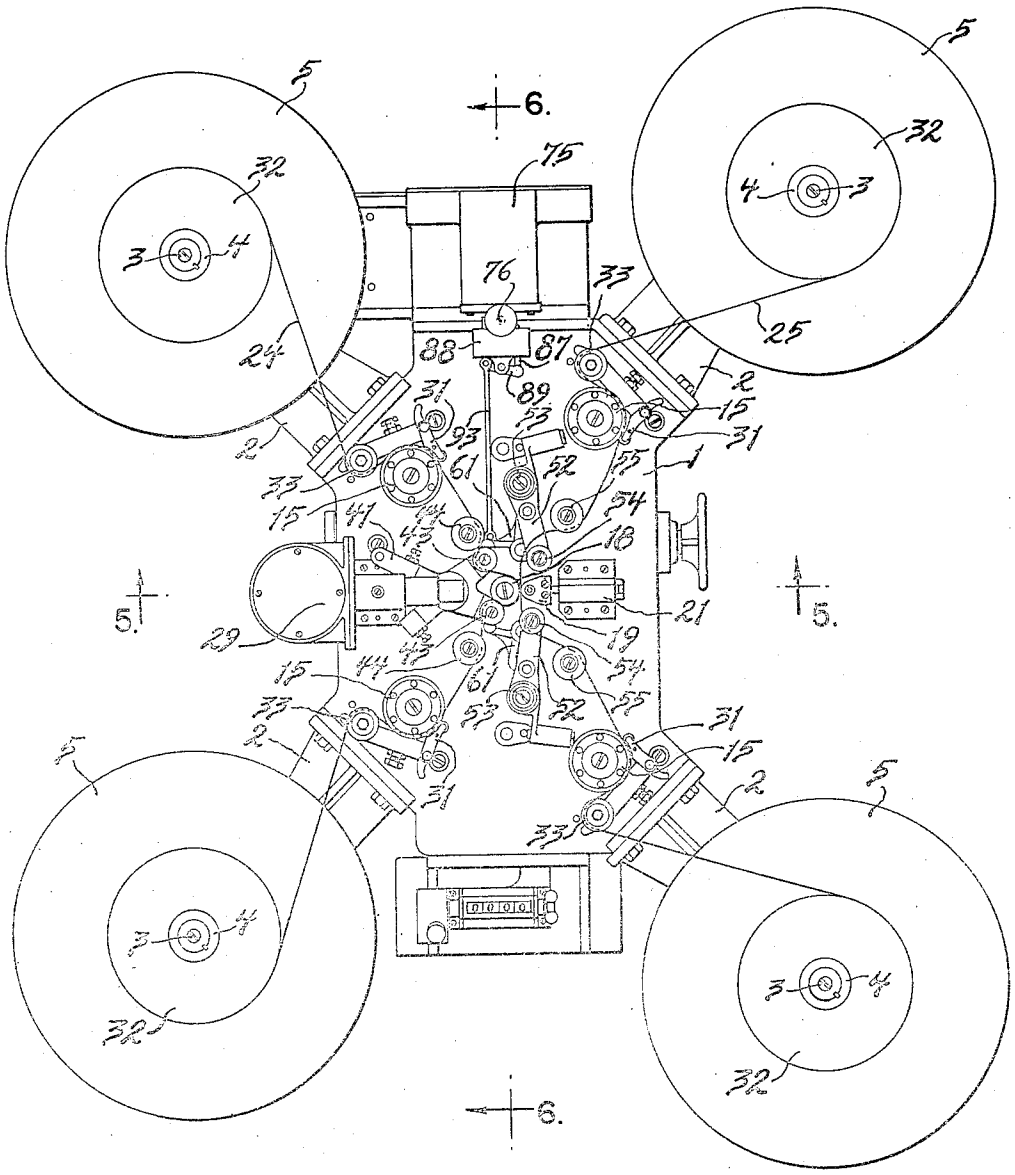
June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 1

FIG. I.



INVENTOR:
CHARLES E. PHILLIMORE

BY:- Robert F. Michel, Jr.,

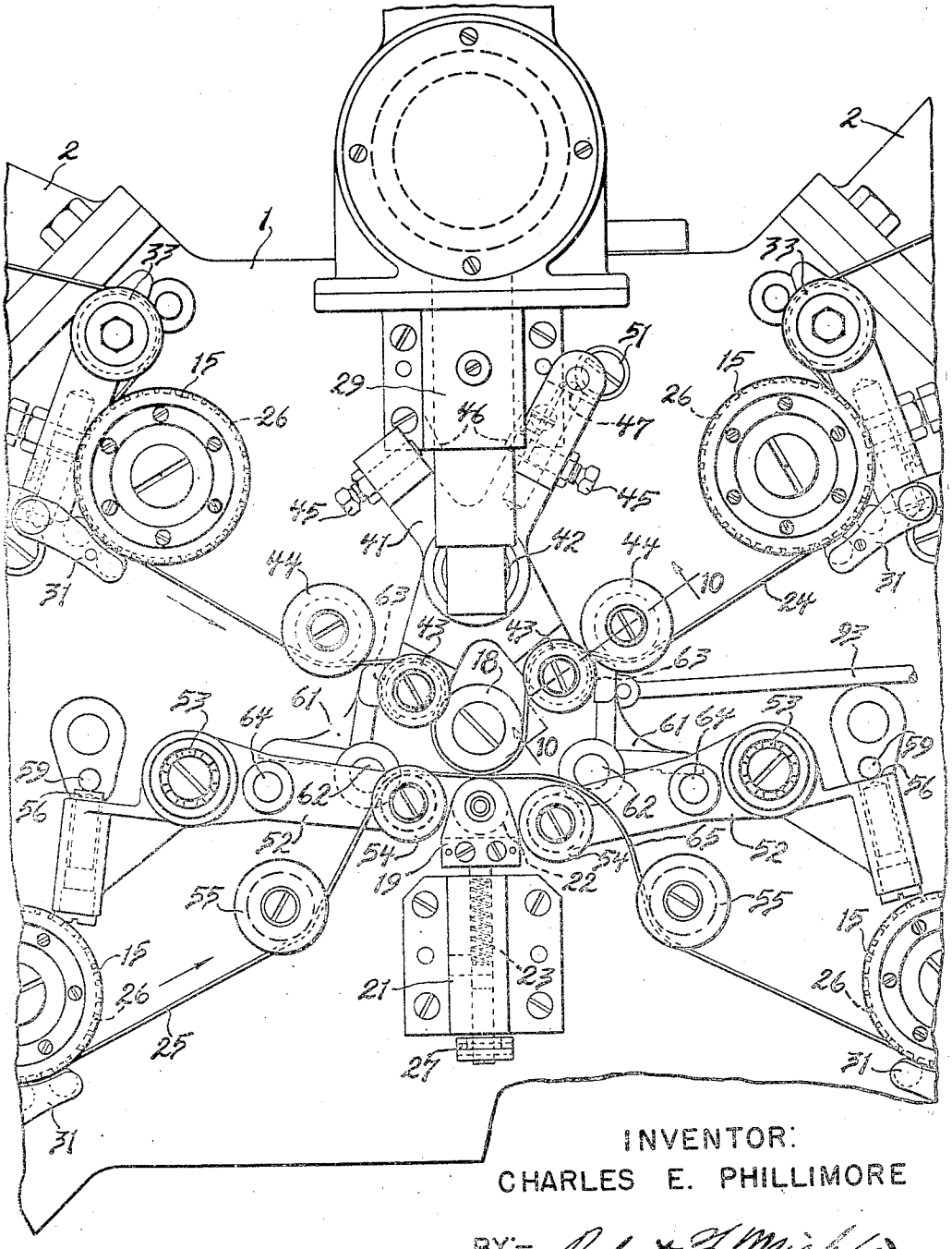
ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 2

