March 20, 1934. H. H. SULLIVAN 1,951,952

PRINTING MACHINE FOR SENSITIZED MATERIAL

Filed Oct. 24, 1930 6 Sheets-Sheet 1

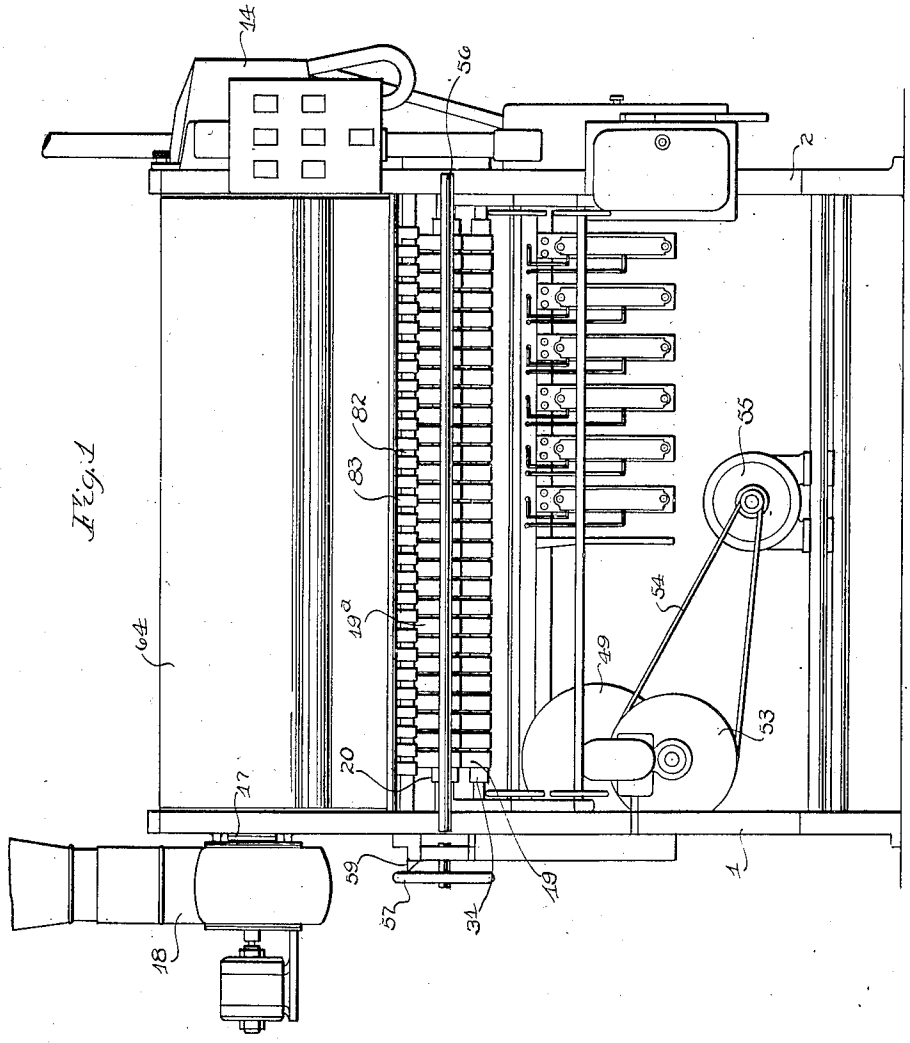


Fig. 1

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PRINTING MACHINE FOR SENSITIZED MATERIAL

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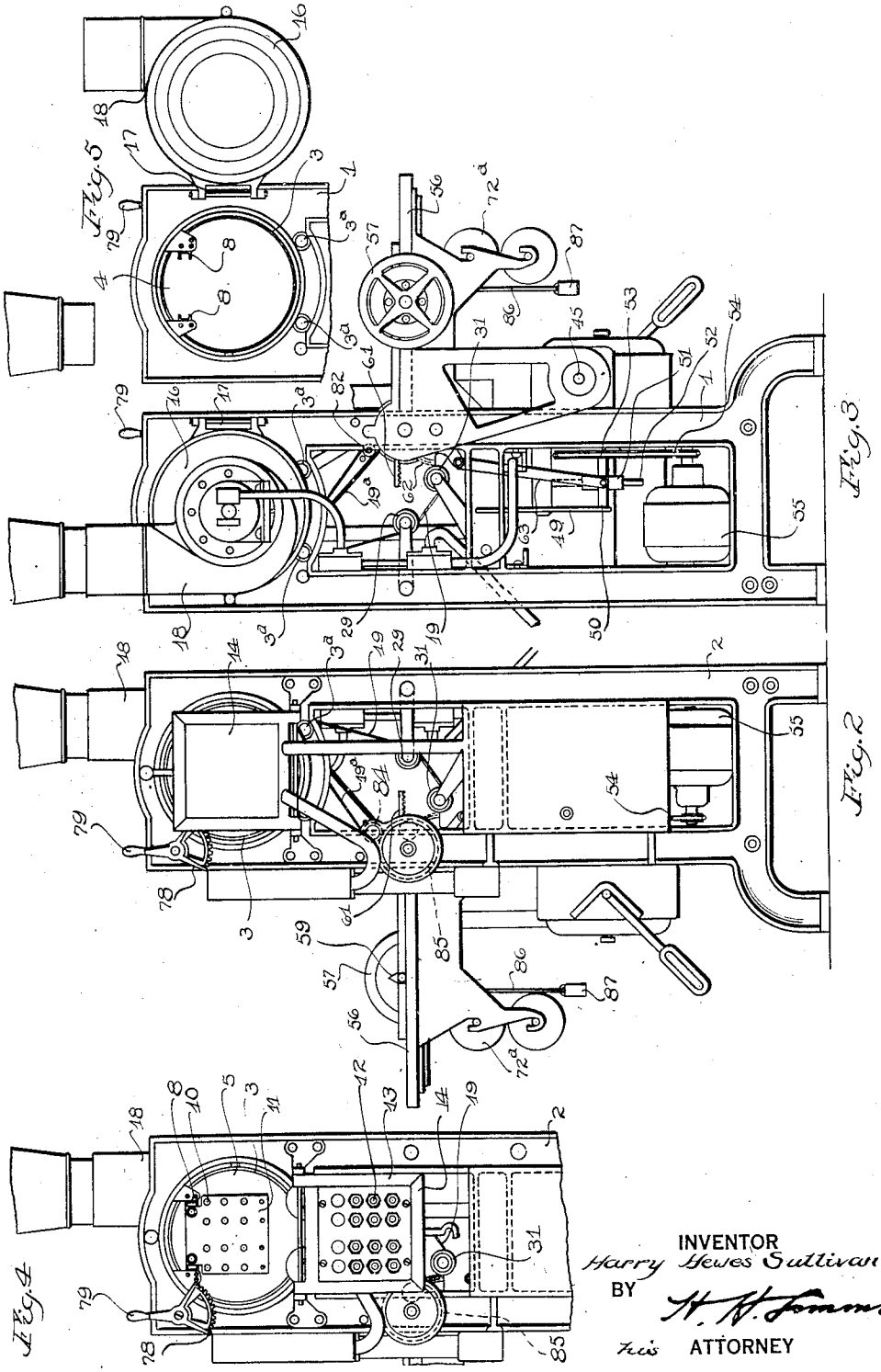


