

Oct. 29, 1957

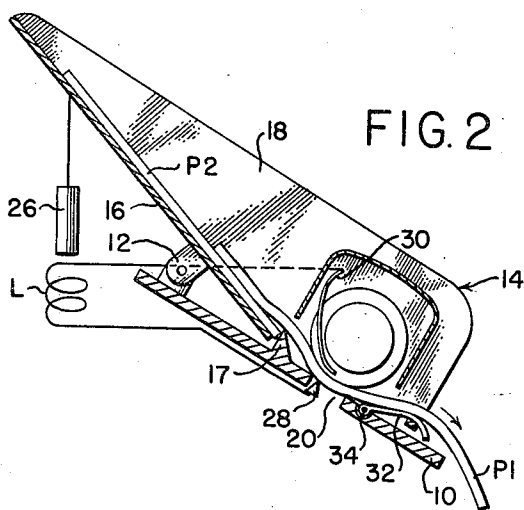
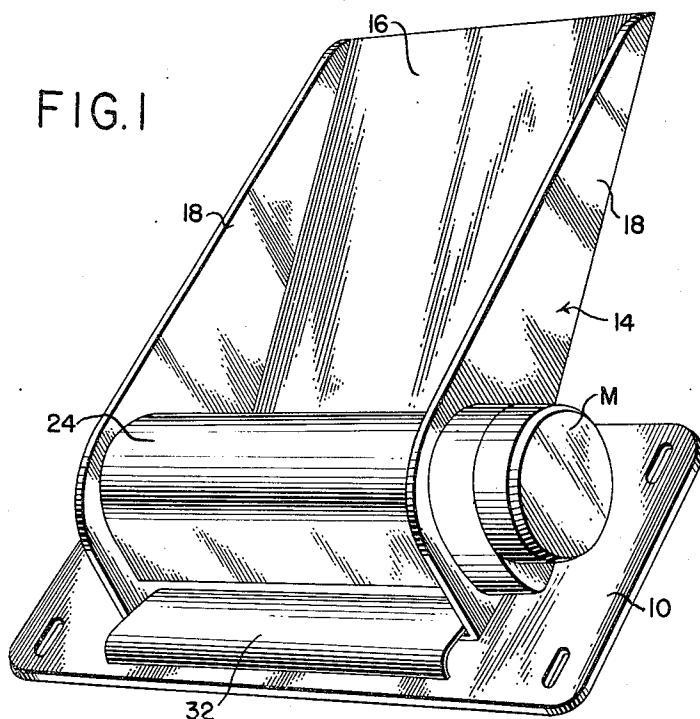
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2,811,353