FIG. 2.



INVENTOR:
CHARLES E. PHILLIMORE

BY:- Robert F. Michel, Jr.
ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 3

FIG. 3.

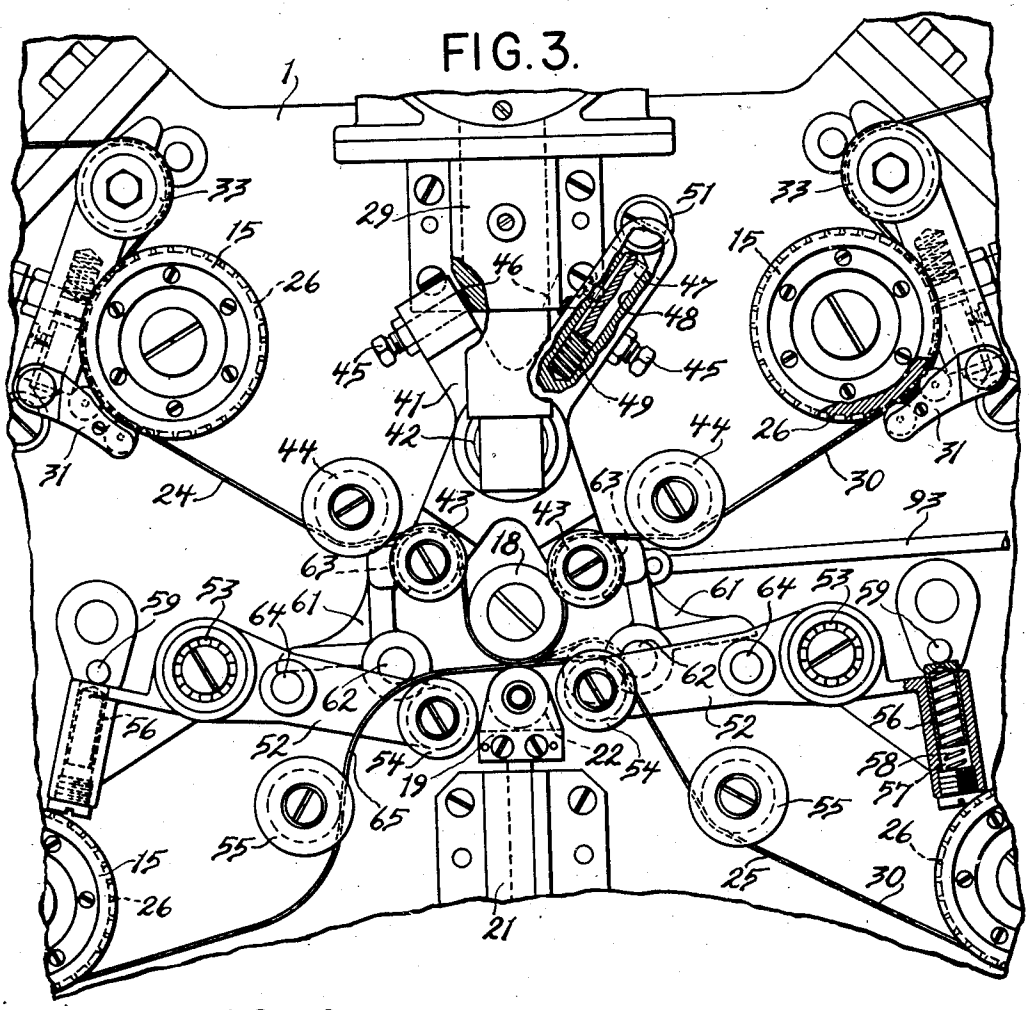
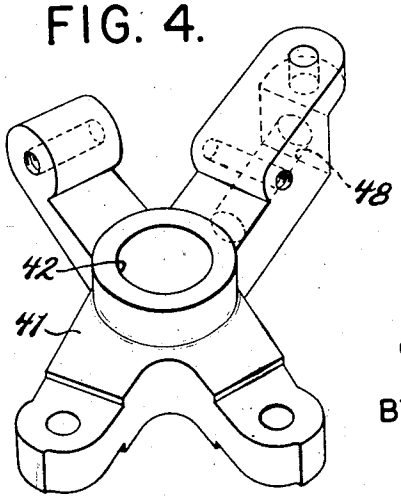


FIG. 4.



