Nov. 7, 1933. G. E. CREED 1,933,712

ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 1

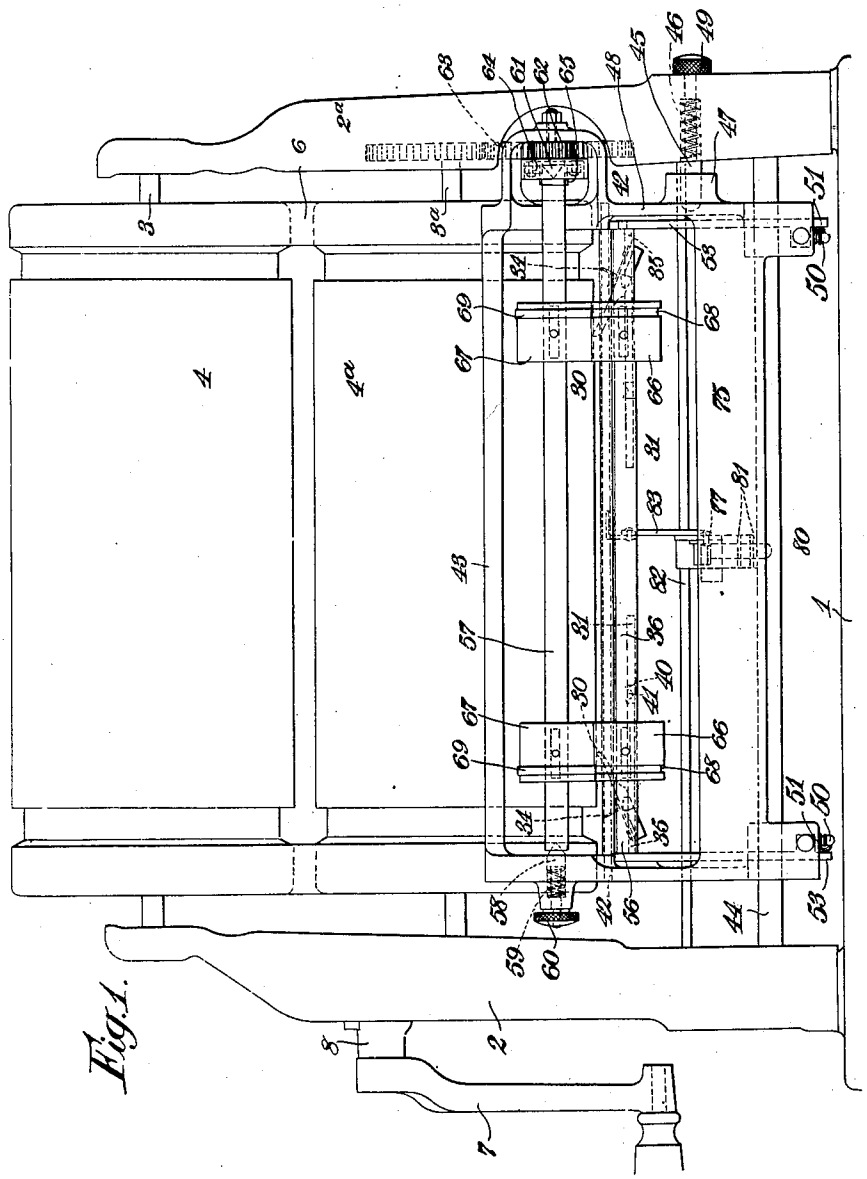

Fig. 1.

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ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 2

