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3,606,307

MOVING TABLE SHEET TRANSPORT FOR COPYING MACHINES

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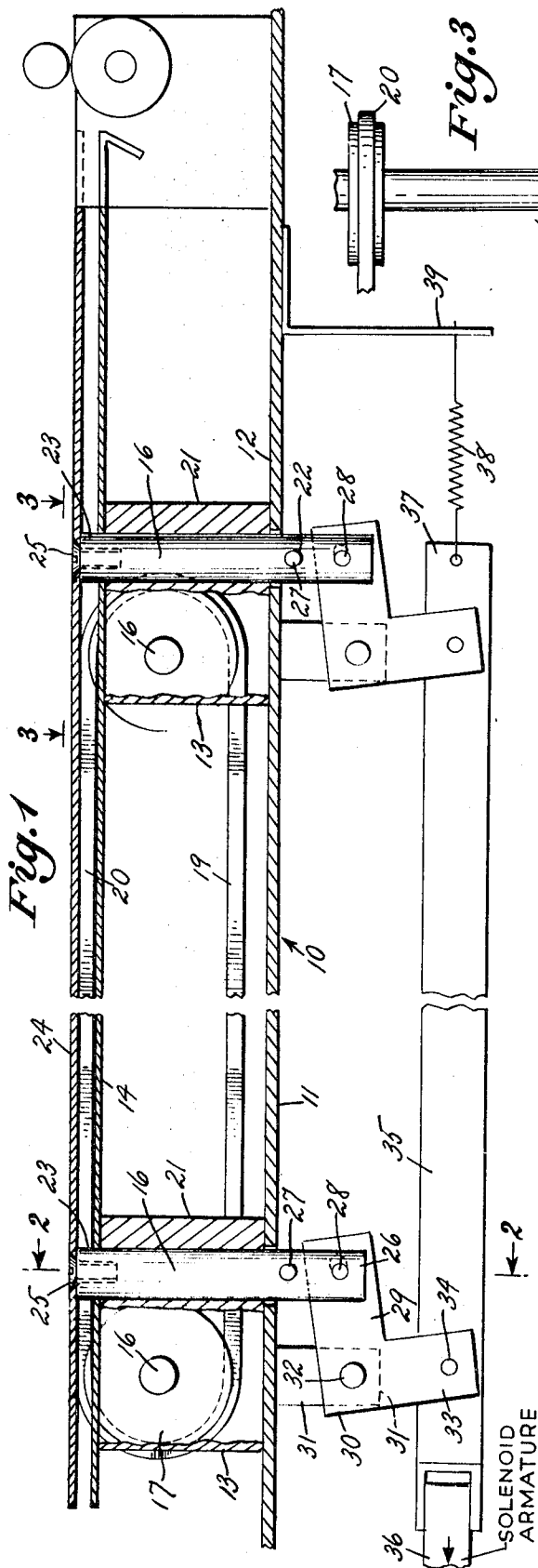
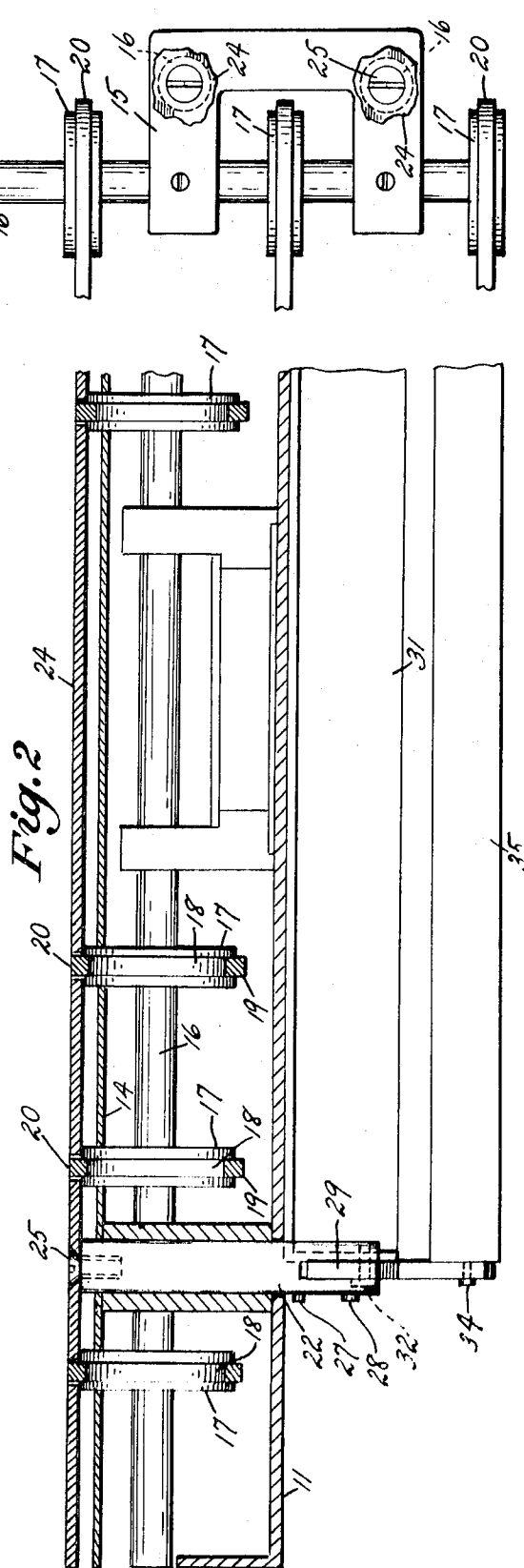
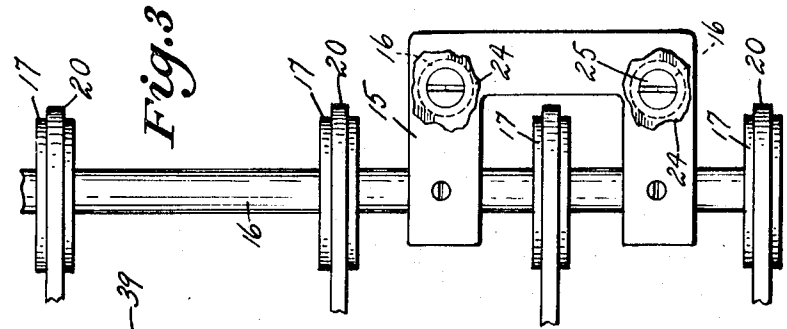