Fig. 5

Fig. 3

Fig. 2

Fig. 4

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PRINTING MACHINE FOR SENSITIZED MATERIAL

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Fig. 6

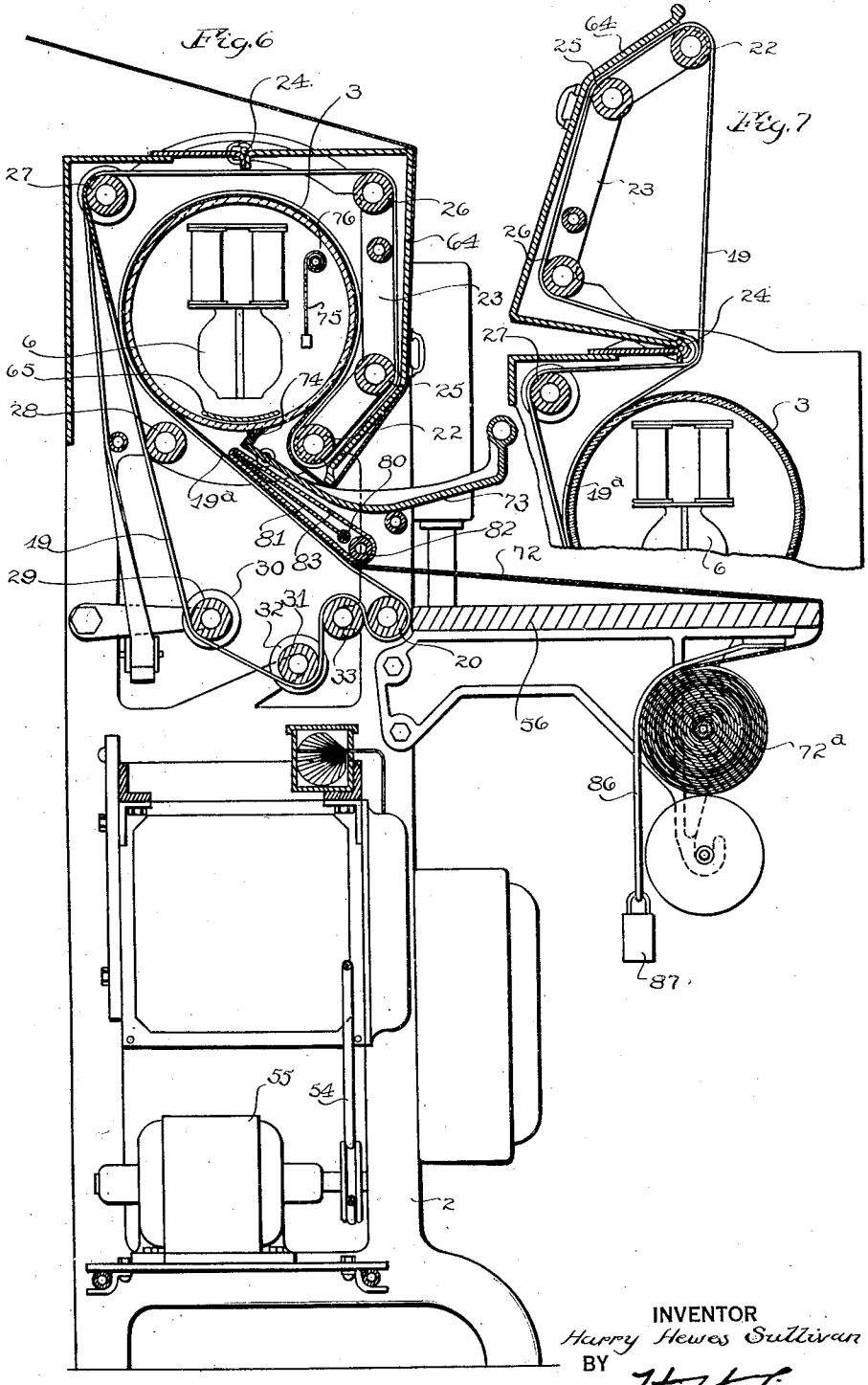


