Dec. 5, 1944. J. B. DEY ET AL 2,364,277

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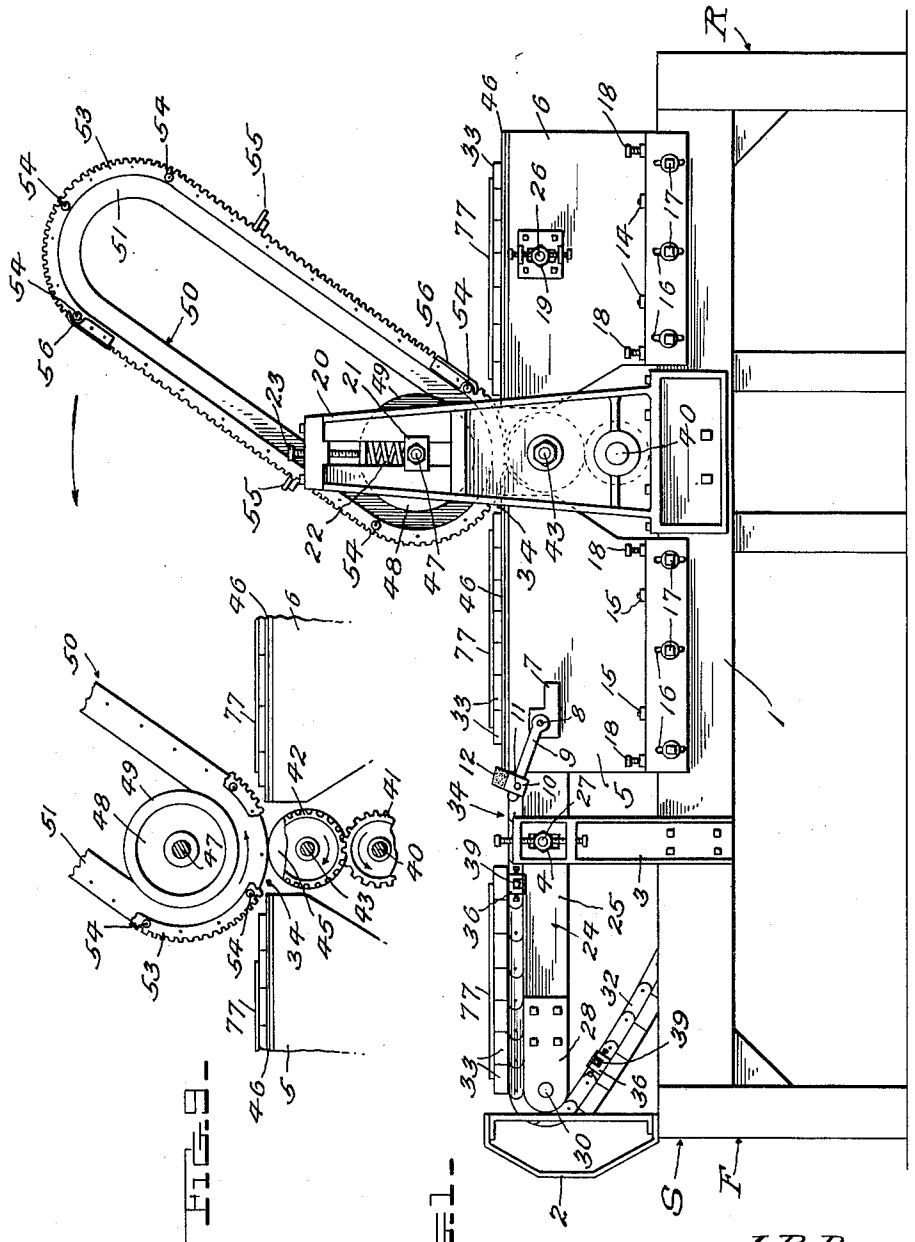


FIG. 1.

FIG. 2.

