

[54] **DEVICE FOR THE FEEDING OF SHEETS IN COPYING MACHINES OR THE LIKE**

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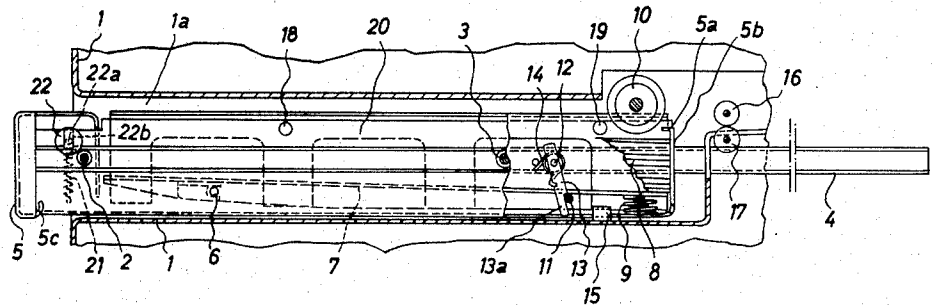
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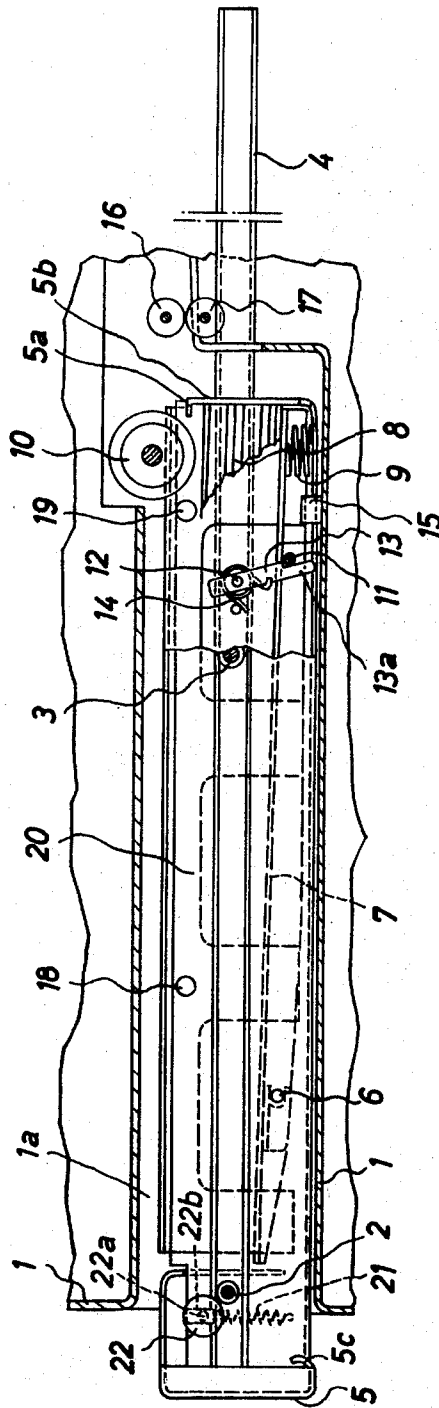
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[57] **ABSTRACT**

A device for the feeding of stacked sheets in a copying machine or the like has a reciprocable drawer which is mounted in the frame of the machine and is movable between an inserted and an extended position. The drawer supports a platform which serves to support a stack of sheets and is pivotably mounted in the drawer. The front part of the platform can be depressed by hand and is then engaged by spring-biased detent levers which are provided on the drawer to hold the front part in a lower position during the placing of a fresh stack onto the platform in extended position of the carriage. A spring biases the front part upwardly and is free to urge the topmost sheet of a freshly inserted stack against an intermittently driven feeding roller, which is mounted in the frame, when the drawer is returned to its inserted position. During such inward movement of the drawer, stops which are provided in the frame disengage the levers from the front part so that the latter can pivot under the action of the spring.