Fig. 7

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PRINTING MACHINE FOR SENSITIZED MATERIAL

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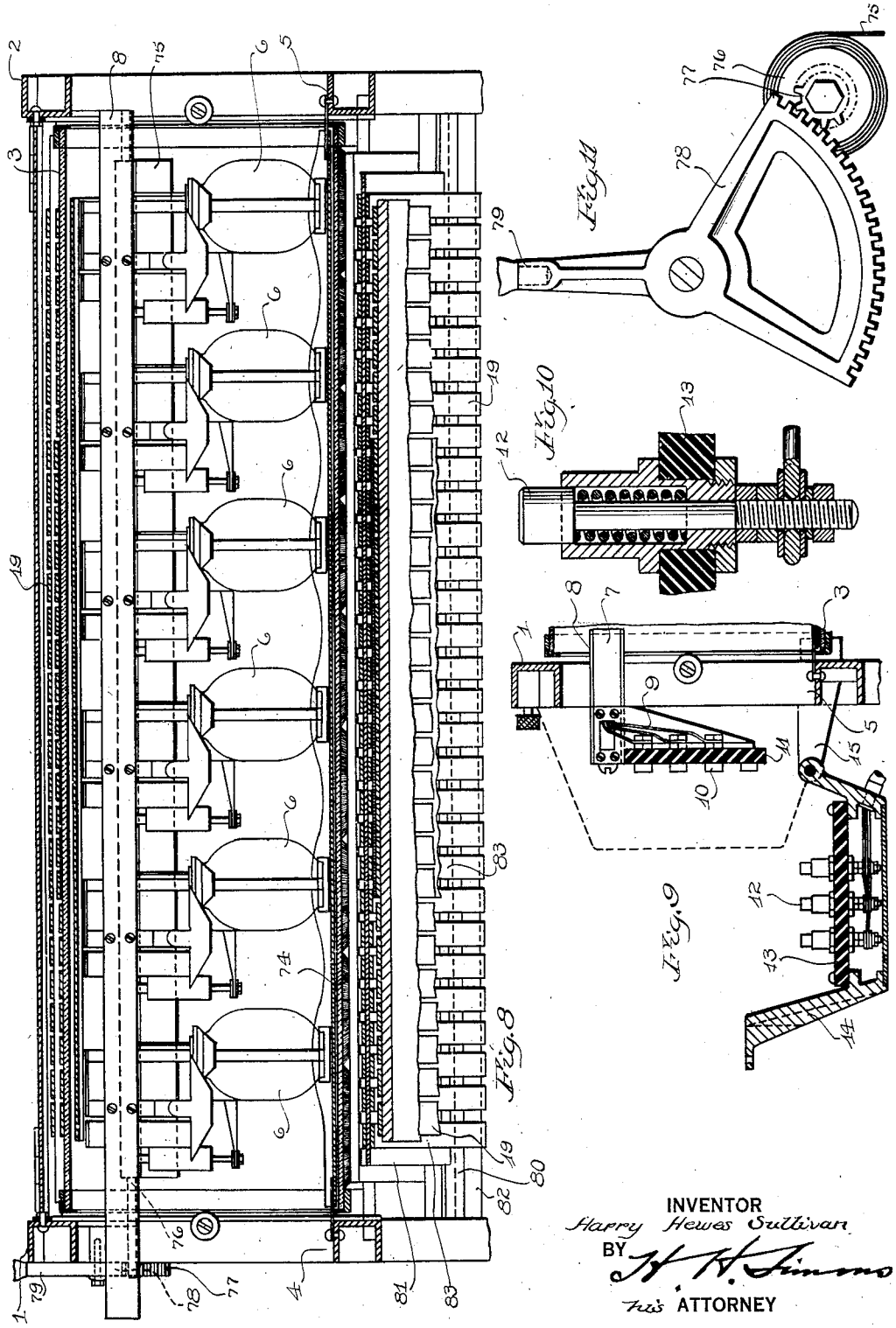