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BY C. A. Dunwoody

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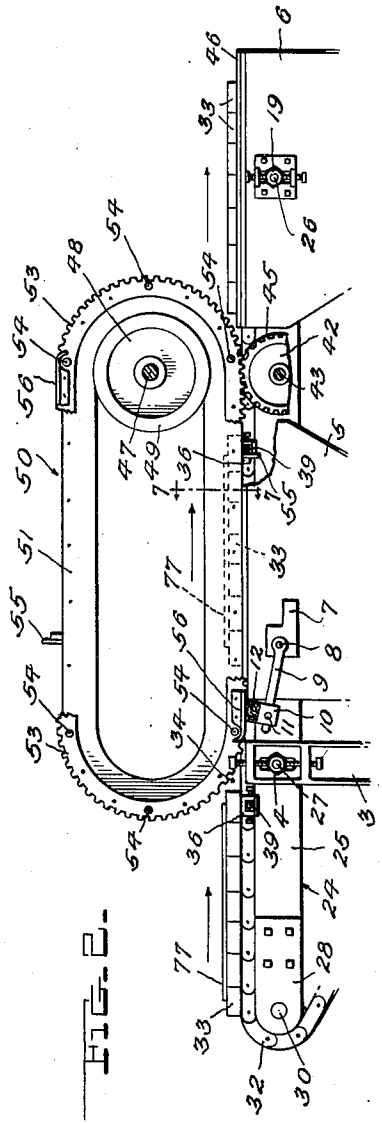


FIG. 2.

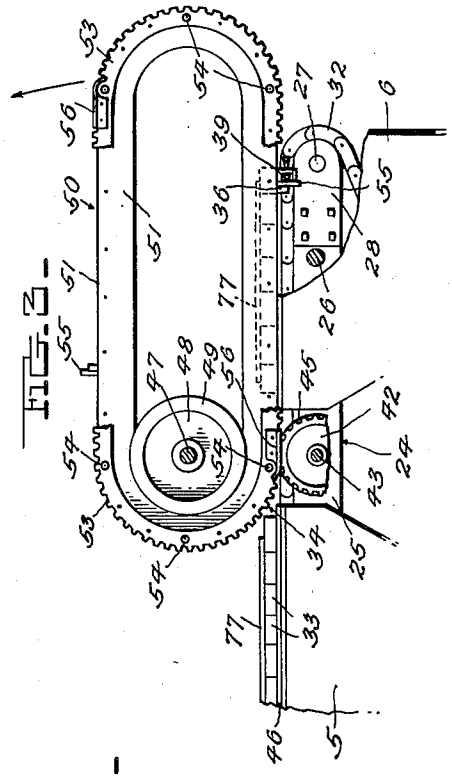


FIG. 3.

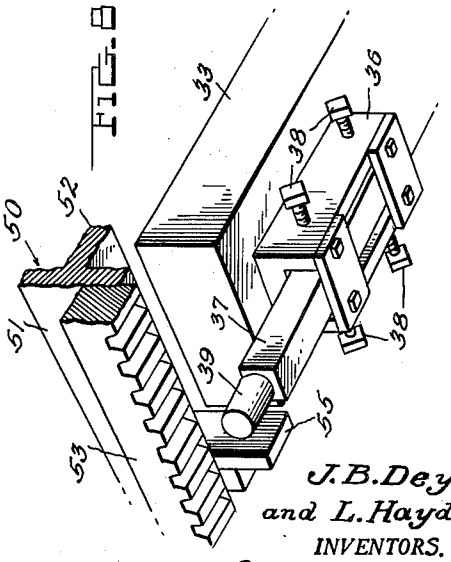


FIG. 4.

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Dec. 5, 1944. J. B. DEY ET AL 2,364,277