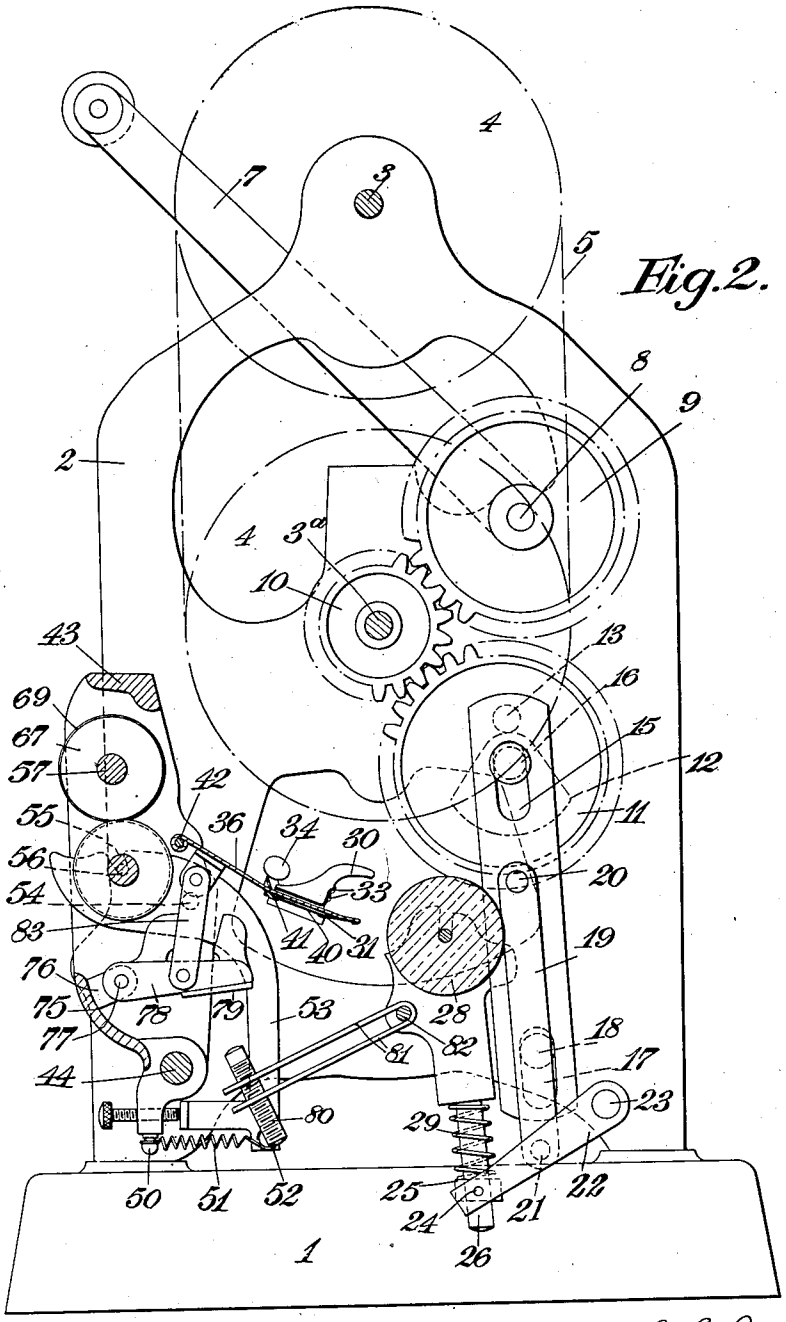

Fig. 2.

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ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 3