Fig. 8

Fig. 11

Fig. 10

Fig. 9

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PRINTING MACHINE FOR SENSITIZED MATERIAL

Filed Oct. 24, 1930 6 Sheets-Sheet 5

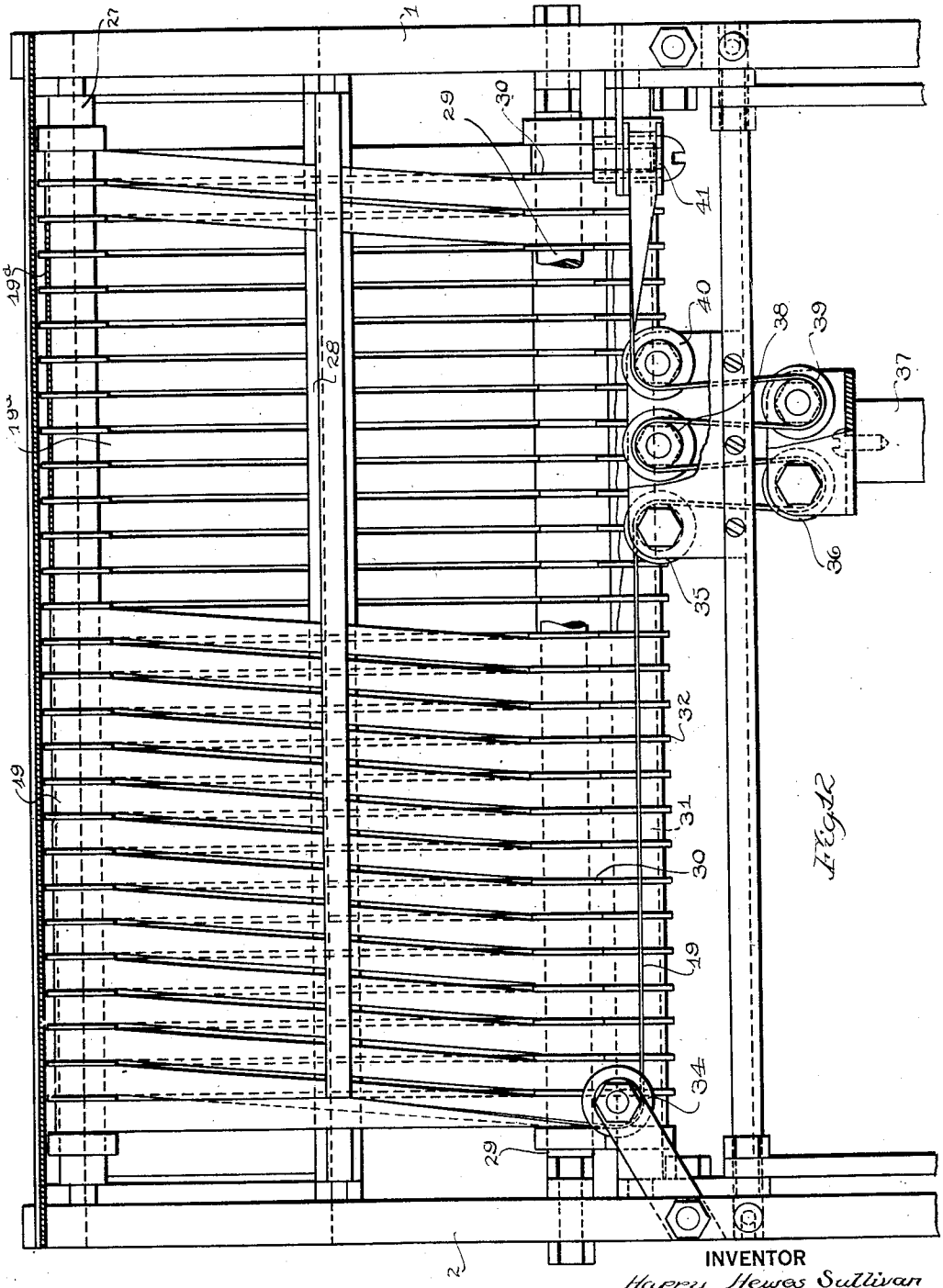


Fig. 12

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PRINTING MACHINE FOR SENSITIZED MATERIAL

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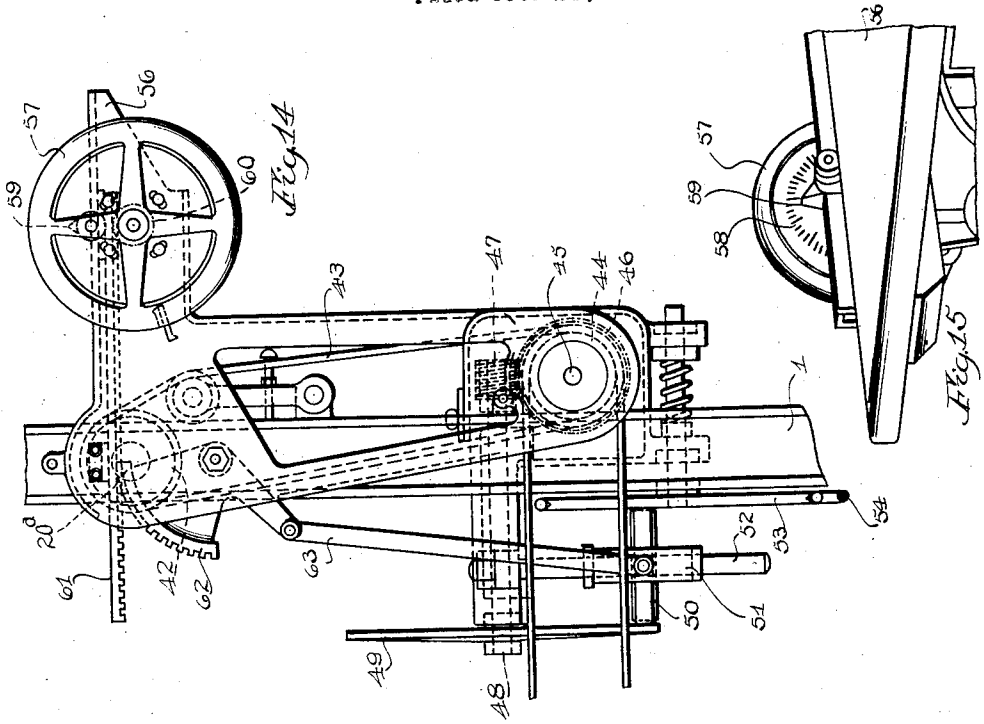


Fig. 14

Fig. 15

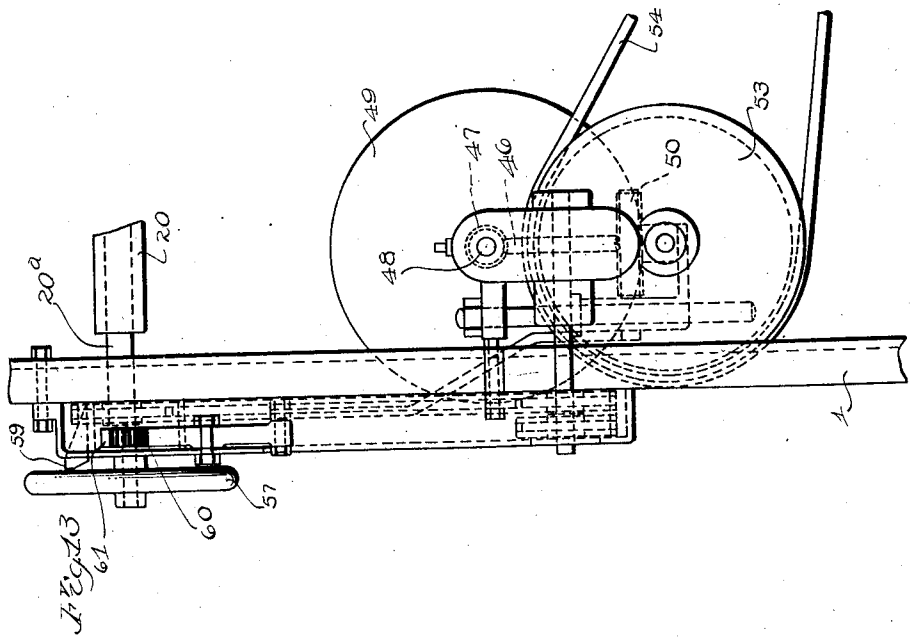


Fig. 13

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Patented Mar. 20, 1934 1,951,952

UNITED STATES PATENT OFFICE

1,951,952

PRINTING MACHINE FOR SENSITIZED MATERIAL

Harry Hewes Sullivan, Rochester, N. Y.

Application October 24, 1930, Serial No. 490,911

11 Claims. (Cl. 95—77.5)

The present invention relates to printing machines for sensitized material and an object thereof is to improve that type of printing machine having an illuminated light transmitting bed against which the sensitized material is held by making it possible to feed large sheets of material under a uniform pressure throughout the width of the bed. Another object of the invention is to obtain uniform pressure on the sensitized material by means of a single belt having a plurality of parallel laps simultaneously engaging the material on the bed. Still another object of the invention is to provide a novel manner of mounting an endless belt pressure means so that the front of the bed may be exposed.

To these and other ends, the invention consists of certain parts and combinations of parts all of which will be hereinafter described: the novel features being pointed out in the appended claims.