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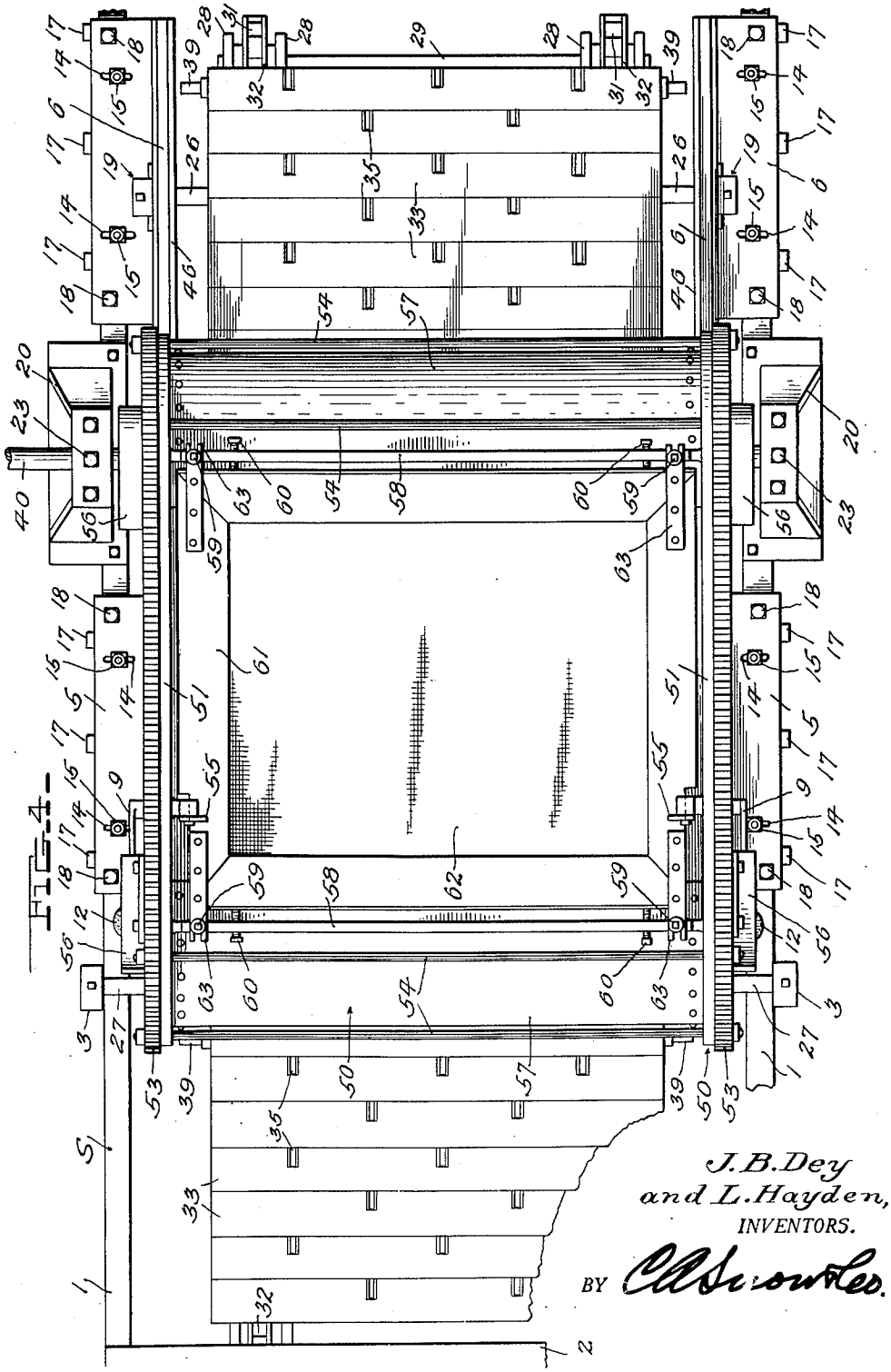


FIG. 4

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Dec. 5, 1944. J. B. DEY ET AL 2,364,277

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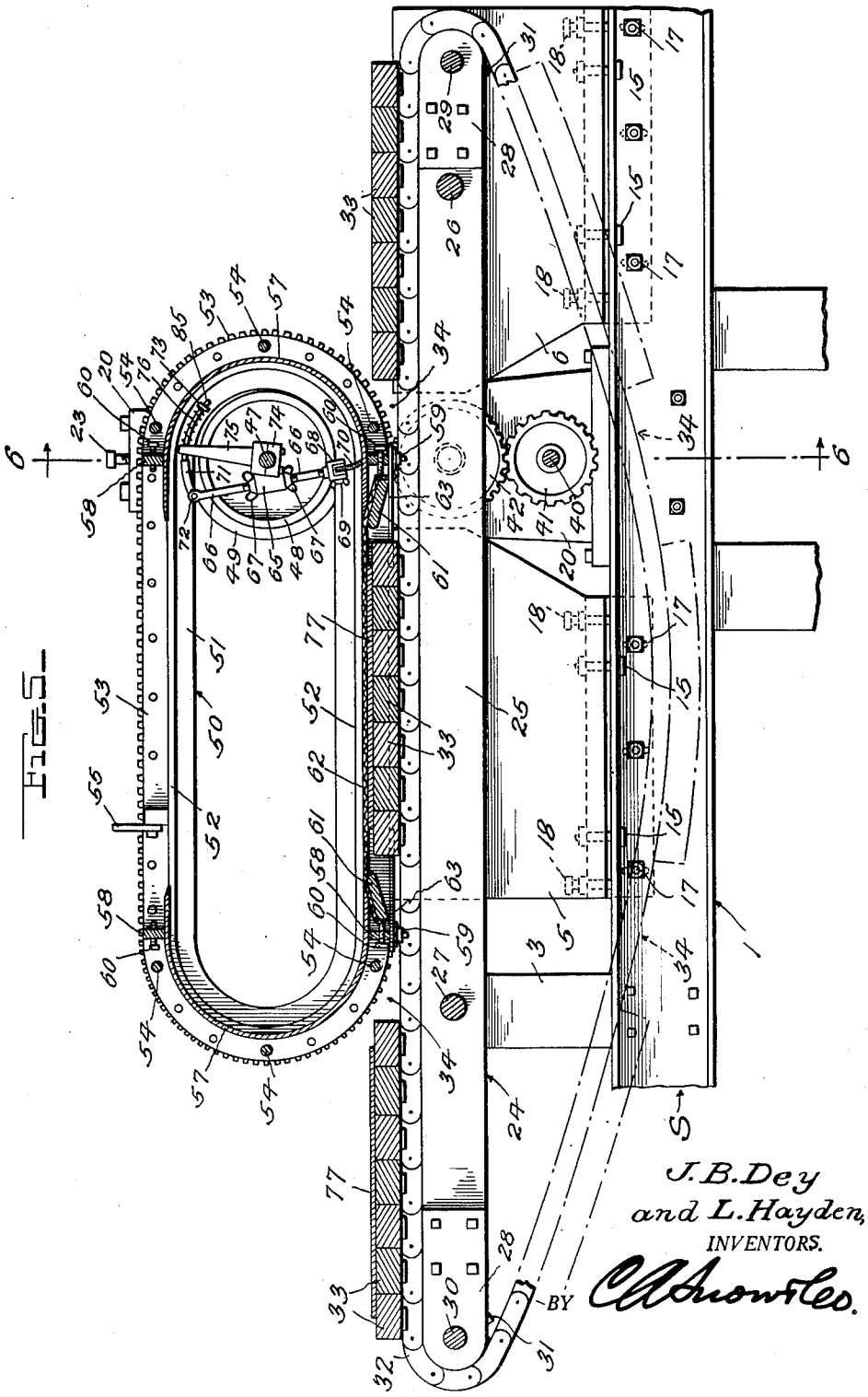