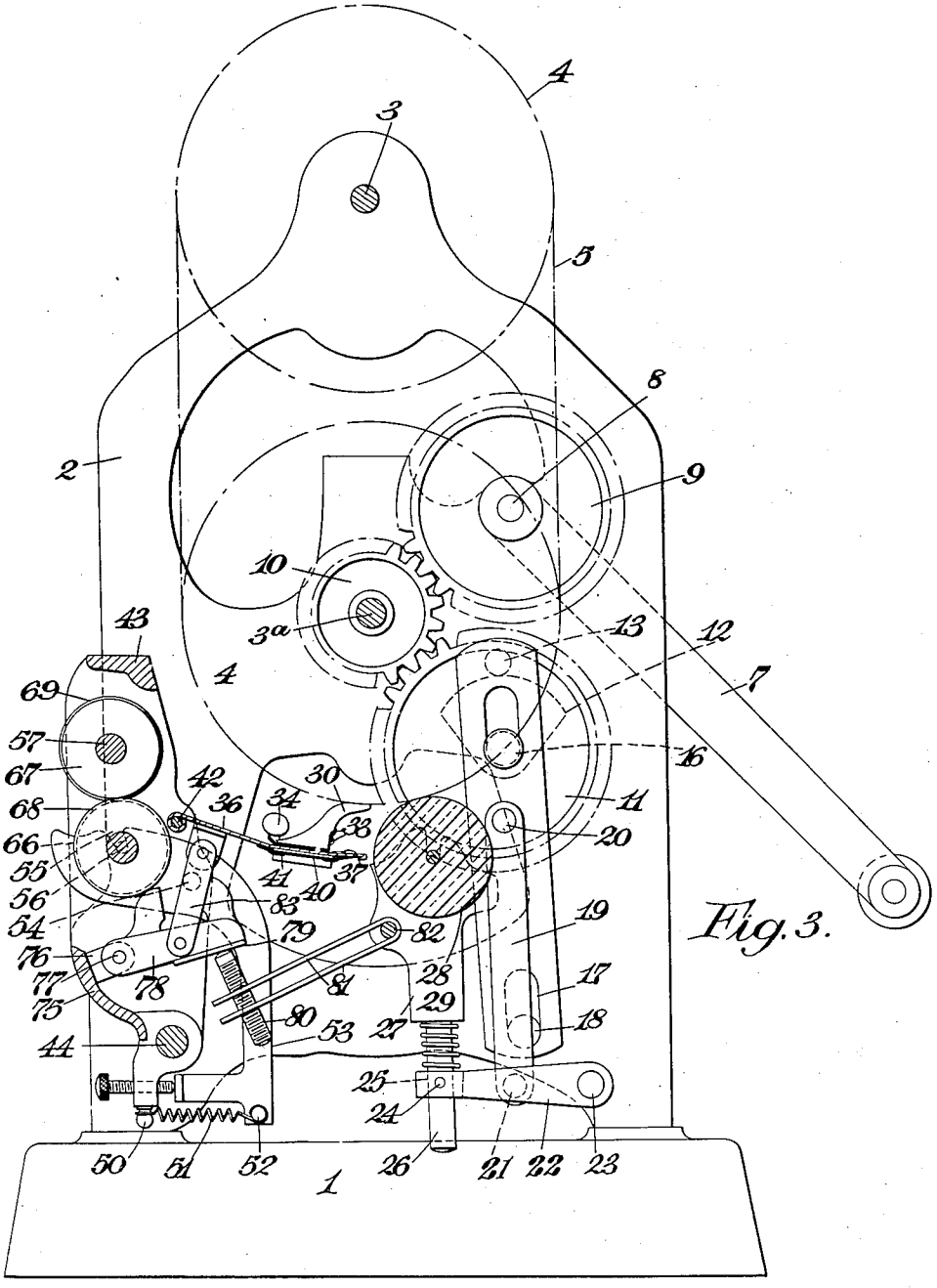

Fig. 3.

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ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931. 7 Sheets-Sheet 4