In the drawings:

Fig. 1 is a front elevation of one embodiment of the printing machine for sensitized material forming the subject matter of this invention;

Figs. 2 and 3 are views in elevation of two ends of the same machine;

Fig. 4 is a fragmentary view of the end shown in Fig. 2 with the lamp chamber open;

Fig. 5 is a fragmentary view of the end shown in Fig. 3 with the lamp chamber open;

Fig. 6 is a vertical transverse section through the machine;

Fig. 7 is a fragmentary section similar to Fig. 6 showing the front frame thrown to expose the transparent bed;

Fig. 8 is a longitudinal vertical section through the machine;

Fig. 9 is a fragmentary section showing the lamp chamber closure, on which the contacts are arranged, thrown to an open position;

Fig. 10 is a detailed section of one of the contacts on the closure;

Fig. 11 is a detail view of the shutter operating means;

Fig. 12 is a detail view of the holding mechanism for the sensitized material and the negative; and

Figs. 13, 14 and 15 are detailed views of the controlling and driving mechanism of the holding means for the sensitized material and the negative.

In the illustrated embodiment of the invention, 1 and 2 indicate the end frames which support between them on roller bearings 3^a, a rotary or revoluble light transmitting or transparent bed 3, in this instance, in the form of an open ended glass cylinder forming also the chamber for an illuminating means, the end frames 1 and 2 having respectively openings 4 and 5 opposite the open ends of the rotary transparent cylinder through which access to the chamber for the illuminating means may be obtained.

Supported within this rotary transparent tubular bed 3 is an illuminating means comprising, in this instance, a plurality of arc lamps 6 arranged in a series extending axially of the bed. These lamps, in this instance, depend from a frame 7 which is slidably mounted on horizontal guides 8 extending through the bed so that the lamps and their frame may be withdrawn from the bed. The lamps connect by conductors 9 with contacts 10 arranged on an insulating slab 11 which is supported in an upright position on the frame 7 at one end thereof. These contacts are adapted to be engaged by yielding contacts 12 mounted to slide in a slab 13 which is secured to the inner face of a hinged closure 14 for the opening in the adjacent side frame 1. The contacts 12 are individually yielding so that the proper engagement of any contact 12 with its contact 11 will not be interfered with by any other pair of contacts 11 and 12. The closure connects with the side frame 1 in such a manner that an air passage 15 is provided at the bottom of the closure. The opposite end of the chamber may be closed by a closure 16 hinged at 17 and may carry a motor driven suction fan 18 by which air is drawn over the surface of the transparent bed to cool the latter. No claim is made in the present application to the suction means for drawing air over the transparent bed to cool the same as the said means forms the subject matter of a divisional application Serial No. 570,226, filed by me October 21, 1931.

The employment of a single belt the width of the cylinder for feeding the sensitized material and the negatives or material to be copied is not practicable, due to the fact, that it tends to build up heat and also interferes with the cooling of the transparent cylinder. Furthermore, it is difficult to maintain an even pressure on the cylinder. The heating effect has been eliminated by feeding the material by means of a plurality of independent belts but here difficulty has been experienced in maintaining an equal pressure of them on the bed.

One of the features of this invention is the provision of a feeding means which will not cause the building up of heat in itself and will at the same time make it possible to produce a uniform pressure on the material being fed.

The feeding means, in this instance, cooperates with the rotary bed in such a manner as to turn said bed in the frame during the operation of the feeding means and embodies a single endless feeding member in the form of a belt or band 19 which is so guided as to provide a plurality of parallel laps traveling at right angles to the axis of the cylindrical bed. This band is guided about the cylinder so that the parallel laps 19ª pass rearwardly and upwardly from a common roller 20 situated below and in advance of the cylinder, being supported at its ends in the side frames 1 and 2. The parallel laps now pass behind and engage the cylinder 3 following the curvature of the latter forwardly and downwardly to a common roller 22 which is journalled in the lower part of a swinging frame or member 23 hinged at 24 substantially vertically above the cylinder 3. When the frame is in its normal or lowered position, the roller 22 lies beneath the cylinder 3 but above and in rear of the roller 20 in spaced relation to the lower portions of the parallel laps so as to provide a throat or combined intake and discharge passage for the sensitized material and the negative, tracing or other material from which the copy is made. After passing from the roller 22, the belt portions move upwardly in a forward direction to a roller 25 supported on the frame 23, thence to a roller 26 supported on the frame 23 vertically above the roller 25 and slightly in advance of the cylinder 3. The belt portions then pass rearwardly above the cylinder to a roller 27 having lap separating flanges 21. This roller 27 is journalled in the side frames 1 and 2 in rear of the hinge 24 and in rear of the cylinder 3 substantially in a plane. With the exception of one lap at one end of this cylinder, from all of the other laps leading to the roller 27, the belt passes downwardly over a roller 28 to and around a roller 29 having lap separating flanges 30, thence forwardly under a roller 31 having lap separating flanges 32, thence upwardly over a roller 33 and from the latter downwardly and under and about the roller 20, hereinbefore mentioned. The end lap above mentioned connects with a belt portion which leads under a roller 34 on the main frame, thence over a roller 35 on the main frame, thence under a roller 36 on a weighted automatic tensioning device 37, thence upwardly and over a roller 38 on the main frame, again downwardly and under a roller 39 on the tensioning device 37, again upwardly and over a roller 40 on the main frame and finally around a roller 41 on the main frame to the roller 20 after passing under the roller 31, and over roller 33.