FIG. 5

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Filed Jan. 30, 1942 5 Sheets-Sheet 5

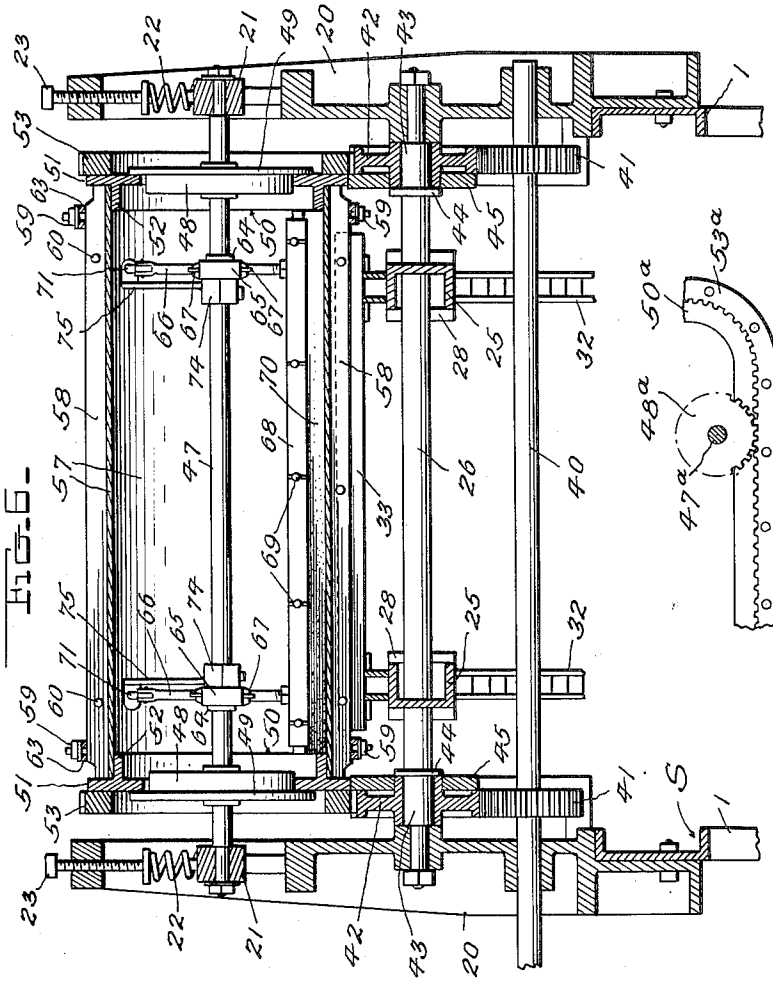


FIG. 6.

FIG. 10.