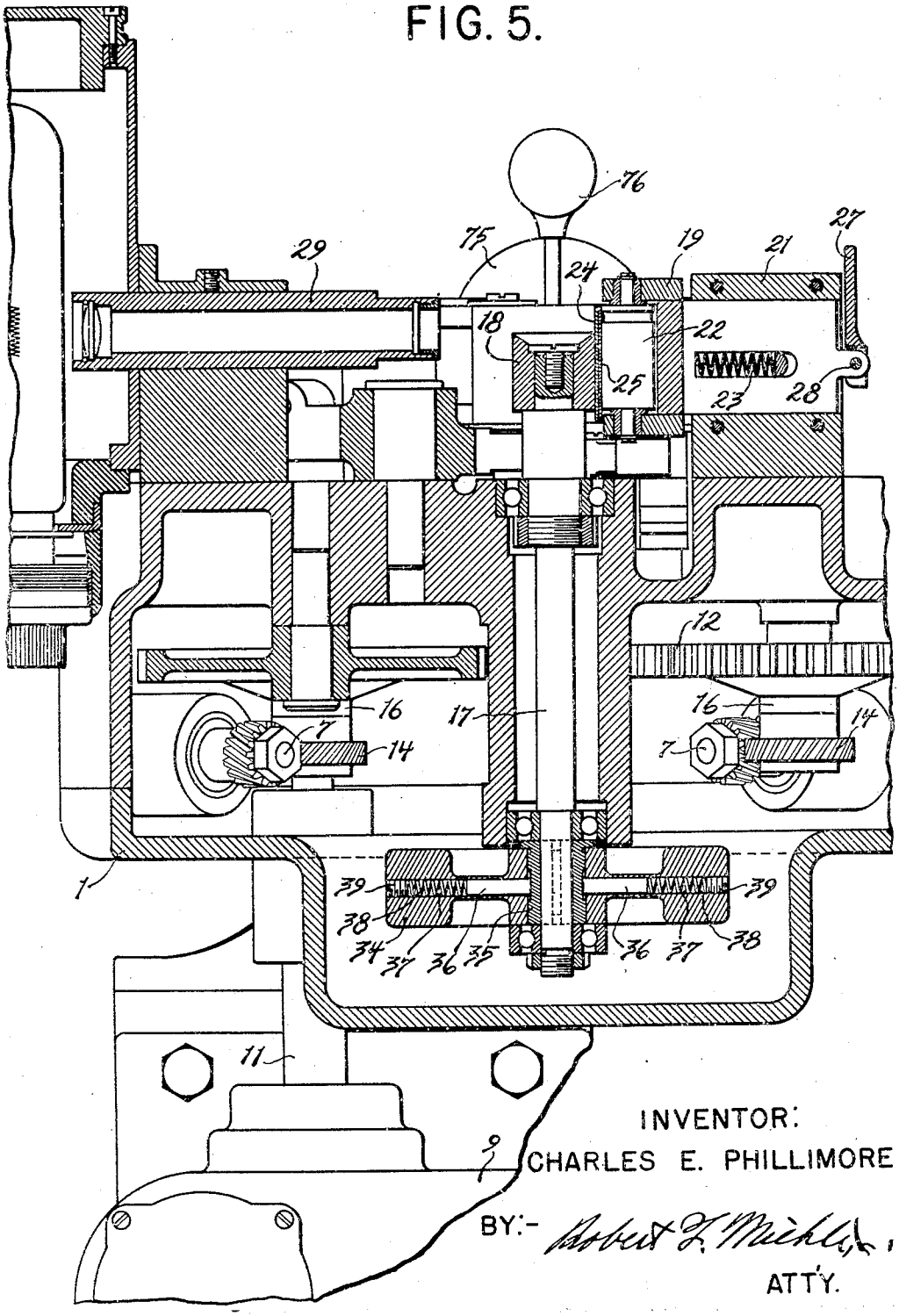
INVENTOR:
CHARLES E. PHILLIMORE
BY:- Robert L. Mickle, Jr.
ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 4

FIG. 5.



INVENTOR:
CHARLES E. PHILLIMORE
BY:- Robert L. Mickley,
ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 5