The driving of this belt may be effected in any suitable manner. In this instance, to the shaft 20ª of the roller 20 (see Fig. 14) a pulley 42 is secured, this pulley having a belt 43 passing about it and also about a pulley 44 on a shaft 45. This shaft 45 also carries a worm wheel 46 which meshes with a worm 47 on a shaft 48. The latter carries a friction disk 49 which is engaged on one face by an axially movable disk 50 movable on its axial movement radially of the disk to provide a speed changing means for changing the speed of travel of the belt. The disk 50 is mounted to turn on a carrier 51 which is guided on a rod 52. Also engaging the disk 50 on the opposite side of its axis of turning is a disk 53 which is driven by the belt 54 from the motor 55. It is apparent that the lower the disk 50 is moved the higher will be the speed of travel of the belt and the higher the disk 50 is moved the slower will be the travel of the belt. This friction gear speed changer makes it possible to move the material at any speed from three inches to twenty feet per minute without changing the motor speed.

With the end in view of controlling the speed of the machine manually from the feed table 56 which projects horizontally from the front of the machine below the intake and discharge opening, there is journalled on the side of the table a combined operating and measuring wheel 57 having a scale 58 thereon arranged to travel past an index 59 on the table. This wheel has a pinion 60 meshing with a sliding rack 61 which engages a segmental rocking gear 62. The latter through a link 63 connects with the carrier 51 so that the turning of the wheel 57 shifts the disk 50 to vary the speed of travel of the feeding belt. By this arrangement the operative of the machine can set from the feed table, a definite speed of travel for the belts.

The sensitized sheet 72 is preferably fed from a roll 72ª journalled beneath the table 56, the sheet leading over the forward edge of the table, thence through the throat beneath the cylinder 3, in rear of and then over the cylinder and finally in front of the cylinder and beneath and then the lower end of the swinging member 23, after which it passes upwardly in front of the swinging member and over the top of the machine to a washing and developing apparatus (not shown).

In order to prevent the roll 72ª unwinding too freely a strap 86 may be secured to the under side of the table 56 in advance of the rear side of the roll and may so hang that it bears with pressure against the rear face of the roll. A weight 87 on the end of this strap maintains the pressure so that while unwinding may take place, it is retarded.

With the end in view of holding the material to the parallel laps before such material passes between the cylinder and the feeding belt laps, there is arranged in the throat a rod 80 from which extends upwardly and rearwardly a plate 81. In advance of the rod 80 is journalled in the side frame a roller 82 and about this roller passes parallel belts 83 which travel under the plate 81, thence around the upper edge of the plate and finally back to the roller 82 after passing above the plate. The lower or under laps of these belts travel upwardly in engagement with the parallel laps of the belt 19 so as to hold the material to be copied against the sensitized sheet 72 until such material passes onto the rotary cylinder 3. The roller 82 may have a gear 84 on one end meshing with a gear 85 on the shaft of the roller 20, the ratio of the gears being such that the surface speed of the two belts are the same.

The material to be copied is laid on the sheet while it is over the table 56 and is carried by the sheet around the cylinder until it again reaches the throat of the machine when it drops with a receiving tray 73 which extends into the throat beneath the roller 22 and projects in front of the throat so that its contents are accessible. A stripper in the form of a brush 74 may be arranged at the inner edge of the tray to strip the material from the cylinder and direct it into the tray.

As before stated the rollers 22 and 26 are mounted on a frame 23 which is mounted to swing upwardly on the hinge 24 (see Fig. 7). The purpose of this is to permit an inspection of the cylinder and the lamp therein. When the frame 23 swings upwardly the adjacent laps of the belt bend about the hinge without destroying

the driving relation of the belt to its rollers.

With the end in view of preventing the escape of light rays from the front of the machine, a hood or light shield 64 covers the front of the frame 23 and extends below the lower part of the roller 22 so that no light can pass from the front of the machine through the spaces between the belt laps. Supported by and extending between the end frames within the cylindrical bed is a light shield 65 which has such a width that it prevents the escape of light rays through the intake and discharge throat.

In some instances, it is desired to reduce the amount of light thrown on the sensitized material and to this end a shutter may be provided in the form of a weighted curtain 75 adapted to be wound on a roller 76 which has a gear 77 at one end meshing with a segmental rack 78 controlled by the hand piece 79. Lowering of this curtain so that its lower edge meets the front edge of the light shield 65 cuts off direct rays from the lamp to the front part of the cylinder.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a printing machine for sensitized material, the combination with a rotary light transmitting bed, of mechanism for rotating the bed and for feeding sheet material past the light passing through the bed comprising a single flat endless belt having a plurality of laps cooperating with the bed and substantially covering the sheet material on the bed, said laps being provided with an extended portion for feeding the sheet material to the bed, and a driving roller receiving the extended portions of the laps for driving the belt and for rotating the cylinder.