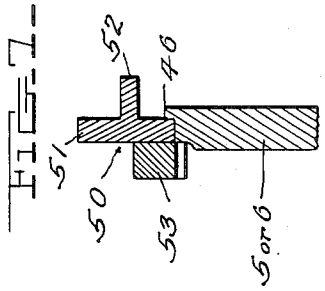


FIG. 7.

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Patented Dec. 5, 1944

2,364,277

UNITED STATES PATENT OFFICE

2,364,277

PRINTER

John B. Dey and Landon Hayden, Lynchburg, Va.

Application January 30, 1942, Serial No. 428,932

8 Claims. (Cl. 101—122)

This invention aims to provide a printing machine including a loop-shaped carrier for two printing screens, means being provided whereby the carrier is inverted, to bring the screens into working position, one at a time, the carrier then being given a longitudinal straight line movement, in order to cause the screens to pass, one at a time, across a wiper.

Another object of the invention is to supply a device of the class described in which the longitudinal, straight line movement of the carrier will actuate a bed on which the material to be printed is supported, and do so regardless of whether one screen or more than one screen is in use.

The invention aims, moreover, to provide novel structural features whereby the ends hereinbefore alluded to may be accomplished.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawings:

Fig. 1 shows, in side elevation, a printing machine constructed in accordance with the invention, the carrier being elevated with respect to the bed;

Fig. 2 is an elevation showing the parts as they will appear when the carrier is at one end of its horizontal stroke;

Fig. 3 is an elevation showing the carrier as it will appear at the opposite end of its longitudinal stroke, and as the carrier is about to be lifted at one end;

Fig. 4 is a top plan wherein parts are broken away;

Fig. 5 is a longitudinal section wherein parts are broken away;

Fig. 6 is a vertical transverse section on the line 6—6 of Fig. 1;

Fig. 7 is a fragmental vertical section, on the line 7—7 of Fig. 2, for example, the view showing a portion of the carrier in operative relation to a plate which supports it;

Fig. 8 is a perspective view showing a part of the carriage in operative relation to a portion of the bed, the disclosure being directed particularly to the means whereby the carrier imparts longitudinal movement to the bed;

Fig. 9 is an elevation showing the carrier in the position which it occupies in Fig. 1, the view illustrating parts which are hidden in Fig. 1;

Fig. 10 is a fragmental elevation showing a modification.

In Fig. 1, the letter F marks the forward end of the machine, the rear end thereof being designated by the letter R. A support S is provided, and includes a bench 1. For the safety of an operator, the bench 1 carries an upstanding guard 2 at its forward end.

Upstanding posts 3 are secured to the side rails of the bench 1, to the rear of the guard 2. In their upper portions, the posts 3 are supplied with vertically adjustable bearings 4. To the rear of the posts 3, intermediate bracket plates 5 are mounted on the side rails of the bench 1, rear bracket plates 6 being similarly mounted, behind the bracket plates 5. The bracket plates 5 and 6 have upstanding flanges 46 (Fig. 7).

Dash pot mechanisms or snubbers 7 are carried by the bracket plates 5, near the forward ends thereof. The dash pot mechanisms 7 are commercial articles, the precise construction of which is immaterial to the present invention. Let it suffice to say that the dash pot mechanisms 7 limit the rotation of horizontal shafts 8, forming parts of the dash pot mechanisms. Forwardly extended arms 9 are secured to the shafts 8, slides 10 being adjustable lengthwise of the arms, the slides being held in adjusted positions by set screws 11, threaded into them, and adapted to engage the arms 9. The slides 10 carry resilient, upwardly projecting buffers 12. The parts 7 to 12 constitute a cushioning means, the function of which will be brought out hereinafter.

Figure 4 shows that the feet of the bracket plates 5 and 6 have transverse slots 14, receiving securing elements 15, in the form of bolts, mounted in the side rails of the bench 1. The slots 14 permit the bracket plates 5 and 6 to be adjusted transversely of the machine. It appears in Fig. 1 that the feet of the bracket plates 5 and 6 are provided with vertical slots 16, receiving securing elements 17, mounted in the side rails of the bench 1. The construction is such that the bracket plates 5 and 6 can be adjusted vertically. Vertical adjusting movement is imparted to the bracket plates 5 and 6, by means of lifting screws 18, mounted in the feet of the bracket plates and bearing on the side rails of the bench 1. Bracket

plates 6 are provided with vertically adjustable bearings 19 (Fig. 1).

Standards 20 are secured to the bench 1, and are disposed between the brackets 5 and 6. Bearings 21 are mounted in the standards 20, for vertical adjustment. Compression springs 22 exert downward pressure on the bearings 21, the upper ends of the springs being engaged by adjusting screws 23, threaded into the upper ends of the standards.

