank handle 6 in order to effect the printing of the sheets.

The jaws 72 and 73 of the gripping means are adapted to close upon each sheet quite near its forward edge and quite near its margin. Preferably between one-quarter and one-half inch from each of said edges, although it is obvious that this distance is variable. By gripping a sheet in this way it is obvious that very narrow sheets may be printed by my improved duplicating machine. Also on account of the positive gripping action of the gripping means and by reason of the fact that as the sheet is fed and stripped it does not move relatively to the gripping means, sheets varying widely in thickness may be efficiently operated upon, and my machine operates more accurately upon thick sheets which machines heretofore have not been able to handle satisfactorily.

In the above description the gripping means have been described as being slidably mounted upon a carrier. It is to be understood, however, that this sliding feature may be omitted, if desired, and that the gripping means and jaws may be mounted so as to be laterally immovable with respect to the chain or to the carrier.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which as a matter of language might be said to fall therebetween.

What I claim is:—

1. In a device of the character described, in combination, means for printing a sheet, and means traveling in a horizontal circuit for stripping a sheet from said printing means.

2. In a device of the character described, in combination, means, comprising a printing couple, for printing a sheet, and means actuated to travel in a horizontal circuit and movable from one side to the other of said printing couple, for feeding a sheet into said

printing couple for printing and for stripping said sheet from said printing couple.

3. In a device of the character described, the combination with a printing couple and a feed table, of sheet stripping mechanism, including means adapted to grip a sheet and adapted to be moved from said printing couple outwardly therefrom to strip from said couple a sheet gripped by said means, and means for moving said gripping means in an established horizontal circuit.

4. In a device of the character described, the combination with a printing couple and a feed table, of sheet feeding mechanism, including means adapted to grip a sheet and adapted to be moved from said table to said printing couple to feed a sheet gripped by said means from said table to said printing couple for printing thereby, and means for moving said gripping means, said sheet feeding mechanism adapted to travel throughout a horizontal circuit.

5. In a device of the character described, the combination with a printing couple and a feed table, of sheet feeding and stripping mechanism, including means adapted to grip a sheet and adapted to be moved from said table past said printing couple to feed a sheet gripped by said means from said table into said printing couple for printing and to strip said sheet therefrom, and means for moving said gripping means and maintaining the same in a horizontal path.

6. In a device of the character described, the combination with a printing couple and a feed table, of sheet feeding and stripping mechanism, including means adapted to grip a sheet and adapted to be moved from said table past said printing couple to feed a sheet gripped by said means from said table into said printing couple for printing and to strip said sheet therefrom, and means for moving said gripping means, said movement past said printing couple being substantially tangential to and out of the line of the members thereof where they coact to print a sheet, and said movement being synchronized with the movement of said printing couple.

7. In a duplicating machine, the combination with sheet printing mechanism, including a rotatable printing cylinder, and a feed table, of means actuated to travel in a horizontal cycle and movable in a predetermined path from said table to said printing mechanism and adjustable into and out of sheet gripping condition, for gripping and moving a sheet, means for moving said gripping means along said path in predetermined synchronism with said printing cylinder, and means for adjusting said means, when adjacent said table, to grip a sheet thereon and for maintaining said adjustment during the movement of said gripping means from said table to said printing

mechanism, whereby said sheet is fed from said table into said printing couple.

8. In a duplicating machine, the combination with sheet printing mechanism, including a rotatable printing cylinder, and a feed table, of mechanism for feeding a sheet from said table into said printing mechanism and for stripping a sheet therefrom, said mechanism including means, adjustable into and out of sheet gripping condition, and adapted to be moved throughout a horizontal circuit, for gripping and moving a sheet, means for moving said gripping means in predetermined synchronism with said printing cylinder from a point adjacent said table past said printing cylinder to a point on the other side thereof, and means for adjusting said sheet gripping means, when adjacent said table, to grip a sheet thereon and for maintaining said adjustment during said movement of said gripping means.

9. In a duplicating machine, the combination with a rotatable printing cylinder, of a movable sheet gripping device adjustable into and out of sheet gripping condition and adapted to travel in an endless horizontal cycle, means for moving said device through a part of its horizontal cycle from one side of said printing cylinder to the other in synchronism therewith, means for automatically maintaining said device in sheet gripping condition as it moves from one side to the other of said cylinder, to cause said device to feed a gripped sheet to said cylinder for printing and to strip said sheet therefrom, and means for automatically adjusting said device out of gripping condition at the other side of said cylinder, to effect the release of said gripped sheet from said gripping device.

10. In a duplicating machine, the combination with a rotatable printing cylinder, of a sheet gripping device which is movable tangentially from one side to the other of said cylinder said sheet gripping device being actuated to travel in an endless horizontal path, and means for rotating said cylinder and for moving said gripping device simultaneously and in established synchronism.

11. In a device of the character described, in combination, a feed table, printing mechanism including a rotatable printing cylinder, a sprocket wheel connected with said cylinder for rotation therewith and in driving mesh with a movable chain, a track for said chain, a sheet-gripping device carried by said chain in an established horizontal circuit, said device being operable into and out of sheet gripping condition, and coacting mechanism for operating said device into and out of sheet-gripping condition at predetermined places along said circuit, whereby upon rotation of said printing cyl-

inder sheets are successively gripped by said gripping device and fed from said table to said cylinder for printing and stripped therefrom and dropped at the other side thereof.