2. In a printing machine for sensitized material, the combination with a rotary light transmitting bed, of mechanism for rotating the bed and for feeding sheet material past the light passing through the bed embodying a single flat endless belt having a plurality of laps arranged in parallel relation and extending about the bed and substantially covering the sheet material on the bed, said laps being provided with an extended portion for feeding the sheet material to the bed, and a driving roller receiving the extended portions of the laps for driving the belt and for rotating the cylinder.

3. The combination with an open ended cylindrically formed rotary bed formed of rotary light transmitting material, of a single flat endless feeding member having a plurality of parallel laps cooperating with the cylinder and lying at right angles to the axis of the cylinder, said laps being provided with a portion extending beyond the bed for feeding sheet material to the bed and tensioning means for the belt through which an equal tension is maintained on all of the laps of the feeding member engaging the cylinder to obtain a uniform pressure of the material on the rotary bed.

4. In a printing machine for sensitized material, the combination with a cylindrically formed bed, and an endless belt having a lap extending upwardly and rearwardly around the rear of the bed thence over the bed and downwardly to a point below the under side of the bed in spaced relation to that portion passing upwardly and rearwardly to provide an intake and discharge throat, a light shield arranged in the cylinder to prevent the escape of light through the throat, and a light shield lying in front of the belt and the cylinder and extending downwardly to a point below the cylinder and the belt to prevent escape of light from the front of the machine.

5. In a printing machine for sensitized material, the combination with a cylindrically formed bed, and an endless belt having a lap extending upwardly and rearwardly around the rear of the bed thence over the bed and downwardly to a point below the under side of the bed in spaced relation to that portion passing upwardly and rearwardly to provide an intake and discharge throat, a light shield arranged in the cylinder to prevent the escape of light through the throat, and a shutter arranged in the cylinder and arranged to cooperate with the front edge of the light shield in the cylinder to cut off light rays through the front of the cylinder to the sensitized material.

6. In a printing machine for sensitized material, the combination with a cylindrically formed bed, and an endless belt having a lap extending upwardly and rearwardly around the rear of the bed thence over the bed and downwardly to a point below the under side of the bed in spaced relation to that portion passing upwardly and rearwardly to provide an intake and discharge throat, a light shield arranged in the cylinder to prevent the escape of light through the throat, and a curtain shutter arranged in the cylinder and movable to cooperate with one edge of the light shield in the cylinder to reduce light transmission of the cylinder.

7. In a printing machine for sensitized material, the combination with a light transmitting bed, of an endless feeding belt cooperating with the bed, and forming with the bed an intake throat, a feed table arranged adjacent the intake throat, a motor, driving connection between the motor and the endless feeding belt including a speed changing device, and controlling means for the speed changing device mounted adjacent the feed table so that the operative may from the feed table control the speed of travel of the endless feeding belt, said controlling means embodying a wheel mounted to turn at one side of the table, a gear turning with the wheel, a rack moved by the gear, a segmental gear moved by the rack, and a link connection between the segmental gear and the speed changing device.

8. In a printing machine for sensitized material, the combination with a light transmitting bed, of an endless feeding belt cooperating with the bed and forming with the bed an intake throat, a feed table arranged adjacent the intake throat, means for supporting a roll of sensitized material beneath the feed table having the sensitized material leading therefrom forwardly over the forward edge of the feed table, and thence rearwardly over the table to the throat, and a roll retarding means comprising a strap having its upper end secured to the feed table above the roll and in advance of the rear face of the latter, said strap depending into engagement with the rear face of the roll, and a weight carried by the lower end of the strap to hold the latter with pressure in contact with the rear face of the roll.

9. In a printing machine for sensitized material, the combination with an open ended light transmitting cylinder, and electric illuminating means arranged therein and removable longitudinally of the cylinder, a movable closure for one end of said cylinder, and separable contacts carried by the illuminating means and the closure so as to insure the breaking of the circuits to the illuminating means before the removal of the latter.

10. In a printing machine for sensitized mate-

rial, the combination with an open ended light transmitting cylinder, and electric illuminating means arranged therein and removable longitudinally of the cylinder, a movable closure for one end of said cylinder, two insulating slabs one on the illuminating means and the other on the closure, and separable contacts carried by the two slabs so that when the closure is moved to open the cylinder, the contacts will be separated.

11. In a printing machine for sensitized material, the combination with a rotary cylindrical light transmitting bed, of a feeding mechanism for moving sheet material past light passing through the bed embodying a flat endless belt having a plurality of parallel laps cooperating with the cylindrical bed and substantially covering the sheet material on the bed, said belt being provided with a lap extending rearwardly and upwardly behind the bed and thence forwardly and downwardly in front of the bed, the rear portions of the belt being extended downwardly below the front portions of the belt for feeding sheet material to the bed, means for supporting the belt in operative relation to the bed including front and rear rollers located above the bed and about which rollers the belt passes, and a swinging member supporting the front roller and the forward portions of the belt and movable upwardly to expose the front of the bed.

HARRY HEWES SULLIVAN.