The numeral 24 designates an elongated bed carrier, comprising track rails 25, held in parallelism by a rear tie rod 26 and a forward tie rod 27 (Fig. 5). The rear tie rod 26 (Fig. 1) is received in the vertically adjustable member 19, the forward tie rod 27 being received in the vertically adjustable member 4. Bearing plates 28 are secured to the end portions of the track rails 25, and in the bearing plates 28 at one end of the bed carrier 24, and in the track rails, a rear shaft 29 is journaled. A forward shaft 30 is similarly mounted with respect to the front portion of the bed carrier 24. Sprocket wheels 31 are secured to the shafts 29 and 30.

The bed of the printing machine comprises endless sprocket chains 32, engaged with the sprocket wheels 31 on the shafts 30 and 29. Transverse slats 33 are secured to adjoining links of the sprocket chains 32. The slats 33 are disposed edge to edge, in groups, there being a space 34 between adjoining groups. The slats 33 carry permanent magnets 35, which appear in Fig. 4. Referring to Fig. 8 for details, a box-like guide 36 is secured to the bottom of one slat 33 of each group, at each end of said slat. In each guide 36, a slide 37 is mounted for longitudinal adjustment, the slide being held in adjusted positions by set screws 38, threaded into the guide 36. At its outer end, each slide 37 terminates in a finger 39, of circular cross section. The upper runs of the sprocket chains 32 move along the upper surfaces of the track rails 25, as shown in Figs. 1 and 6.

A drive shaft 40 is journaled in the lower portions of the standards 20 (Figs. 5 and 6). The shaft 40 is rotated by means of any suitable motor, not shown in the drawings, and forming no part of the present invention. Gear wheels 41 are secured to the drive shaft 40 and mesh with pinions 42, mounted to rotate on fixed shafts 43 which are mounted in the standards 20.

The shafts 43 are supplied with fixed collars 44, which engage the hubs of the pinions 42, to hold them in place, in mesh with the gear wheels 41. Disk-like spacing wheels 45 (Figs. 6 and 9) are fixed on the hubs of the pinions 42, the spacing wheels being called by that name for a reason which will be set forth hereinafter. Each plate 5 or 6 has an outstanding marginal flange 46.

A transverse upper shaft 47 is secured in the vertically adjustable members 21, wheels 48 being rotatable on the shaft, the wheels being provided at their outer sides with annular flanges 49, disposed at right angles to the axis of rotation of the wheels.

The numeral 50 designates, generally, a carrier for the screens used in printing. The carrier 50 includes oppositely disposed members which are of elongated loop shape, comprising straight side pieces and semi-circular end portions. The members of the carrier 50 are T-shaped in cross section (Fig. 6) and include, each, a vertical body 51 and an inwardly projecting flange 52. Loop-shaped racks 53 are secured to the outer surfaces of the bodies 51 of the carrier members, the carrier members being connected by tie rods 54.

The wheels 48 of Figures 5 and 6 are disposed within the loop-shaped members of the carrier 50, the flanges 49 of the wheels 48 overlapping the outer surfaces of the bodies of the carrier members, to hold the carrier against movement transversely of the machine. The racks 53 mesh with the pinions 42. The spacing wheels 45 engage the lower edges of the bodies 51 of the loop-shaped members of the carrier 50, and prevent the teeth of the racks 53 from meshing too deeply with the teeth of the pinions 42, a consideration which is desirable because the carrier 50 has an end-for-end reversal, a manner to be described hereinafter.

The straight portions of the carrier 50 are provided with outstanding projections 55, spaced apart lengthwise of the carrier, the projections being adapted to come into contact with the fingers 39 (Fig. 8), which are carried by one slat 33 of each group. Shoes 56 are mounted on the racks 53 of the carrier 50 and are adapted to make contact with the buffers 12 of Fig. 2, when the carrier 50 swings downwardly from the position of Fig. 1, for example, to the position of Fig. 2. The side members of the carrier 50 are connected by U-shaped plates 57 (Fig. 5), the plates being secured to the flanges 52, the plate at one end of the carrier being spaced from the plate at the opposite end of the carrier.

The bodies 51 of the side members of the carrier 50 (Figs. 6, 5 and 4), are adapted to slide on the plates 5 and 6, between the flanges 46, and connected by cross rails 58, resting on the curved end plates 57. Screws 59 (Fig. 4) are threaded into the edges of the cross rails 58. The screws form a clamping means, and any appropriate, equivalent structure may be substituted for the screws. Binding screws 60 are threaded through the cross rails 58 and are disposed at right angles to the clamping screws 59.