SHEET FEEDING MECHANISM

Filed Aug. 26, 1953

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 3

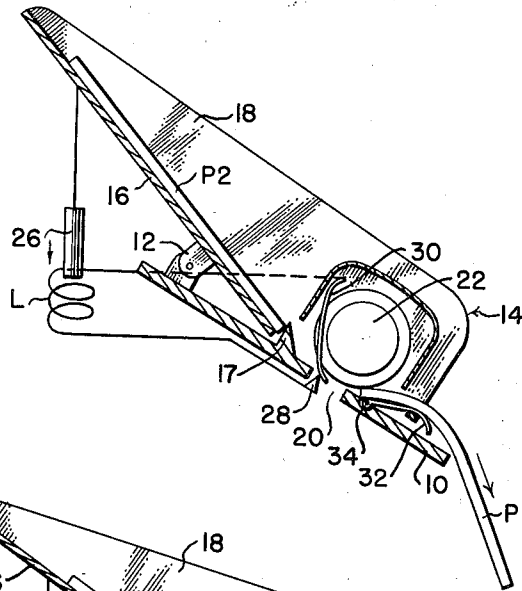


FIG. 4

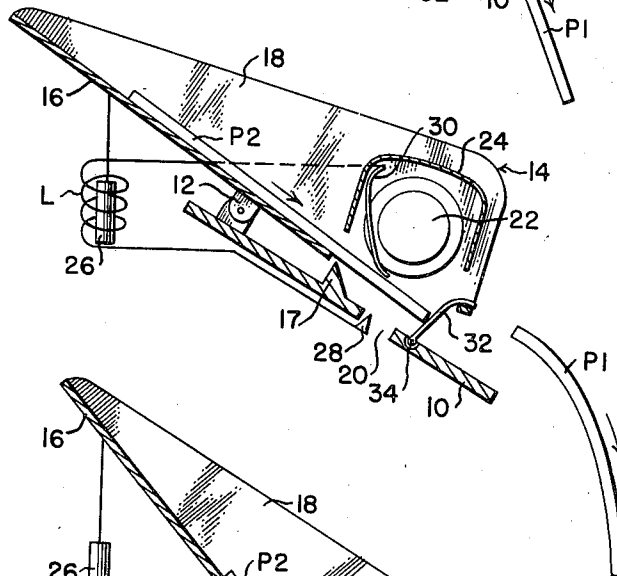
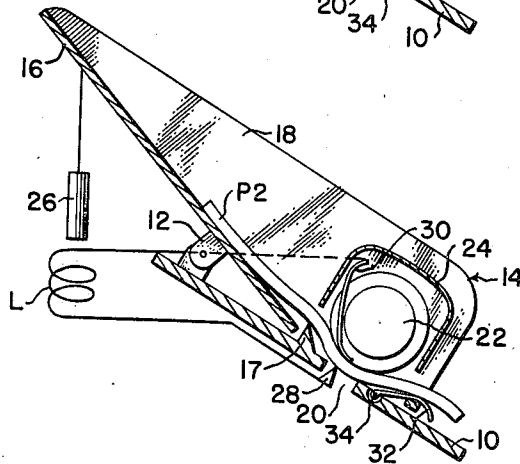


FIG. 5



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SHEET FEEDING MECHANISM

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9 Claims. (Cl. 271—57)

This invention relates to mechanisms for feeding successively sheets of a material such as paper, and more particularly to mechanisms for feeding copy to machines such as facsimile apparatus or business machines.

As separate sheets of copy are fed to a continuously operating machine, such as a facsimile scanner, it is necessary for the operator to pay constant attention to make certain that as soon as one sheet has been scanned a succeeding sheet is immediately inserted between the feed rolls so that blanks do not appear in the copy and that expensive communication circuits are used to their fullest possible extent.

It is accordingly the objects of this invention to provide a sheet feeding mechanism which as soon as a first sheet has been removed will advance a succeeding sheet, which is particularly adapted for use with facsimile apparatus, which is automatic and certain in operation, which does not require a skilled operator and which needs a minimum of maintenance.

A feeding mechanism according to the present invention comprises feeding and guiding means defining a pathway along which the sheets successively travel. The sheets are held by a magazine with one end thereof abutting a stop located along the pathway. Means are provided, such as a pair of electrical contacts, which are responsive to the absence of a first sheet on the pathway to energize electro-magnetic means, such as a solenoid or motor, to tilt or otherwise move the magazine so that the succeeding sheet is lifted over the stop whereupon it drops onto the pathway.

These and other objects and aspects will be apparent from the following description of a specific embodiment of the invention which relates to drawings wherein:

Fig. 1 is an isometric view of the feeding mechanism; and

Figs. 2 to 5 are schematic views in partial section showing the sequence of operation of the feeding mechanism.

The feeding mechanism shown in Fig. 1 is particularly adapted for use with an optical facsimile scanner such as is described and illustrated in patent application No. 240,418, filed August 4, 1951, now abandoned, the base plate 10 being substituted for the plate of the scanner in the aforementioned application but being inclined to the horizontal plane as is shown in Figs. 2 to 5 for reasons which will appear hereinafter. Pivotaly mounted to the upper end of the base plate 10, as at 12, is a magazine 14 which is therefore tiltable with respect to the base plate. As can best be seen in Fig. 1, the magazine 14 comprises a bottom plate 16 upon either side of which is a normally disposed side plate 18 thereby to form a hopper for receiving the sheet material, such as the sheets of copy to be fed to the facsimile scanner.