10 Claims, 1 Drawing Figure





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DEVICE FOR THE FEEDING OF SHEETS IN COPYING MACHINES OR THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to devices for the feeding of sheets in copying, mimeographing or like machines. More particularly, the invention relates to improvements in feeding devices of the type wherein at least a portion of the platform which serves to support a stack of sheets is biased upwardly to cause the uppermost sheet of the stack thereon to bear against one or more intermittently driven feeding or advancing rollers which are mounted in the frame of the machine.

Presently known feeding devices of the just outlined character exhibit the drawback that a fresh stack must be inserted with one hand because the other hand must press the platform to its lower position in order to insure that the front part of the topmost sheet of the fresh stack can be introduced into the space below the feeding rollers. The situation is aggravated when the platform is mounted in the interior of the machine frame so that one hand of the user must reach into the frame in order to move and to maintain the platform in the lower or depressed position while the other hand places a fresh stack onto the thus depressed platform. Such concealed or partly concealed platforms are often employed in electrostatic copying machines.

SUMMARY OF THE INVENTION

An object of the invention is to provide a novel and improved feeding device for electrostatic copying machines or the like wherein the platform need not be held in depressed position by hand so that the person in charge can use both hands for the placing of a fresh stack onto the platform.

Another object of the invention is to provide a feeding device wherein a normally concealed or partly concealed platform can be readily exposed for convenient placing of a fresh stack onto its upper side.

A further object of the invention is to provide a feeding device wherein the platform is caused to automatically leave its depressed position when the topmost sheet of the fresh stack thereon is ready to engage one or more feeding rollers.

An additional object of the invention is to provide a feeding device which can be incorporated in presently known copying or like machines.

The improved feeding device can be used in copying or like machines and comprises a support which preferably constitutes the frame of the machine, a carriage which is mounted in the support, a stack-supporting platform which is mounted on the carriage and at least a portion (preferably the front portion) of which is movable between several raised positions and a lower position, cooperating guide means provided on the carriage and on the support for controlling movements of the carriage between an extended position in which the platform is readily accessible for the placing of a stack of sheets onto its upper side and an inserted position in which the topmost sheet is in the range of one or more intermittently driven feeding rollers mounted in the support and serving to transport the topmost sheet forwardly, detent means provided on the carriage for releasably holding the front portion of the platform in the lower position (the front portion can be moved to such lower position by hand), and disengaging means provided in the support and located in the path of movement of the detent means for disengaging the detent means from the platform in response to movement of the carriage to its inserted position. A spring biases the front portion of the platform upwardly so that the platform can move the topmost sheet of the stack thereon against the feeding rollers when the carriage returns to its inserted position. The lower position of the front portion is selected in such a way that the topmost sheet can move below the feeding rollers during movement of the carriage toward its inserted position and before the detent means is disengaged from the platform.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims.

The improved feeding device itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a schematic longitudinal vertical sectional view of a feeding device which embodies the invention, the carriage for the platform being shown in a nearly fully inserted position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drawing illustrates a portion of a copying machine whose frame 1 constitutes a support for a reciprocable carriage or drawer 5. The frame 1 has a compartment 1a for reception of the drawer 5 and is provided with guide rolls 2, 3 which extend into a pair of elongated horizontal U-rails 4 (only one shown) of the drawer. The two rails flank the drawer 5 and are long enough to properly guide the drawer during movement between a fully inserted position and an extended position in which the drawer exposes at least the major part of the upper side of a stack-supporting platform 7. The latter is pivotable on a transverse horizontal shaft 6 of the drawer and its front portion (as considered in the direction of movement of the drawer from extended to inserted position) is biased by a helical spring 9. The spring reacts against the drawer 5 and urges the front portion of the platform 7 upwardly so that, in the inserted position of the drawer, the topmost sheet of a stack 8 of paper sheets on the platform bears against the lowermost point of one or more advancing or feeding rollers 10 which are rotatably mounted in the frame 1. When the supply of sheets on the platform 7 is nearly or fully exhausted, the user grips a handle 5c at the rear or outer end of the drawer and withdraws the latter together with the platform to facilitate the placing of a fresh stack 8 onto the upper side of the platform before the drawer 5 is returned to its inserted position. The drawing shows the drawer 5 in an intermediate position which is close to the fully inserted position.