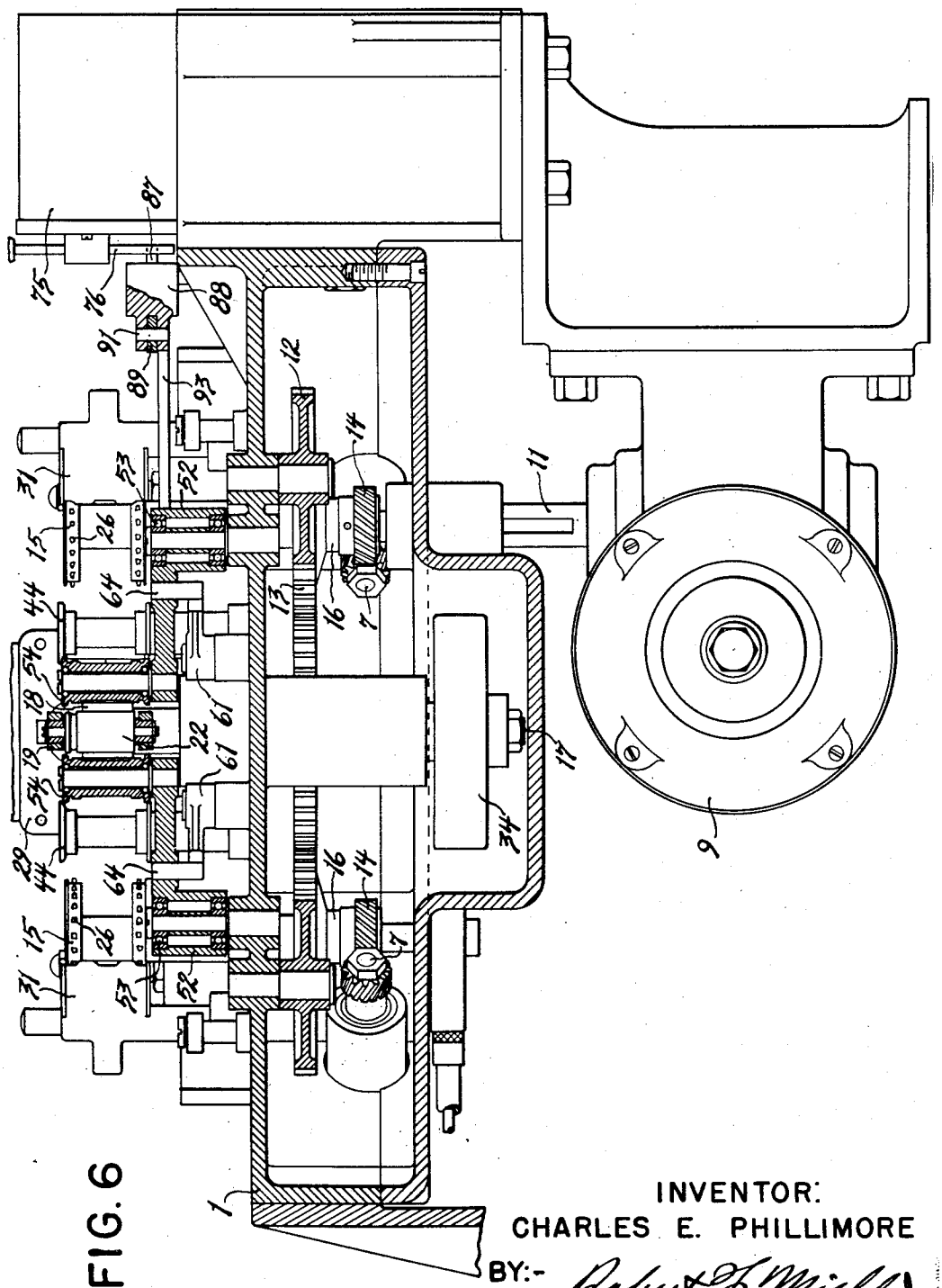


FIG. 6

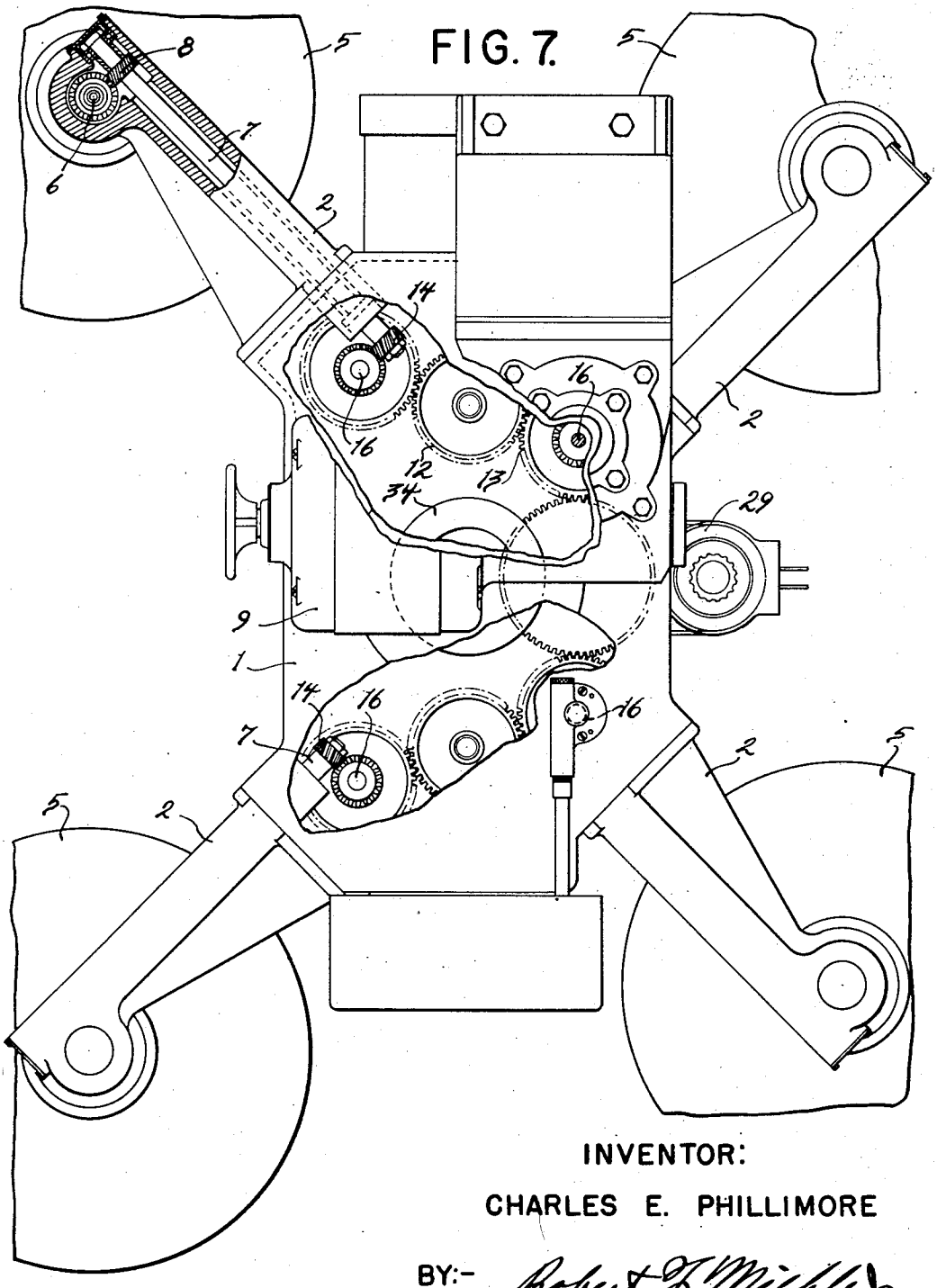
INVENTOR:
CHARLES E. PHILLIMORE
BY:- Robert F. Michel Jr.
ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 6

FIG. 7.



INVENTOR:

CHARLES E. PHILLIMORE

BY:- Robert F. Michler, Jr.

ATT'Y.

June 25, 1940. C. E. PHILLIMORE 2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Filed Nov. 1, 1938 7 Sheets-Sheet 7

FIG. 8.

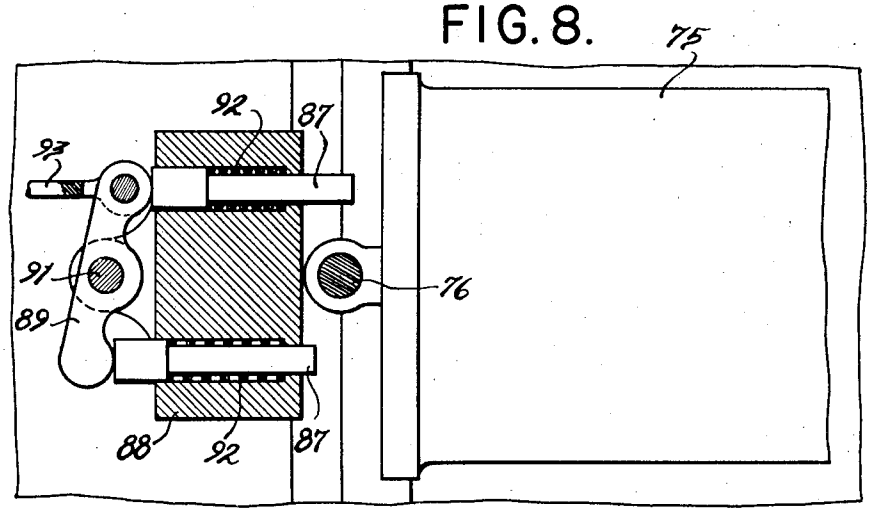


FIG. 9.

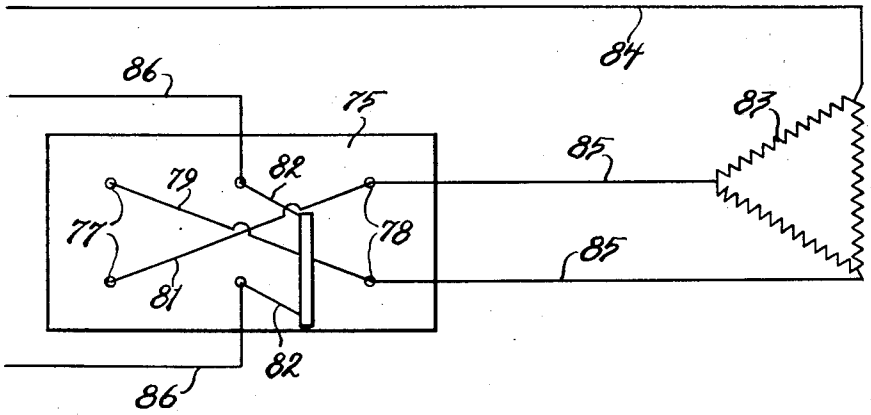
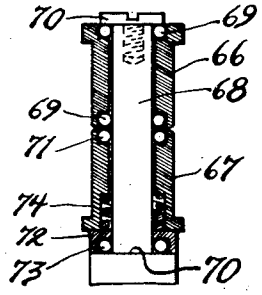


FIG. 10.