With the magazine 14 in its normal lowered position shown in Fig. 2, the lower end of the bottom plate 16 is adjacent an abutment extending transversely of the base plate 10 which abutment forms a stationary stop 17 for engaging the leading edge of the sheet P2 to restrain it in the hopper. As is shown in Figs. 2 to 5, the base plate

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10 has a transverse slot 20 which is an optical aperture serving the same purpose as the aperture in the aforementioned patent application.

Opposite the slot 20 and spaced therefrom a distance somewhat less than the thickness of the copy is a single feed roll 22 which is journaled in bearings (not shown) in the magazine side walls 18. The feed roll 22 is driven by an electric motor M (Fig. 1) having an integral reduction gear. The roll 22 is enclosed by a cover 24 which extends between the hopper side walls 18.

The magazine 14 is tilted by means of an electro-magnetic solenoid shown schematically at L (Figs. 2-5) and having an armature 26. The solenoid L is energized to draw the armature downwardly by an electrical current drawn from a conventional power source (not shown) through a pair of contacts 28 and 30 which are connected in series therewith. The lower contact 28 is attached to the base plate 10 so as to extend through the slot 20 to make with the upper contact 30 carried by the magazine 14 in the absence of paper in the space between the roll 22 and the base plate as is shown in Fig. 3. When a sheet of paper P1 is in such space, as in Figs. 2, 4 and 5, the contacts 28 and 30 are separated and the circuit therethrough is interrupted to deenergize the solenoid L.

Extending transversely of the pathway followed by the sheets and located near the lower end of the base plate 10 is an auxiliary stop formed by a curvilinear strip of metal 32 which is pivoted along one edge as at 34 and biased by a spring (not shown) to the upright position shown in Fig. 4 when the magazine 14 is tilted into its raised position. When the magazine 14 is in its normal position as in Fig. 2, the forward end thereof engages the auxiliary stop 32 to depress the stop so that it does not obstruct the movement of the sheet.

The operator initiates the operation of the above described feeding mechanism by inserting the first sheet P1 into the space between the roll 22 and base plate 10 with the side to be scanned facing downwardly. The succeeding sheet P2 is placed in the magazine 14 face downwardly with the forward edge abutting the stationary stop 17 so that the succeeding sheet is restrained in the hopper as the first sheet is moved past the scanning slot 20 by the rotation of the feed roll 22 as is shown in Fig. 2. When, as in Fig. 3, the trailing edge of the first sheet P1 progresses beyond the scanning slot 20, the contacts 28 and 30, being no longer blocked by the sheet, close to energize the solenoid L. The resulting magnetic field pulls the armature 26 towards the solenoid L so as to tilt the magazine 14 to its upper raised position shown in Fig. 4. In such upper position of the magazine 14 the stationary stop 17 no longer restrains the succeeding sheet P2 which due to the declivity of the base plate 10 and the magazine bottom plate 16 drops until the forward edge thereof strikes the auxiliary stop 32 which has been raised by the tilting of the magazine as has been described heretofore.

The movement of the magazine 14 also lifts the upper contact 30 to break the energizing circuit of the solenoid L so that the magazine 14 returns to its normal position wherein the sheet P2 is engaged by the feed roll 22 and moved along the base plate 10 as shown in Fig. 5.

It will be evident that if a further sheet is to be scanned it can be inserted under the trailing edge of sheet P2 any time after the magazine 14 has returned to its normal position so that it is not necessary for the operator to attend to the scanner at the exact moment the scanning of the preceding sheet is completed, making it possible for one operator to service a number of machines.

Although in the above described embodiment the tilting of the magazine was accomplished by a solenoid, it will be evident that other electromagnetic means, such as an electric motor operating a suitably shaped cam, can be used to operate the magazine in response to the closing of the

contacts 28 and 30 without departing from the spirit of my invention.