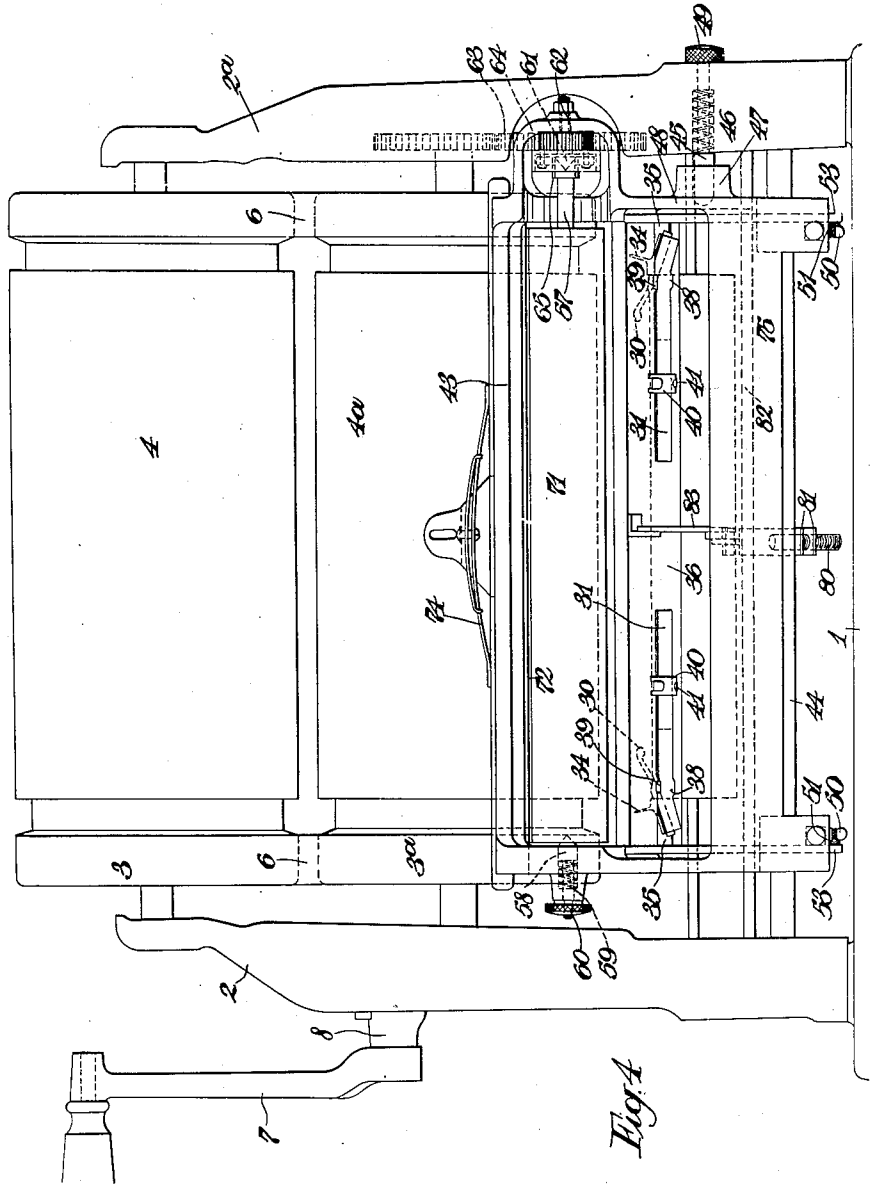

Fig. 4

G. E. Creed
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Nov. 7, 1933. G. E. CREED 1,933,712

ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 5

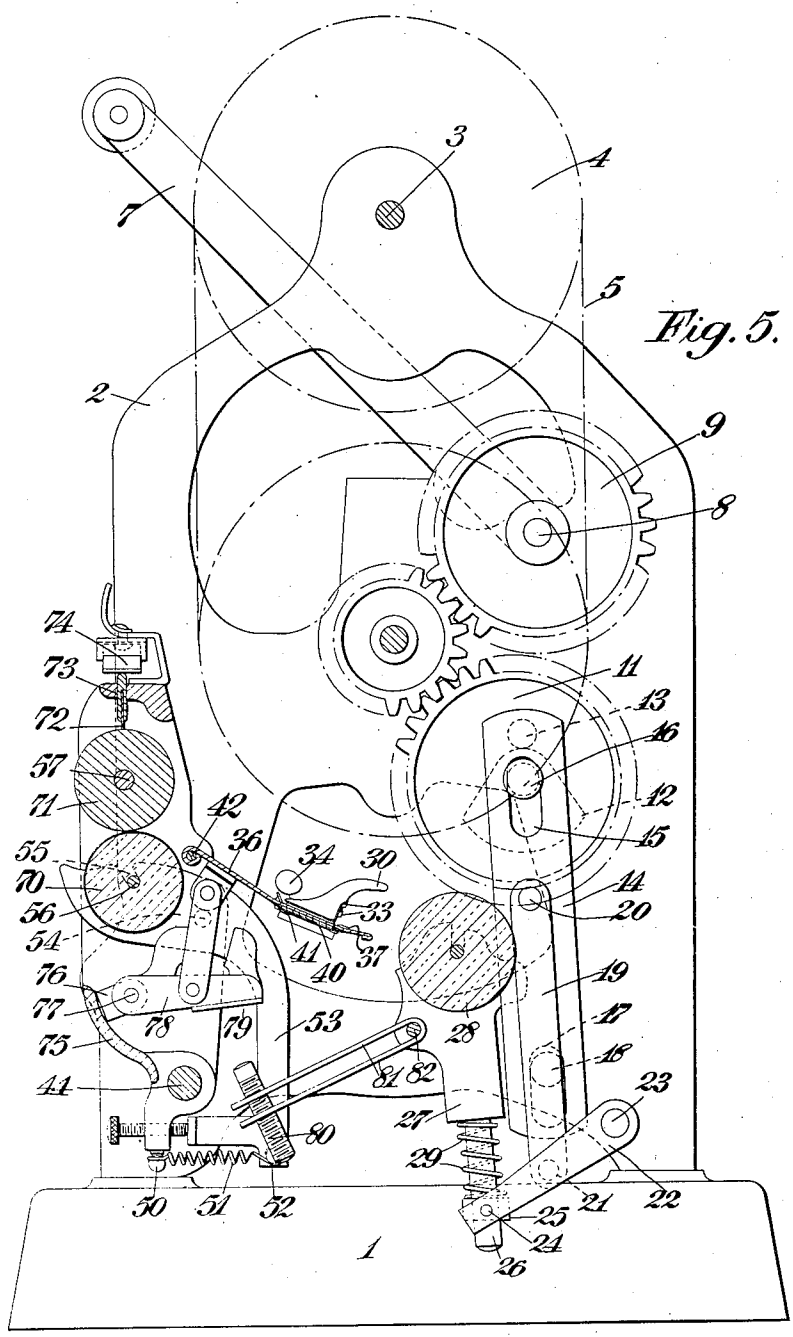

Fig. 5.

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ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 6