The numeral 61 marks a frame, resting against the flanges 52 of the carrier members, it being possible to use two such frames, one on the upper part of the carrier 50, and one on the lower part of the carrier. The screws 60 are advanced to engage the frame 61 and hold it in place. The frame 61 carries a printing screen 62. The frame 61 is provided at its corners with forks 63, adapted to engage under the heads of the securing devices 59.

The means for applying ink to the printing screen 62 may be of any desired kind, and a particular means to that end cannot be covered in this application. A satisfactory ink applying means, however, is disclosed in Figs. 5 and 6 of the drawings.

Sleeves 64 (Fig. 6) are mounted to rock on the fixed shaft 47, the sleeves carrying upright sockets 65. Spindles 66 are longitudinally adjustable in the sockets 65 and are held in adjusted positions by means of wing nuts 67. To the lower ends of the spindles 66 is secured a trough-shaped holder 68 into which set screws 69 are threaded. The set screws 69 retain in the holder 68, a flexible wiper 70. As the carrier 50 is turned end-for-end, in a way to be described hereinafter, the wiper 70 traverses the inner surfaces of the curved end plates 57 of the carrier and moves over the printing screens 62. Pigment may be supplied to the wiper 70 in any preferred way, the means for that purpose being no part of the present invention. Since the spindles 66 can be adjusted endwise, the wiper 70 can be

adjusted properly with respect to the surfaces which it is to engage.

Curved fingers 71 are provided, and are pivoted at 72 to the upper ends of the spindles 66. The fingers 71 have reduced ends 85, on which abutment nuts 73 are threaded. Clamps 74 are secured to the fixed shaft 47 and carry uprights 75, through which the reduced ends 72 of the fingers 71 pass slidably. Compression springs 76 are disposed about the ends 85 of the fingers 71 and abut against the nuts 73 and the uprights 75. By means of the nuts 73, the efforts of the springs 76 may be varied at will, and the wiper 70, therefore, will be caused to operate at adjusted pressures.

Referring to Figs. 5 and 6, the driving train for the carrier 50 includes the drive shaft 40, the gear wheels 41, the pinions 42, and the racks 53 on the elongated carrier 50. Assume that the carrier 50 is in the position shown in Fig. 1, the wheels 48 being in one curved end portion of the carrier 50. The pinions 42, engaging the curved portions of the racks 53, tend to swing the carrier 50 radially in the direction of the arrow in Fig. 1, to the position shown in Fig. 5. Each group of the slats 33 carries one of the articles 77 which is to be printed, for example, a thin metal plate.

As the carrier 50 moves to the position of Figs. 5 and 2, the shoes 56 on the carrier engage the buffers 12. The movement of the carrier 50 to the position of Fig. 2 is checked and cushioned, the arms 9 being swung downwardly, the shafts 8 being rocked, and the dash pot mechanisms 7 becoming active.

Assuming that the carrier 50 is in the position of Figs. 2 and 8. The fingers 39, cooperating with the projections 55 on the carrier, cause the carrier and the sprocket chain bed to move to the right in Fig. 2, in the direction of the arrow, the pinions 42 engaging with one of the straight portions of the racks 53. The wheels 48 ultimately cooperate with the left hand curved portion of the carrier 50, as in Fig. 3. The straight line movement of the bed, in the direction of the arrows of Fig. 2 stops, as the fingers 39 move downwardly and clear of the projections 55, and the carrier is over-ended again, by the cooperation between the pinions 42 and the racks 53, thereby bringing into play the frame 61 and associated parts which formerly was uppermost.

As the sprocket chain bed 32—33 is moved to the right, along with the carrier 50 in Fig. 1, the piece of material 77 is carried out of the field of operation of the machine, along with the corresponding group of slats 33. It may be remarked at this place that the sprocket chain bed 32—33 has no individual drive. It is advanced only when the carrier 50 is advanced, the parts 39 and 55 of Fig. 8 cooperating to secure that result. When straight line horizontal movement is imparted to the carrier 50, the wiper 70 spreads the pigment over the screen 62.

When the carrier 50 swings to the position shown in Fig. 1, there is, sometimes, a tendency to lift the thin plates 77 which are being printed. The plates 77, however, are held down on the slats 33 by the action of the permanent magnets 35.

By means of the adjustable members shown at 19 and 4 in Fig. 1, either end of the bed carrier 24 may be raised or lowered to level the bed carrier and the bed.

The racks 53 have been shown as external racks. Internal racks 53a (Fig. 10) may be used, but the carrier 50a then is supported on yieldably-supported wheels 78, mounted on the framework of the machine.