INVENTOR:
CHARLES E. PHILLIMORE

BY:- Robert F. Michael

ATT'Y.

Patented June 25, 1940 2,205,540

UNITED STATES PATENT OFFICE

2,205,540

PHOTOGRAPHIC PRINTING MACHINE

Charles E. Phillimore, Chicago, Ill., assignor to The Bell & Howell Company, Chicago, Ill., a corporation of Illinois

Application November 1, 1938, Serial No. 238,234

13 Claims. (Cl. 95—75)

My invention relates particularly to photographic sound record printing machines although not limited to this use alone, the invention contemplating the printing of photographic sound records on motion picture film for the exhibition of sound accompanied motion pictures.

The invention is toward the end of effecting an extremely accurate progressive photographic printing for the instant purpose of effecting the reproduction of photographic sound records without the distortion as may be incident to length variations of the printing and sensitized elements at the time of printing. The problems involved are well known and need not be amplified except as hereinafter referred to.

The invention also contemplates a progressive photographic printing machine of the above character which may be operated in either direction of feed of the printing and sensitized strips to the end that the printing strip need not be rewound after each printing operation, this phase of the invention involving adjustable mechanism for conveniently adapting the machine for effective operation in either direction of feed of the printing and sensitized strips, the invention also contemplating interlock mechanism whereby proper positioning of the aforesaid adjustable mechanism is assured for the operation of the machine in the instant direction of feed of the printing and sensitized strips.

The invention will be better understood by reference to the accompanying drawings in which—

Figure 1 is a top plan view of a photographic printing machine embodying my invention;

Figure 2 is an enlarged partial top plan view of the same;

Figure 3 is a view similar to Figure 2 with parts broken away and shown in section;

Figure 4 is a perspective view of a carrier part involved in the embodiment hereinafter described;

Figure 5 is a partial sectional view substantially on the line 5—5 of Figure 1;

Figure 6 is a partial sectional view substantially on the line 6—6 of Figure 1;

Figure 7 is a partial bottom plan view with parts broken away and shown in section;

Figure 8 is a partial top plan view with parts shown in section;

Figure 9 is a diagrammatic view of the reversing switch circuit, hereinafter described; and

Figure 10 is a partial section substantially on the line 10—10 of Figure 2.

Referring to the drawings, 1 designates a hollow horizontally disposed frame which is provided with four hollow support arms 2 radiating horizontally therefrom. See Figures 1, 2, 3 and 7. Rotatably mounted at the outer ends of the arms 2, are vertically disposed film spool spindles 3 having their upper ends arranged to detachably receive film spools 4, film roll supporting plates 5 being also provided, all as is more or less usual. The spindles 3 are driven through the medium of the usual one way frictional drives, not shown, and commonly employed in reversing motion picture apparatus, from vertically disposed rotatably mounted shafts 6 alined with the spindles 3.

Horizontally disposed rotatably mounted shafts 7 extending within and longitudinally of the arms 2 are connected to drive the shafts 6 by spiral gearing 8 from the interior of the frame 1. See particularly Figure 7.

Mounting beneath the frame 1 is a suitable electric motor, generally designated at 9, and this motor is connected to drive, in a usual manner, a vertical drive shaft 11 extending into the interior of the frame 1. See Figures 6 and 7. Through suitable gearing, within the frame 1, comprising a spur gear train, generally designated at 12 and including an intermediate gear 13 fixed with the shaft 11, and spiral gearing, generally designated at 14, the shafts 7 are driven together.

Four radially arranged vertically disposed rotatable constant film feed sprockets 15, positioned above the frame 1, are fixedly mounted on vertical shafts 16, which shafts are rotatably mounted on the frame 1 and are fixed with corresponding gears of the gear train 12 and of the spiral gearing 14 to the end that these sprockets and the shafts 7 are driven together, one of the shafts 16 being coaxial and fixed with the shaft 11 in a usual manner, so that the sprockets 15 and shafts 7 are driven by the motor 9. See Figures 1, 2, 3, 6 and 7.

A vertically disposed shaft 17 is rotatably mounted on the frame 1 centrally of the sprockets 15 and extends from the interior thereof above the same. See Figure 5. Fixed on the upper end of the shaft 17 and above the frame 1 is a roller 18 arranged in concentric relation with this shaft, this roller being thus rotatably mounted. See Figures 1, 2, 3 and 5.

A carrier 19 is slidably mounted in a slide mounting 21, secured on the top of the frame 1, for horizontal movement radially of the roller 18, and a roller 22 is rotatably mounted on the carrier 19 on an axis parallel with that of the roller 18. See Figures 2, 3 and 5. A spring 23

is operative between the carrier 19 and the mounting 21 to urge the roller 22 toward the roller 18 for the passage of a photographic printing strip or film 24 and a sensitized photographic strip or film 25 between these rollers in pressure contact, the strips or films 24 and 25, as shown, being standard motion picture film strips provided with usual feed perforations 30 along the margins thereof which feed perforations are engaged by the usual feed teeth 26 of the sprockets 15 for the feeding of the printing and sensitized strips or films.

For the purpose of conveniently placing the strips 24 and 25 between the rollers 18 and 22, a manually operated cam lever 27 is pivotally mounted, as designated at 28, on the carrier 19 for cam engagement with the slide mounting 21 to withdraw the roller 22 in a direction away from the roller 18, the lever 27 being shown in inoperative position in Figures 1, 2, 3 and 5, in which the film strips are held in pressure contact between these rollers for passage therebetween.

A restricted printing station is established in association with the pressure contact of the printing and sensitized strips between the rollers 18 and 22 by means of a usual optical printing light device, generally designated at 29 and mounted on the frame 1, the upper end of the roller 18 being disposed to permit the passage of printing light from said optical device through the printing strip and on to the sensitized strip to expose the printing strip in accordance with the photographic record on the printing strip at the aforementioned pressure contact of the printing on sensitized strips between the rollers 18 and 22.