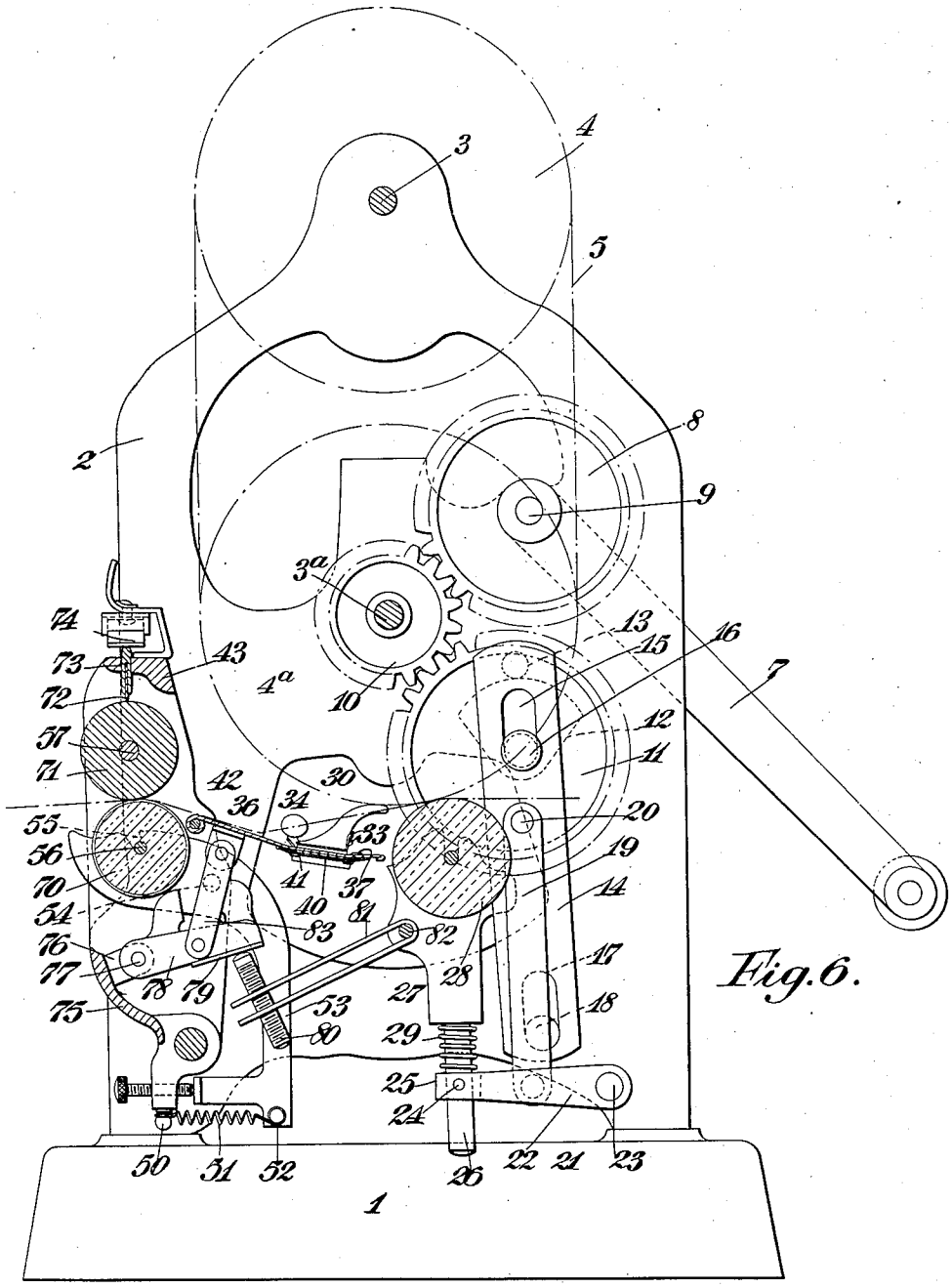

Fig. 6.

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Nov. 7, 1933. G. E. CREED 1,933,712

ROTARY STENCIL DUPLICATING MACHINE

Filed May 26, 1931 7 Sheets-Sheet 7

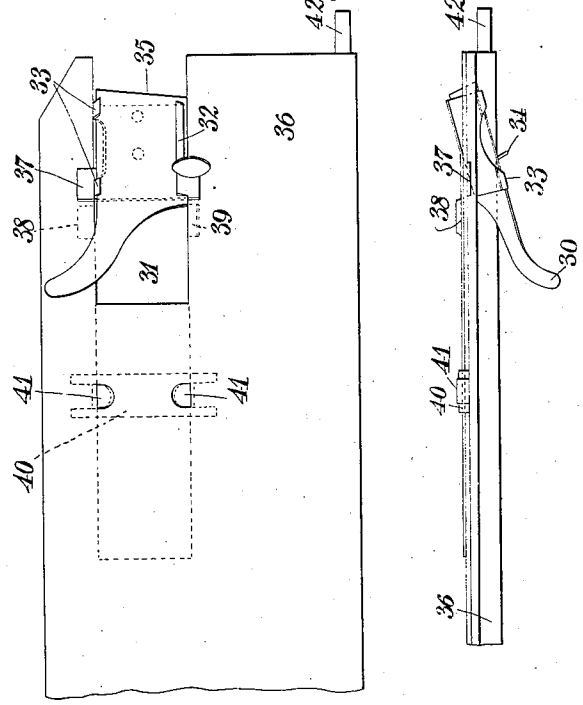

Fig. 9.

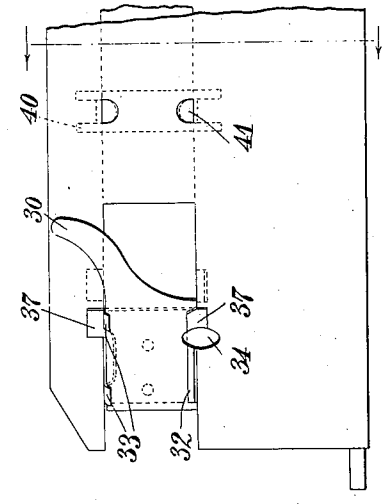

Fig. 7.

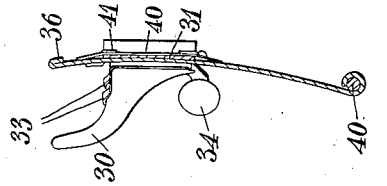

Fig. 8.

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Patented Nov. 7, 1933 1,933,712

UNITED STATES PATENT OFFICE

1,933,712

ROTARY STENCIL DUPLICATING MACHINE

George Ernest Creed, London, England, assignor, by mesne assignments, to A. B. Dick Company, Chicago, Ill., a corporation of Illinois

Application May 26, 1931, Serial No. 540,175, and in Great Britain July 12, 1930

8 Claims. (Cl. 101—118)

This invention relates to rotary stencil duplicating machines and particularly to rotary stencil duplicating machines of the type in which a stencil secured to a flexible stencil carrier is caused to travel over a plurality of inking rollers.