Fig. 3



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3,606,307 MOVING TABLE SHEET TRANSPORT FOR COPYING MACHINES

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1 Claim

ABSTRACT OF THE DISCLOSURE

Sheet transportation means for use with photocopying machines comprising a plurality of belts moving in a relatively fixed path of motion, a table having slotted openings in the plane thereof through which said belts may pass, means for raising said table with respect to said belts whereby paper resting upon said table is moved free of contact with said belts, and for lowering said table below the level of the uppermost continuous segment of the belts, whereby the under surface of the sheet is engaged by the belts to be transported in a plane parallel to that of the table.

This invention relates generally to the field of photocopyers, an more particularly to an improved paper transport means for moving photosensitive paper to and from a focal plane for exposure prior to development or actuation of the sensitized surface thereof. Reference is made to my co-pending application Ser. No. 763,241; filed Sept. 27, 1968, now Pat. No. 3,545,745 entitled Paper Transport For Photocopyers, the present disclosure relating to analogous and improved structure.

It is known in the art to provide a fixed horizontally oriented surface for supporting the copy paper in position for exposure, which surface lies in the focal plane of a lens projecting the image to be copied thereupon. Prior to exposure, the belts move the paper to position, and after exposure the belts transport the paper to an actuating or developing station, and subsequent ejection from the machine. Since, in order to obtain purchase on the undersurface of the copy paper the belts must project slightly upwardly from the surface, when the paper is positioned upon the surface, portions thereof will be pushed upwardly out of the focal plane by the belts, thereby destroying proper focus in these areas, and creating a condition for exposure wherein all portions of the image will not be in clear focus, and the copy quality is correspondingly affected.

In the above mentioned co-pending application, there is disclosed a means whereby the belts extend upwardly of the supporting surface only during the period in which the paper is being actually transported, and at the completion of a transporting operation, the uppermost continuous segment of the belt which contacts the undersurface of the paper drops below the surface through which it projects, to permit the paper to lie exactly in the focal plane. The present disclosure relates to structure which produces an equivalent result by shifting the position of the paper supporting table, rather than the uppermost continuous segment of the belts, to provide more reliable operation.

It is therefore among the principal objects of the present invention to provide a belt-type drive of the class described in which the belt is movable along its own axis to transport sensitized paper to and from the focal plane, and in which the surface defining the focal plane is shiftable along a vertical axis, so that the belt will selectively project into the surface for engagement with the undersurface of the paper prior to axial movement thereof, and withdraw from the same at the completion of said movement.

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Another object of the invention lies in the provision of an improved mechanism for performing the above end, which will be substantially automatic in operation once axial movement of the belt has been commenced or arrested.