The film strips 24 and 25 are so laced that each strip has toothed engagement, by means of the aforesaid usual feed perforations 30 thereof with the teeth 26 of two of the feed sprockets 15 on both sides of the aforesaid pressure contact of the film strips between the rollers 18 and 22 and the printing station associated therewith, as shown in Figures 1, 2 and 3. Suitable releasable retaining devices 31 maintain toothed engagement between the film strips and the feed sprockets, and each film strip leads from the pair of sprockets engaged thereby to rolls 32 thereof carried by a corresponding pair of the film spools 4, the film strips being trained over flanged guide rollers 33 between the feed sprockets and rolls 32.

The film strips are thus fed to and from the pressure contact thereof between the rollers 18 and 22 and the printing station thereat by the feeding means comprising the constant feed sprockets 15, the rollers 18 and 22 rotating as the strips are fed therebetween, and the aforesaid one way frictional drives of the film spool shafts 3, and accordingly of the film spools 4 and film rolls 32, being arranged for the reversal of the drive of the film strips as is usual in motion picture apparatus, reversal of the drive being effected by reversing the motor 9, as hereinafter described, and reversal of the drive of the film strips obviating the necessity of rewinding the negative or printing strip after each printing operation.

The rollers 18 and 22 are rotated by the film strips 24 and 25 being fed in pressure contact therebetween, and for the purpose of promoting uniform travel of the film strips between these rollers, and at the printing station thereat, see Figures 5 and 6, a flywheel 34 within the frame 1, is mounted for rotation on a bushing 35, secured on the lower portion of the shaft 17, which shaft is fixed with the roller 18, and this flywheel is frictionally connected with the bushing 35 by means of studs 36 slidably mounted in radial bores 37 in the flywheel and frictionally engaged against the bushing 35 by means of compression springs 38 within said radial bores and operative between the studs 36 and screws 39 screwthreaded into said radial bores to frictionally engage the studs 36 with the bushing 35 and accordingly establish a frictional connection between the flywheel and the film strip engaged roller 18 to the end aforementioned.

A manually actuated carrier 41, in the form of a cross, is pivotally mounted centrally thereof, as designated at 42, on top of the frame 1 on a vertical axis parallel to the roller 18. Rotatably mounted on adjacent arms of the carrier on axes parallel to that of the roller 18, are flanged rollers generally designated at 43. See Figures 1 to 5 inclusive.

The rollers 43 are arranged oppositely with respect to the roller 18 so that opposite positioning of the carrier 41 alternately positions the rollers 43 in adjacent relation with the roller 18. Vertically disposed spaced flanged guide rollers 44 are rotatably mounted on the top of the frame 1 in opposite relation with the carrier 41, and the negative or printing strip 24 is laced between the feed sprockets 15 engaged thereby by engaging the printing strip similarly about the rollers 18 and 44 and about the rollers 43 in an opposite manner as shown in Figures 1, 2 and 3.

Opposite positions of the carrier are adjustably limited by set screws 45 mounted on adjacent arms of the carrier 41 and engaging against stop surfaces 46, and this carrier is oppositely positioned by resilient means consisting of a conically ended detent stud 47 slidably engaged in a radial bore 48 in an arm of the carrier 41, a spring 49 in said bore and yieldably urging said stud outwardly to engage the conical end of said stud against a stud roller 51 mounted on the frame 1. This arrangement is such that, in the opposite positions of the carrier, opposite sides of the conical end of the stud 47 engage the stud roller 51 to yieldably urge the carrier in the direction of the instant of the opposite positions thereof whereby to yieldably urge the corresponding guide roller 43 toward the roller 18 and thus effect a pressure contact wrap of the printing strip about the roller 18, the contact pressure of this pressure contact wrap being yieldable by reason of the yieldable detent means including the spring 49 to accommodate varying conditions in practice such as the instant thickness of the printing strip.

The aforesaid pressure contact wrap of the printing strip on the roller 18 is thus changeable from either side of the aforesaid pressure contact of the printing and sensitized strips between the rollers 18 and 22 and the associated printing station for the purpose of assuring an effective controlling wrap of the printing strip about the roller 18 on the instant feed inside of the printing station pressure contact of the strips between the rollers 18 and 22 in order to assure proper control of the printing strip at the printing station and to obviate any interference on the instant feed off side of the printing station pressure contact, the carrier 41 being oppositely positioned for this purpose correspondingly with operation of the machine in opposite directions. Figures 1 and 2 show the position of the parts including the carrier 41 for the travel of the strips to the right in these figures, and Figure 3 shows

the position of the parts for the opposite travel of the strips and to the left in this figure.

A pair of arms 52 are pivotally mounted on spaced vertical axes on the frame 1, as designated at 53, on opposite sides of the rollers 18 and 22. These arms extend from their mountings toward the rollers 18 and 22, and a pair of flanged rollers 54 are rotatably mounted on vertical axes on the free ends of respective of these arms, these rollers being disposed on opposite sides of and adjacent the rollers 18 and 22 for independent movement, due to the pivotal mountings of the arms 52 transversely of the plane of the aforesaid printing station pressure contact of the strips 24 and 25 between the rollers 18 and 22.

Vertically disposed spaced flanged guide rollers 55 are rotatably mounted on the top of the frame 1, and the positive or sensitized strip 25 is laced between the feed sprockets 15 engaged thereby by engaging the strip 25 similarly on the rollers 22 and 54 and about the rollers 55 in an opposite manner as shown in Figures 1, 2 and 3.

The arms 52 are independently and yieldably urged in the direction to cause the rollers 54 to wrap the strip 25 about the roller 18, with the strip 24 therebetween, by means of studs 56 slidably engaged in tangential bores 57 in the arms 52 and springs 58 in these bores yieldably urging these studs to engage studs 59 mounted on the frame 1. See particularly Figure 3.

Two oppositely disposed bell crank levers 61 are pivotally mounted on vertical axes, as designated at 62, on top of the frame 1, and corresponding arms thereof are oppositely engageable, as designated at 63, with adjacent arms of the carrier 41 for the alternate actuation of the levers 61 with movement of the carrier into its opposite positions. The other arms of the levers 61 are engageable with studs 64 on the arms 52 to alternately position the rollers 54 carried by the arms 52, against the influence of the springs 58, out of tensioned engagement with the sensitized strip 25 with opposite positioning of the carrier 41, to the end that the influence of the rollers 54 to wrap the strip 25 about the roller 18 with the printing strip 24 therebetween is alternately restricted to opposite sides of the aforesaid pressure contact of the printing and sensitized strips between the rollers 18 and 22 and the associated printing station.

The arrangement is such that a roller 43 is in pressure engagement with the printing strip on the roller 18 and a corresponding roller 54 is yieldably tensioned against the sensitized strip on the same side of the pressure contact of the printing and sensitized strips between the rollers 18 and 22, and the associated printing station, this being the instant feed in side of the rollers 18 and 22, the position of the carrier 41 being changed for reverse feeding of the strips, as shown in Figures 2 and 3.