As is well known, when sheets of extremely thin paper are employed for receiving the stencil impressions difficulties arise owing to the sheets adhering to the stencil with the result that such sheets may be carried round by the flexible stencil carrier or, in the case of the perforated drum type of duplicator, by the drum to which the stencil is secured. With relatively thick paper this difficulty rarely, if ever, arises as the inherent stiffness of the paper is sufficient to prevent the paper being caused by the adhesive effect of the ink to follow the curvature of the stencil as it passes over the inking cylinder or to conform with the curvature of the drum if the duplicator is of the perforated drum type.

The object of the present invention is to provide means for stripping from the stencil carrier or the drum, as the case may be, the sheets of paper receiving the stencil impressions.

The invention consists, broadly, in the provision of a finger located adjacent to each of the opposite sides of the stencil carrier or drum and somewhat in advance with the line along which pressure is applied to the impression receiving sheet, adapted to be brought into a position to bear upon the individual sheets of paper operated upon by the stencil, adjacent to the marginal edges thereof and thus to deflect away from the stencil carrier the sheet of paper as it is fed forward by the latter.

In other words, the fingers are arranged to be brought into position as the sheet of paper is fed by hand or by the automatic feed mechanism forming part of the duplicating machine, shortly after the forward edge of the sheet has been advanced beyond the line where pressure is applied to the sheet by a pressure roller or the like to force it against the stencil and, thereafter, for a suitable period of time, to continue to bear against the sheet of paper while it is being fed between the stencil carrier and the pressure roller or its equivalent.

A further feature of the invention consists in the employment in a stripping device associated with a stencil duplicating machine for engaging the sheets on which the impressions are produced of fingers formed of material which is relatively flexible and of such character generally that they will not be liable to cause injury to the stencil should they be brought into contact therewith in the operation of the machine.

Thus, in accordance with this feature of the invention, the fingers may be formed of thin sheet celluloid or like material possessing a corresponding degree of flexibility and elasticity.

Furthermore, the fingers should be so formed and arranged that they do not expose sharp edges which might be brought in contact with the stencil.

Moreover, the flexibility and elasticity of the fingers should be such that if the fingers come into contact with any moving part of the stencil carrier no injury to the machine, beyond the deformation or destruction of the fingers, will result.

As is well known, with stencil duplicating machines it is necessary to move the pressure roller or its equivalent away from the stencil carrier during the time when the stencil fastening means, by the motion of the stencil carrier, is brought immediately above or in line with the pressure roller, the reason for this being that the stencil fastening means projects considerably beyond the general level of the stencil when mounted upon the stencil carrier irrespective of whether the stencil carrier is of the flexible type secured to endless bands in driving connection with inking cylinders or is rigidly secured to a drum carrying a pad saturated with ink and would in consequence injure the pressure roller were it not moved into a position in which contact between it and the stencil fastening means is precluded.

In consequence of the projection of the stencil fastening means beyond the general level of the stencil carrier it is necessary or desirable that the fingers shall be arranged to be moved towards and away from the stencil carrier to prevent the fingers contacting with the stencil fastening means and any other parts associated with the stencil carrier which may project above the general level of the surface thereof.

In accordance with the invention means actuated in synchronism with the means for raising and depressing the pressure roller is provided for securing appropriate motion of the fingers towards and away from the stencil carrier.

For instance, in accordance with the invention, the fingers formed of thin celluloid or the like may be secured to a plate extending between the side members of the frame of the machine and pivotally connected therewith while on the carriage for the pressure roller or its equivalent there may be provided means adapted to engage the plate and raise it into a position in which the fingers will be adjacent to the stencil carrier when the pressure roller is raised. For causing the plate to move about its pivotal connection in the reverse direction when the carriage for the pressure roller is lowered any suitable means or arrangement may be employed. For instance, a spring may be provided to secure such motion or the member carrying the fingers may be arranged to move in the direction indicated under the action of gravity.

If desirable or necessary means may be provided for adjusting the degree of motion imparted to the member carrying the fingers and thus varying the degree of proximity with the stencil into which the fingers are brought or the pressure between the fingers and the stencil. To this end, for instance, an adjustable abutment may be provided on the carriage for the pressure roller.

Conveniently, the fingers are connected with the plate by means enabling them readily to be detached therefrom.

Thus, for example, the plate may be provided with grooved or otherwise formed elements within which lateral extensions on the fingers may be engaged, the fingers being, for example, generally of more or less L-shape.

Preferably, in accordance with the invention, means are also provided for engaging the edges of the sheet after it has been deflected away from the stencil carrier or the drum and feeding or conveying the sheet away from the stencil carrier or drum and delivering it, for instance, into a collecting tray or other device designed to receive the sheets after the stencil impression has been formed thereon.