Yet another object of the invention lies in the provision of an improved transport means of the class described which may have a minimum of mechanical complexity.

A feature of the disclosed embodiment lies in the fact that the mechanism requires little or no servicing throughout its useful life.

These objects and features, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claim.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. 1 is a fragmentary vertical sectional view of an embodiment of the invention.

FIG. 2 is a fragmentary transverse sectional view thereof.

FIG. 3 is a fragmentary plan view, partly broken away to show detail.

In accordance with the invention, the device, generally indicated by reference character 10, comprises a frame element 11 including a horizontal frame member 12, and a plurality of vertical members 13 supporting a horizontal upper member 14. Interconnecting the frame members 12 and 14 are a plurality of vertical bearing members 15 supporting shafts 16 for rotation about fixed horizontal axes. The shafts 16 support a series of pulleys 17 having grooved outer peripheries 18 for the engagement of paper advancement belts 19 entrained thereupon. The belts 19 are preferably of resilient material, the outer surface 20 of which engages the undersurface of successive sheets of paper (not shown) as is known in the art.

A plurality of vertical guides 21 support a corresponding plurality of vertically arranged shafts 22 the upper ends 23 of which support a paper engaging plate 24 which in its uppermost position lies within the focal plane of the copying device, attachment being made by means of screws 25. The lower ends 26 thereof are provided with guide pins 27 which engage the undersurface of the frame member 12 to determine the upper limit of movement of the shafts, as well as lower pins 28, which are connected to an arm 29 of bell-cranks 30.

The bell-cranks 30 are supported on downwardly extending mounting means 31 by means of pins 32, the other arms 33 of which are interconnected by pins 34 to elongated rod members, one of which is indicated by reference character 35.

The rod members 35 are interconnected at the leftward ends (as seen in FIG. 1) thereof to the armatures 36 of an electrically operated solenoid (not shown). The corresponding rightward ends 37 are attached to one end of a spring 38, the opposite end being secured to an anchor 39 extending downwardly from the lower surface of the horizontal frame member 12.

During operation, when the belts 19 are not in operation, the solenoids are de-energized, permitting the springs 38 to move the rod members 35 rightwardly resulting in counterclockwise movement of the bell-cranks 30 to a point where the shafts 22 are raised to move the plate 24 into the focal plane of the device, and sufficiently high such that the belts 19 do not project to the upper surface thereof. At the completion of an exposure of an individual sheet of paper, the solenoids are energized, resulting in the lowering of the plate 24 below the level of the upper continuous segment of the belts 19, wherein the undersurface of the individual sheets of paper may be engaged and moved. With the positioning of a serially ad-

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vanced sheet, the solenoids are again deenergized, permitting the plate to again raise the newly positioned sheet to the focal plane for exposure.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

1. Paper transport means for use in conjunction with an electrostatic copying device comprising: a frame element, belt-supporting pulley means supported for rotation about a fixed axis relative to said frame element, endless belt means carried by said pulley means and having a plurality of horizontally disposed continuous segments, an outer planar surface of each of which is adapted to contact a lower surface of a sheet of paper disposed thereupon, a paper-supporting planar plate having elongated openings therein corresponding in location to that of said horizontally disposed continuous segments, means supporting said last mentioned plate in a horizontal position and for shifting the same vertically between two positions, in a first position of which the upper surface of said plate lies below the outer surface of said continuous segments of said belts, whereby said surfaces may engage the lower surface of a sheet of paper disposed thereon, and in a second position of which said plate is raised a distance sufficient to prevent such engagement, said last-named means comprising a plurality of vertically extending guide pins depending below said planar plate, each of said pins having an upper end and a lower end,

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means fastening each of the upper ends of said guide pins to said planar plate, guide means fixed to said frame element and mounting each of said guide pins for vertical movement therein, a horizontally extended actuating member located below the ends of said guide pins, a crank means corresponding to each guide pin and rotatably connected at one end to the actuating member and at the other end to the lower end of the corresponding guide pin, and rotatably connected to a fulcrum intermediate said other two ends, spring means connected at one end to said frame element and an opposite end to said actuating member normally to retain said actuating member in said second position, electromagnetic actuating means connected to said actuating member to translate said actuating member against the action of said spring thereby to move said planar plate from said second position to said first position.

References Cited

UNITED STATES PATENTS

747,395	12/1903	Fales	271—35
880,872	3/1908	Fletcher	271—46
1,596,489	8/1926	Jacquemin	271—35
2,255,522	9/1941	Wilcox et al.	271—35UX
3,424,452	1/1969	Jones	271—35X

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