12. In a device of the character described, mechanism for determining the movement of a sheet fed to said machine, said mechanism including, in combination, a movable sheet gripping device having jaws operable into closed and into opened condition to grip and to release a sheet, means, including a movable chain and connections between said chain and said device, for moving said device in an established horizontal circuit, means, including cams positioned along said circuit and adapted to coact with said device, for operating said jaws into open position at predetermined points as said device moves along said circuit, and spring means associated with said jaws normally holding said jaws in closed position.

13. In a device of the character described, the combination with printing mechanism including a rotatable printing cylinder, and a feed table, of a movable sheet gripping device including jaws operable into closed condition to grip a sheet and operable into opened condition to release a gripped sheet or to straddle a sheet without gripping it, means engaging said gripping device and adapted to be driven to carry said gripping device repeatedly in an established horizontal circuit to a point adjacent said feed table and from said point along said feed table and past said printing cylinder and then back to said point, means engaging said driven means for driving the same, and means for operating said jaws as said gripping device is moved along said circuit, whereby said jaws are opened to straddle a sheet on said feed table each time said device is moved to said point adjacent thereto, whereby said jaws are closed to grasp a sheet thereon each time said device is moved to a certain point along said table, whereby said jaws are maintained in closed sheet-gripping condition each time said device moves from said point of closing to a certain point beyond said printing mechanism, and whereby said jaws are opened to release a gripped sheet as said device reaches said point beyond the printing mechanism.

14. In a device of the character described, the combination with printing mechanism including a rotatable printing cylinder, and a feed table, of a movable sheet gripping device including jaws operable into closed and into open condition, means including an endless chain mounted to travel in an established circuit and supporting said device for movement therewith and adapted to be driven to carry said gripping device repeatedly in an established circuit to a point adjacent said feed table and from said point

along said feed and past said printing cylinder and then back to said point, means comprising a sprocket wheel attached to said printing cylinder for unitary rotation therewith and in mesh with said chain for driving said chain simultaneously and in established synchronism with the rotation of said printing cylinder, and means, comprising cam surfaces positioned along said circuit and adapted to coact with said jaws and comprising spring means engaging said jaws and normally holding them in closed condition, for operating said jaws as said gripping device is moved along said circuit, whereby as the gripping device moves along its path, said jaws are operated to first straddle and then grasp a sheet on the said feed table each time said device reaches a certain point and to maintain the hold until the sheet has been transported forwardly to said printing cylinder for printing and beyond said cylinder so as to be stripped therefrom and brought to a certain point where said jaws are operated to release the sheet, a stencil on said printing cylinder, the synchronism of movement between said gripping device and said cylinder being such that when sheets are successively placed in a predetermined position on said table they will successively receive imprints from said stencil in the same relative position thereon.

15. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a chain having a plurality of connected members each providing two spaced horizontal flanges and two spaced vertical flanges above said horizontal flanges, horizontal rollers rotatably carried by one of said horizontal flanges and a vertical roller carried by said vertical flanges, links connecting adjacent chain members and presenting a downwardly extending arm rotatably supporting a vertical roller.

16. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a chain having a plurality of connected members each providing two spaced horizontal flanges and two spaced vertical flanges above said horizontal flanges, horizontal rollers rotatably carried by one of said horizontal flanges and a vertical roller carried by said vertical flanges, links connecting adjacent chain members and presenting a downwardly extending arm rotatably supporting a vertical roller, means for supporting and guiding said chain, said means comprising track members presenting channels in which said rollers run and

are confined and sprockets rotatably mounted between adjacent ends of said track members and arranged to mesh between horizontal rollers of said chain.

17. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a movable sheet gripping device which comprises, in combination, a base and operable sheet-gripping means slidably mounted on said base, said sheet gripping means including gripping jaws adapted to simultaneously move toward or away from each other.

18. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a movable chain and a sheet gripping device comprising a base secured to said chain for movement therewith and operable sheet-gripping means slidably carried on said base.

19. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a movable chain and a sheet gripping device comprising a base secured to said chain for movement therewith and operable sheet-gripping means slidably carried on said base, said sheet-gripping means including an upper jaw member and a lower jaw member both said jaw members being relatively and simultaneously movable into open or closed condition to grip and to release a sheet, and spring means engaging said members normally holding them in closed condition.

20. In duplicating machines, mechanism for determining movement of a sheet fed to said machine, said mechanism including a movable chain and a sheet gripping device comprising a base secured to said chain for movement therewith and operable sheet-gripping means carried on said base, said sheet-gripping means including a base member, a member pivotally mounted on said base member and providing an upper jaw, a bell crank lever pivoted on said base member providing at one end a lower jaw to coact with said upper jaw and at its other end pivotally engaging said upper jaw member whereby said jaws are mounted for simultaneous movement toward or from each other, a spring engaging both said jaw members normally holding them in closed condition, and a cam engaging portion extending downwardly from said upper jaw member.

This specification signed and witnessed this 22nd day of May, 1922.

ERNEST J. BRASSEUR.