Thus, for instance, in accordance with the invention, such means may comprise a plurality of rollers adapted to be rotated in the operation of the duplicating machine.

Where rollers are provided for engaging the edges of the sheet after it has been deflected away from the stencil carrier or drum by the fingers in question these may be arranged to engage only the marginal edges of the sheets of paper which are operated upon, such rollers being secured between the side members of the frame of the duplicating machine or an auxiliary frame secured to such side members and a driving connection being provided between the rollers and some moving part of the machine.

Thus, for instance, the rollers in question may be arranged to be driven by a train of toothed wheels from one of the toothed wheels normally forming part of the driving mechanism of the duplicating machine.

The rollers above referred to for engaging the edges of the sheets may, alternatively, be arranged to extend across the machine and to function as means for removing the excess of ink from the stencil impressions in which case the roller will be provided with a wiper or doctor blade as described in the specification of the application for British Letters Patent No. 3,527/1930 in the name of D. Gestetner and in this aspect the present invention may be defined as comprising also the combination of means for stripping sheets of impression receiving paper from the stencil carrier or drum and means whereby the offsetting of the stencil impressions may be prevented or minimized.

The invention will be described further in detail with reference to the accompanying drawings, in which:—

Figure 1 is a view in elevation of one construction of duplicating machine in accordance with the invention,

Figures 2 and 3 being sectional end elevations thereof showing the working parts in two different positions, while

Figures 4, 5 and 6 are, respectively, corresponding views of a further construction comprising also means for preventing offsetting;

Figure 7 is a fragmentary plan view of a detail comprising stripper fingers,

Figure 8 being a cross section thereof on the line VIII—VIII of Figure 7 viewed in the direction of the arrows, while

Figure 9 is a fragmentary elevation of the detail in question.

In Figures 1 to 6 of the drawings, 1 is the base plate of the machine to which side or end frames 2 and 2*a* are secured and in these end frames are journalled spindles 3 and 3*a* of the inking cylinders 4 and 4*a* over which the flexible stencil carrier, indicated by the reference 5 in Figures 2, 3, 5 and 6, is caused to travel. Driving connection between the cylinders is secured in known manner by means of flexible bands 6. Motion is imparted to the lower inking cylinders in the constructions illustrated by means of a crank handle 7 secured to a spindle 8 on which is mounted a spur wheel 9 engaging a pinion 10 on the spindle of the lower inking cylinder. This pinion also engages a spur wheel 11 on the face of which is provided a cam 12 co-operating with a pin 13 on the link 14 provided with a slot 15 engaging about the pin 16 which forms a pivot for the wheel 11 and a further slot 17 engaging the pin 18 secured on the side frame of the machine whereby rectilineal motion of the link 14 is secured in the operation of the machine.

To the link 14 is secured the link 19 by a pin 20 and this link is connected by a pin 21 with the arm 22 pivoted at 23 connected with a similar arm on the opposite side of the machine, both of the arms being pivotally connected by pins 24 with collars 25 mounted upon the extensions 26 of the side members 27 of the frame carrying the impression roller 28 so that in the operation of the machine springs 29 encircling the extensions being interposed between the collars and the frame so that at appropriate times the pressure roller will be brought into position against the lower inking cylinder in order to force a sheet of paper fed below the inking cylinder in question into contact with the stencil mounted upon the flexible stencil carrier which is arranged to travel over the inking cylinders.

The adhesion produced between the stencil and the sheet of paper operated upon by the stencil, particularly if the latter is thin, will cause or tend to cause the paper to continue in contact with the stencil and to be carried by it over the upper inking cylinder. To prevent this the stripping mechanism in accordance with the invention is provided. The stripping mechanism essentially comprises two flexible fingers 30 formed, for instance, of thin sheet celluloid. The flexible fingers are secured, as may be more clearly seen in Figures 7 to 9, to the slides 31 by the upturned portions 32 and 33 provided thereon.

These slides are provided with finger pieces 34 adapted to facilitate their being slid in the recesses 35 provided in the plate 36 into the desired position to engage the edges of paper of various widths which may be operated upon by the machine and they are each secured to the plate in question by a lug 37 arranged to bear against the upper face of the plate and lugs 38 and 39 arranged below the plate, the extremities of the slides 31 being engaged between springs 40 secured to the plate by lugs 41 and the lower face of the plate.

The plate 36 is secured, by bending over one of its edges as shown more clearly in Figure 8, to a rod or spindle 42, the ends of which are freely engaged in holes provided in the right and left hand sides of the frame 43 which is pivotally mounted on the spindle 44 engaged

in the side members 2 and 2*a* of the frame of the machine.

The frame in question is designed to be releasably secured in its working position by means of a plunger 45 with which is associated a spring 46 adapted to force the plunger into a recess provided in the boss 47 on the side member 48 of the frame 43, the knob 49 being provided for facilitating the actuation of the plunger 45.