The machine will be found particularly useful in connection with silk screen printing. It is automatic in its action. No special form of screen is required and handwork is avoided entirely. The machine is adapted to small runs as well as large runs, changes and wash-ups can be accomplished quickly and it is possible to run two separate orders at the same time, provided that the same color is to be used in connection with both orders.

What is claimed is:

1. In a printing machine, an elongated, rigid, loop-shaped carrier comprising oppositely-disposed, straight side portions and oppositely-disposed, outwardly-curved end portions, an endless rack on the carrier and conforming in shape to the side and end portions of the carrier, a driving pinion supported for rotation and meshing with the rack, means for supporting the carrier for straight-line sliding movement, and for end-for-end reversal, at different times, responsive to the action of the pinion on the rack, and a printing means mounted on one of the side portions of the carrier, the means for supporting the carrier comprising a wheel supported for rotation and engaging within the carrier, the rack being an external rack.

2. In a printing machine, an elongated, rigid, loop-shaped carrier comprising oppositely-disposed, straight side portions and oppositely-disposed, outwardly-curved end portions, an endless rack on the carrier and conforming in shape to the side and end portions of the carrier, a driving pinion supported for rotation and meshing with the rack, means for supporting the carrier for straight-line sliding movement, and for end-for-end reversal, at different times, responsive to the action of the pinion on the rack, and a printing means mounted on one of the side portions of the carrier, the means for supporting the carrier being external to the carrier and being yieldably mounted, the rack being an internal rack.

3. A printing machine comprising a movably mounted bed, a carrier, printing means on opposed portions of the carrier, means for mounting the carrier for end-for-end reversal, to make strokes which bring the printing means, alternately, into position for printing on the bed, and means for imparting straight line movement to the carrier after each of said strokes, and interengageable elements on the carrier and on the bed, said elements cooperating to advance the bed during the aforesaid straight line movement of the carrier.

4. A printing machine comprising a movably mounted bed, a carrier, printing means on opposed portions of the carrier, means for mounting the carrier for end-for-end reversal, to make strokes which bring the printing means, alternately, into position for printing on the bed, and means for imparting straight line movement to the carrier after each of said strokes, and interengageable elements on the carrier and on the bed, said elements cooperating to advance the bed during the aforesaid straight line movement of the carrier, in combination with means for cushioning the movement of the carrier as each printing means approaches the position for printing.

5. A printing machine comprising a movably mounted bed, a carrier, printing means on opposed portions of the carrier, means for mount-

ing the carrier for end-for-end reversal, to make strokes which bring the printing means, alternately, into position for printing on the bed, and means for imparting straight line movement to the carrier after each of said strokes, and interengageable elements on the carrier and on the bed, said elements cooperating to advance the bed during the aforesaid straight line movement of the carrier, in combination with means located within the carrier for applying pigment to the printing means during the straight line movements of the carrier.

6. In a printing machine, a support, a carrying member, means on the support and cooperating with the carrying member for holding it in vertically adjusted positions, an endless bed mounted to move about the carrying member longitudinally thereof, a carrier, printing means on opposed portions of the carrier, means for mounting the carrier on the support for end-for-end reversal, to make strokes which bring the printing means, alternately, into position for printing on the bed, and means for imparting straight line movement to the carrier after each of said strokes, and interengageable elements on the carrier and on the bed, said elements cooperating to advance the bed during the aforesaid straight line movements of the carrier.

7. In a printing machine, an elongated, rigid, loop-shaped carrier comprising oppositely-disposed, straight side portions and oppositely-disposed, outwardly curved end portions, an endless rack on the carrier and conforming in shape to the side and end portions of th carrier, a driving pinion supported for rotation and meshing with the rack, means for supporting the carrier for straight-line sliding movement, and for end-for-end reversal, at different times, responsive to the action of the pinion on the rack, and oppositely-disposed printing means mounted on the side portions of the carrier.

8. In a printing machine, an elongated, rigid, carrier comprising oppositely-disposed, straight side portions and oppositely disposed, outwardly-curved end portions, an endless loop-shaped rack on the carrier and comprising side and end portions conforming in shape to the side and end portions of the carrier, a driving pinion supported for rotation and meshing with the rack, the pinion cooperating with the end portions of the rack to invert the carrier by a radial swinging movement at intervals, thereby to bring the side portions alternately into printing position, the pinion cooperating with the straight side portions of the rack, between said intervals, to impart straight-line movements to the carrier, and a printing means mounted on each of the side portions of the carrier.

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