The conditions on the instant feed in side of the rollers 18 and 22 are that the corresponding roller 43 effects a pressure contact wrap of the printing strip 24 about the roller 18 and that the corresponding roller 54 is tensioned against the sensitized strip 25 in the direction to wrap this strip about the roller 18 with the printing strip therebetween, as will be seen at the left in Figure 2. These conditions result in the printing strip being closely wrapped in pressure contact with the roller 18 for adequate controlling contact between the printing strip and the roller 18 and uniform feeding of the printing strip through the printing station pressure contact between the rollers 18 and 22, and in the sensitized strip being tensioned to wrap about the roller 18 with of course the printing strip therebetween.

This tensioning of the sensitized strip on the feed in side of the pressure contact of the strips between the rollers 18 and 22 serves to feed the sensitized strip through this pressure contact under varying conditions of longitudinal curvature to the end that the actual relative length of the sensitized strip, as distinguished from its feed perforation pitch length, is compensated for at the pressure contact between the rollers 18 and 22 and the printing station thereat, with resultant fidelity of exposure of the sensitized strip.

To illustrate, if the portion of the sensitized film between the sprocket 15 engaged thereby on the instant feed in side of the rollers 18 and 22 is relatively long the corresponding yieldably urged roller 54 will cause a corresponding longitudinal curvature of the sensitized strip about the roller 18 with the printing strip therebetween adjoining the pressure contact printing station and effect the corresponding shortening of the surface of the sensitized strip contacting the printing strip at the pressure contact printing station to the end as aforesaid. In this manner varying relative lengths of the sensitized strip, as distinguished from its feed perforation pitch length, are compensated for automatically and continuously during the printing operation, as is obvious.

The conditions on the instant feed off side of the rollers 18 and 22 are that the corresponding roller 43 is positioned away from the roller 18 so that the printing strip leads freely off of the roller 18 without any tendency of interference with the conditions established at the printing station and that the corresponding roller 54 is withdrawn from tensioned engagement with the sensitized strip and permits a compensating loop 65 of the sensitized strip on the feed off side of the printing station to the end of eliminating interference with the conditions established at the printing station, as will be seen at the right in Figure 2 and at the left in Figure 3.

To guide the printing strip edgewise to and from the roller 18 with extreme accuracy, the rollers 43 are constructed as designated in Figure 10. Each of these rollers consists of upper and lower flanged and bored roller parts 66 and 67 engaged over a vertically disposed mounting stud 68 secured on the carrier 41. The upper roller part 66 is rotatably mounted on the stud 68 by means of ball bearings 69, the upper of which forms an upward thrust bearing for the upper roller part by engagement with a headed bearing screw 70 screwthreaded downwardly into the upper end of the stud 68.

The upper end of the lower roller part 67 is rotatably mounted on the stud 68 by means of a ball bearing 71. A counterbored annular member 72 is engaged for rotation on the stud 68 below the lower roller part 67 and a ball bearing 73 is interposed between the annular member 72 and the stud 68 and engages this stud and an upwardly facing shoulder 70 thereof to provide a radial and downward thrust bearing for the annular member. A compression spring 74 is disposed in an enlarged lower portion of the bore of the lower roller part 67, and reacting on the annular member yieldably urges the lower roller part upwardly to closely engage the printing strip edgewise between the flanges of the upper and lower roller parts 66 and 67.

As before described alternate positioning of the rollers 43 and 54 for reverse operation of the machine is effected by oppositely positioning the carrier 41, reverse operation of the machine being effected by reversing the motor 9.

Reversal of the motor is conveniently accomplished by a reversing switch, generally designated at 75, mounted on the frame 1 and embodying a manually operated pivoted lever 76 effecting reversal of the motor in opposite positions thereof, the switch being in neutral or off position in an intermediate position of the lever 76 as is usual. See Figure 1.

The reversing switch 75 and its circuit connections with the motor 9 are illustrated in Figure 9, in which the switch comprises oppositely disposed pairs of stationary contacts 77 and 78 diagonally connected by conductors 79 and 81, and a pair of pivoted contacts 82 are manually actuated by the aforesaid lever 76 to contact respective pairs of the stationary contacts 77 and 78 in opposite positions of the lever 76.

A three phase winding of the motor is indicated at 83 in Figure 9, one terminal of which is connected by a conductor 84 to one terminal of a source of a three phase current, and the other two terminals of which are connected respectively to the contacts 78 by conductors 85. The pivoted contacts 82 of the reversing switch are respectively connected by conductors 86 to the other two terminals of the aforesaid source of current, all as is usual, and with the usual result that opposite positioning of the pivoted contacts 82 by corresponding positioning of the lever 76 to alternately contact the pairs of contacts 77 and 78 effects reverse operation of the motor and accordingly reverse operation of the machine.

In order that the proper position of the carrier 41 is assured for the instant direction of operation of the machine, the following is provided.

Referring to Figures 1 and 8, a pair of spaced plungers 87 are slidably mounted in a carriage 88 mounted on the frame 1 for movement transversely of the plane of movement of the lever 76 into and out of the path thereof. A rock lever 89 is intermediately pivoted, as designated at 91, on the carriage 88, and corresponding ends of the plungers 87 are urged against opposite ends of the lever 89 by compression springs 92 so that opposite positioning of this lever effects alternate positioning of the plungers 87 in the path of the lever 76 to prevent its being moved to the corresponding contact position from its intermediate or non-contact position.

A connecting rod 93 is pivotally connected with the rock lever 89 and with the adjacent bell crank lever 61, and the arrangement is such that the plungers 87 are alternately positioned in the path of the reversing switch lever 76 with opposite positioning of the rollers 43 and 54 and that the feeding means can only be operated in the direction in which the instant position of the rollers 43 and 54 is that of being operative to effect the aforesaid pressure contact wrap of the printing strip 24 on the roller 18 and the tensioning of the sensitized strip to wrap the same about the roller 18 on the instant feed in side of the printing station rollers 18 and 22.

While I have thus described my invention, I do not wish to be limited to the precise details described as changes may be readily made without departing from the spirit of my invention, but having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

1. In a photographic printing machine the combination with a pair of printing station elements, including an arcuate element, arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of means for reversibly feeding said strips in unison between said station elements and operative on one of said strips on both sides of said station elements, means yieldably urging said one strip between said feed means and said station elements in the direction of said arcuate element and operative to vary the curvature of said strip between said station elements in correspondence with the varying length of said strip between said station elements and said feed means, and means for rendering said yieldably urging means operative alternately on opposite sides of said station elements.

2. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for reversibly feeding said strips in unison between said station rollers and having toothed engagement with feed perforations of both of said strips on both sides of said rollers, means yieldably urged against said sensitized strip between said feed means and said station rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said strip between said station rollers and said feed means, and means for rendering said yieldably urged means operative alternately on opposite sides of said rollers.