With each of the pins 50 on the frame 43 there is engaged one end of a spring 51, the other end of which is secured to a pin 52 on the levers 53 secured to the sides of the frame 43 by the pivots 54. In these levers there are provided recesses 55, in which the ends of the spindle 56 are engaged.

The spring 51 will operate to force the spindle 56 towards the spindle 57 which is removably secured in the side elements of the frame 43 by the engagement of the conical end of the plunger 58, with which is associated a spring 59 and a manipulating knob 60, in a suitably formed recesses in one end of the spindle, the other end of which is also provided with a conical recess engaging a cone 61 formed on the spindle of the spur pinion 62 which is in driving connection with the spur wheel 63 and with the spur wheel there is associated a one-way or free-wheel clutch 64, the pawls of which engage in a ratchet 65 provided on the end of the spindle 57.

In the construction illustrated in Figures 1 to 3, on the spindles 56, 57, respectively, there are secured adjacent to the ends thereof, rollers 66 and 67 each of the former being provided with a groove 68 and each of the latter with a flange 69 engaging the groove in the adjacent roller 66. These rollers are designed merely to engage the edges of a sheet whereas in the construction illustrated in Figures 4 to 6, on the spindle 56 there is arranged a roller 70 extending across the whole width of the machine and on the spindle 57 there is provided a roller 71 similarly extending across the machine. This last-mentioned roller may be formed of steel or similar hard material and is designed to prevent offsetting, the wiper or doctor blade 72 which is passed through a slot 73 in the upper member of the frame 43, being pressed, by means of the spring 74, into contact with the roller.

In both of the constructions, to the cross member 75 of the frame 43 there is secured a bracket 76 with which is connected by means of the pin 77, the lever 78 provided with an abutment surface 79 co-operating with the screw 80 engaging arms 81 connected to the bar 82 connecting the side members of the carriage for the pressure roller in such manner that in the raising of the carriage and with it the pressure roller the lever is rotated about its pivot and, in turn, raises through the link 83 the plate 36 thus causing the fingers 30 to be, at appropriate times, pressed against the stencil and thus to operate to strip or separate the sheet of paper, which is fed forward between the pressure roller and the stencil, from the latter. The continued feeding forward of the sheet will eventually cause the leading end of the sheet to be engaged by the rollers 66 and 67, in the case of the construction shown in Figures 1 to 3, or the rollers 70, 71, in the case of the construction shown in Figures 4 to 6, the rotary motion imparted to these rollers through the intermediary of the spur wheel 63, the pinion 62 and the one-way clutch 64 operating, in turn, to draw the sheet forward and thus to prevent buckling of the portion of the sheet located between these rollers and the line at which the fingers bear upon the stencil.

As will be understood, in the case of the construction shown in Figures 4 to 6 the roller 71 will take up excess of ink from the sheet and the wiper or doctor blade 72 will remove from the roller the ink so taken up by it.

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

1. In a stencil duplicating machine, a stripping device for engaging the impression sheets comprising light, flexible fingers formed of thin, elastic material.

2. In a stencil duplicating machine, a stripping device for engaging the impression sheets comprising fingers of elastic and easily deformable material.

3. In a stencil duplicating machine, a stripping device for engaging the impression sheets, comprising fingers formed of thin sheet celluloid.

4. In a stencil duplicating machine having a stencil carrier, an impression roller and means to periodically raise and lower said roller, a stripping device including a plate pivotally mounted on the machine, flexible stripping fingers secured to said plate adapted to approach the stencil carrier upon movement of the plate, and means connected to and operable by said roller actuating means to pivotally move said plate in timed relation to said roller.

5. In a stencil duplicating machine having a stencil carrier, an impression roller and means to periodically raise and lower said roller, a stripping device comprising flexible fingers mounted for movement into and out of engagement with the stencil carrier, a lever adapted to move said fingers, and arms carried by said roller actuating means and engaging said lever to move the fingers in accordance with movement of the roller.

6. In a stencil duplicating machine having a stencil carrier, an impression roller and means to periodically raise and lower said roller, a stripping device comprising flexible fingers mounted for movement into and out of engagement with the stencil carrier, a lever adapted to move said fingers, and arms of adjustable length carried by said roller actuating means engageable with said lever to move the fingers.

7. In a stencil duplicating machine having a stencil carrier, an impression roller and means to periodically move said roller into and out of operative engagement with the stencil carrier, a stripping device comprising flexible stripper fingers, a support therefor movable to carry said fingers into and out of operative engagement with the stencil carrier, a pivoted lever connected to said support, and arms carried by said roller actuating means operatively engaging the lever, said arms being adjustable to vary the effective throw of said lever.

8. In a stencil duplicating machine having a stencil carrier, a stripping device comprising a movable stripper support provided with grooves disposed laterally of the machine, a slide member adjustably mounted in each of said grooves, and a thin, flexible stripper finger having a portion removably secured to said slide member and a portion adapted to cooperate with said stencil carrier upon movement of the support.

GEORGE ERNEST CREED.