It is also possible to use a feeding mechanism as described above continuously to feed the same sheet past the slot 20 by the addition of a curved sheet metal guide one end of which is located adjacent the auxiliary stop 32 so as to engage the end of the sheet as it passes over the stop. The other end of the guide is disposed adjacent the stationary stop 17 to bring the sheet back over the top of the roll cover 24 so that its leading edge abuts the stationary stop and the sheet is in a position to repeat the scanning cycle as soon as the trailing edge thereof permits the electrical contacts 28 and 30 to close.

I claim:

1. A feeding mechanism for sheet material comprising means defining a pathway along which the sheets sequentially travel and having a projecting stationary stop, a magazine movable with respect to the pathway for holding the sheet material with one edge thereof abutting the stop, a driven feed roll located adjacent said pathway for feeding a first sheet therealong, said roll being movable away from said pathway to interrupt its feeding action, an auxiliary stop located upon the opposite side of the roll from the said stationary stop and movable into the pathway to arrest the travel of a sheet therealong, and control means responsive to the absence of a sheet in the pathway for moving the magazine to lift the succeeding sheet over the stationary stop, said control means simultaneously causing the movement of the roll away from the pathway and the auxiliary stop into the pathway so that the succeeding sheet travels past the roll into contact with the auxiliary stop.

2. A feeding mechanism for sheet material comprising means for feeding and guiding successive sheets along a predetermined pathway, said means including a base plate forming a portion of the pathway and having a stop for arresting the progress of the sheets therealong, means for rotatably mounting said roll adjacent the base plate so that a first sheet inserted between the plate and the roll is fed along the pathway, said roll mounting means being movable with respect to said base plate to lift the roll and interrupt its feeding action, a magazine tiltable with respect to the base plate for holding the sheet material with one edge thereof abutting the stop, and control means responsive to the absence of a sheet between the roll and the plate for tilting the magazine to lift the succeeding sheet over the stop, said control means simultaneously causing the movement of the roll mounting means to permit the succeeding sheet to drop between the roll and the base plate.

3. A feeding mechanism according to claim 2 wherein the magazine is pivotally mounted on the base plate and the stop is an abutment on the plate projecting into the pathway between the end of the magazine and the roll.

4. A feeding mechanism according to claim 2 wherein the means for tilting the magazine includes electrical

switching means which are operated by the presence of a sheet along the pathway.

5. A feeding mechanism according to claim 4 wherein are provided electromagnetic means for tilting the magazine which are energized by the operation of the switching means in the absence of a sheet.

6. A feeding mechanism for sheet material comprising a base plate forming a declivous pathway for the material and having a projecting stationary stop, a pivotally mounted magazine for holding the sheet material with one edge thereof abutting the stop, a driven feed roll journaled in the magazine in spaced relation from the base plate so as to move a first sheet of material along the pathway, electrical contacts disposed in the pathway so as to be operated by the presence of a sheet on the pathway, and electromagnetic means energized by the operation of the contacts as the first sheet is moved therebeyond for tilting the magazine to lift the succeeding sheet over the stop into the space between the feed roll and the base plate.

7. A feeding mechanism for sheet material according to claim 2 wherein is further provided an auxiliary stop upon the opposite side of the roll from the stationary stop for momentarily restraining the succeeding sheet after it has dropped between the feed roll and the base plate.

8. A feeding mechanism for sheet material according to claim 7 wherein the auxiliary stop is removed from the pathway by the magazine as it returns to its normal position.

9. A feeding mechanism for sheet material comprising means defining a pathway along which the sheets sequentially are delivered, a stationary stop carried by said means and disposed in said pathway, the portion of said pathway anterior to said stop forming a magazine for holding the sheet material and being movable with respect to the posterior portion of the pathway to lift the uppermost sheet in the magazine over the stop, sheet feeding means operable to move a sheet along the posterior portion of the pathway, and control means responsive to the absence of a sheet in the posterior portion of the pathway to interrupt the feeding means operation, said control means simultaneously moving the magazine to lift the uppermost sheet over the stop so that such sheet is delivered to the feeding means while the operation thereof is interrupted.

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