3. In a photographic printing machine the combination with a pair of printing station elements, including an arcuate element, arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of means for reversibly feeding said strips in unison between said station elements and operative on both of said strips on both sides of said station elements, means engaging the one of said strips contacting said arcuate element between said feed means and said station elements to effect a pressure contact wrap thereof about said arcuate element, means yieldably urging the other strip between said feed means and said station elements in the direction of said arcuate element and operative to vary the curvature of said strip between said station elements in correspondence with the varying length of said strip between said station elements and said feed means, and means for rendering said pressure contact wrap means and said yieldingly urging wrap means operative alternately on opposite corresponding sides of said station elements.

4. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for reversibly feeding said strips in unison between said station rollers and having toothed engagement with feed perforations of both of said strips on both sides of said rollers, movably mounted means engageable with the printing strip between said feed means and station rollers and oppositely positionable to effect a

pressure contact wrap of said printing strip about the station roller contacted thereby alternately on opposite sides of said first mentioned contact, releasable detent means oppositely positioning said pressure contact wrap means, means yieldably urged against said sensitized strip between said feed means and station rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, and means operative between said pressure contact wrap means and said yieldably urged means to render said yieldably urged means operative alternately on opposite sides of said station rollers in correspondence with opposite positioning of said pressure contact wrap means.

5. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for reversibly feeding said strips in unison between said station rollers and having toothed engagement with feed perforations of both of said strips on both sides of said rollers, a pivotally mounted carrier, spaced printing strip rollers mounted on said carrier and engaging said printing strip between said feed means and station rollers on opposite sides of said station rollers to effect a pressure contact wrap of said printing strip about the station roller contacted thereby alternately on opposite sides of said first mentioned contact with opposite positioning of said carrier, yieldable detent means oppositely positioning said carrier, pivotally mounted yieldably urged arms, sensitized strip rollers mounted on said arms and yieldably urged therewith against said sensitized strip between said feed means and station rollers on opposite sides of said station rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, and means operative between said carrier and said arms to render said sensitized strip rollers operative alternately on opposite sides of said station rollers in correspondence with opposite positioning of said carrier.

6. In a photographic printing machine the combination with a pair of printing station elements, including an arcuate element, arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed means for feeding said strips in unison between said station elements and operative on at least one of said strips on both sides of said station elements, reversing means for driving said feeding means in opposite directions, means yieldably urging said one strip between said feed means and said station elements in the direction of said arcuate element and operative to vary the curvature of said strip between said station elements in correspondence with the varying length of said strip between said station elements and said feed means, means for rendering said yieldably urging means operative alternately on opposite sides of said station elements, and means operative between said last mentioned means and said reversing means to cause operativeness of said yieldably urging means on the instant feed in side of said station elements.

7. In a photographic printing machine the combination with a pair of revoluble printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for feeding said strips in unison between said station rollers and having toothed engagement with said sensitized strip on both sides of said station rollers, manually controlled reversing means for driving said feeding means in opposite directions, means yieldably urging said sensitized strip between said feed means and said station rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, manually controlled means for rendering said yieldably urging means operative alternately on opposite sides of said station rollers, and interlock means controlled by said last mentioned means and operative on said reversing means to cause operativeness of said yieldably urging means on the instant feed in side of said station rollers.

8. In a photographic printing machine the combination with a pair of printing station elements, including an arcuate element, arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed means for feeding said strips in unison between said station elements and operative on both of said strips on both sides of said station elements, reversing means for driving said feeding means in opposite directions, means engaging the one of said strips contacting said arcuate element between said feed means and said station elements to effect a pressure contact wrap thereof about said arcuate element, means yieldingly urging the other strip between said feed means and said station elements in the direction of said arcuate element and operative to vary the curvature of said strip between said station elements in correspondence with the varying length of said strip between said station elements and said feed means, means for rendering said pressure contact wrap means and said yieldingly urging wrap means operative alternately on opposite corresponding sides of said station elements, and means operative between said last mentioned means and said reversing means to cause operativeness of said pressure contact wrap means and said yieldably urging wrap means on the instant feed in side of said station elements.

9. In a photographic printing machine the combination with a pair of revoluble printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for feeding said strips in unison between said station rollers and having toothed engagement with both of said strips on both sides of said station rollers, reversing means for driving said feed means in opposite directions, printing strip roller means engaging said printing strip between said feed means and said station rollers to effect a pressure contact wrap thereof about the station roller contacted thereby, sensitized strip roller means yieldably urged against said sensitized strip between said feed means and said station rollers in the direction

of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station roliers and said feed means, means for rendering said printing and sensitized strip roller means operative alternately on opposite corresponding sides of said station rollers, and interlock means controlled by said last mentioned means and operative on said reversing means to cause operativeness of said printing and sensitized strip roller means on the instant feed in side of said station rollers.

10. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, constant feed means for feeding said strips in unison between said rollers and operative on at least one strip on the feed in side of said rollers, means yieldably urging said one strip between said feed means and said station rollers on the feed in side of said rollers in the direction of one of said rollers and operative to vary the curvature of said strip between said station rollers in correspondence with the varying length of said strip between said station rollers and said feed means, and a flywheel connected with one of said rollers.

11. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for feeding said strips in unison between said rollers and having toothed engagement with feed perforations of said printing strip on the feed off side of said rollers and with said sensitized strip on the feed in side of said rollers, means yieldably urged against said sensitized strip between said feed means and said rollers on the feed in side of said rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, and a flywheel frictionally connected with the roller contacted by said printing strip.

12. In a photographic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed means for feeding said strips in unison between said rollers and operative on said sensitized strip on the feed in side of said rollers, means engaging said printing strip on the feed in side of said rollers to effect a pressure contact wrap thereof about the station roller contacted thereby, means yieldingly urging said sensitized strip between said feed means and said station rollers on the feed in side of said rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, and a flywheel connected with said one station roller.

13. In a photostatic printing machine the combination with a pair of rotatable printing station rollers arranged for the passage of photographic printing and sensitized strips therebetween in pressure contact, of constant feed sprocket means for feeding said strips in unison between said rollers and having toothed engagement with feed perforations of both strips on both sides of said station rollers, printing strip roller means engaging said printing strip between said feed means and said station rollers on the feed in side of said station rollers to effect a pressure contact wrap thereof about the station roller contacted thereby, sensitized strip roller means yieldingly urged against said sensitized strip between said feed means and said station rollers on the feed in side of said station rollers in the direction of said printing strip and operative to vary the curvature of said sensitized strip between said station rollers in correspondence with the varying length of said sensitized strip between said station rollers and said feed means, and a flywheel frictionally connected with said one station roller.

CHARLES E. PHILLIMORE.