In the absence of any means for holding the front portion of the platform 7 in the illustrated depressed or lower position during movement of the drawer 5 to its inserted position, the user would have to press the front portion downwardly by one hand in order to overcome the action of the spring 9 and to insure that the topmost sheet of a full stack 8 on the platform can be moved below the portion rollers 10. In order to overcome such drawback of conventional feeding devices, the drawer 5 is provided with one or more detents which can temporarily retain the front portion of the platform 7 in its lower position. Each detent comprises a lever 13 which is pivotable on a transversely extended horizontal pin 12 of the drawer and is biased in a counterclockwise direction, as viewed in the drawing, by a torsion spring 14. The lower end portion 13a of each lever 13 has a notch or shoulder for reception of a pin-shaped projection 11 on the front portion of the platform 7. When the front portion of the platform is pivoted in a clockwise direction toward the lower position shown in the drawing, the lever 13 is free to pivot counterclockwise as soon as the projection 11 moves beyond the shoulder so that the shoulder thereupon holds the front portion against movement to one of its raised positions and maintains the spring 9 in compressed condition. The front portion of the platform 7 preferably carries two laterally extending projections 11 and the drawer 5 is preferably provided with two detent levers 13, each adjacent to one of the rails 4 and each cooperating with one of the projections 11. This prevents twisting of the drawer and/or platform. The front portion of the platform 7 must be depressed by hand after the drawer 5 is at least partially withdrawn from its inserted position. The levers 13 then remain in engagement with the projections 11 and retain the front portion of the platform in the lower position until shortly before the drawer returns to its fully inserted position. To this

end, the frame 1 is provided with two stops or disengaging means 15 (only one shown) each of which is located in the path of movement of one of the levers 13 and engages and pivots clockwise the lower end portion 13a of the respective lever while the drawer moves inwardly toward its inserted position. This enables the spring 9 to bias the topmost sheet of the freshly inserted stack 8 against the feeding rollers 10. The stops 15 are positioned in the frame 1 in such a way that they disengage the levers 13 from the respective projections 11 after the front part of the topmost sheet has been advanced forwardly and beyond the lowermost points of the feeding rollers 10. These rollers are driven intermittently in a manner well known from the art of copying and mimeographing machines and feed the topmost sheet into the nip between two advancing rolls 16, 17. These rolls are installed in the frame 1 forwardly of the front portion of the platform 7.

The front or inner portion of the drawer 5 is provided with two corner separators 5a (only one shown) each of which overlies one front corner of the topmost sheet of the stack 8. It is preferred to place the corner separators 5a a short distance above the level of the lowermost points of the rollers 10, i.e., at a short distance (preferably between 0.1 and 0.5 millimeter, most preferably 0.3 millimeter) above the plane of the topmost sheet when such sheet abuts against the rollers 10. The drawer 5 is further provided with a front stop 5b which serves to maintain the front edges of sheets in the stack 8 in a common vertical plane.

The drawer 5 supports lateral stops 20 for the stack 8 on the platform 7. Such lateral stops are secured to the carriage by screws or rivets 18, 19 or analogous fasteners. At least one of the lateral stops 20 is preferably adjustable transversely of the platform 7, i.e., toward and away from the other lateral stop, to insure that the inserted stack is properly confined between the two lateral stops and the front stop 5b.

The drawer 5 is further provided with an additional detent device which serves to yieldably hold it in the fully inserted position. This additional detent device comprises one or more rollers 22 whose shafts 22a are mounted for movement in substantially vertical slots 22b of the drawer and are urged downwardly by one or more helical springs 21. The rollers 22 are mounted on the carriage 5 close to the handle 5c and cooperate with a projection on the frame 1, for example, with one of the outer guide rolls 2. When the drawer 5 is being withdrawn from its fully inserted position, the illustrated roller 22 rides over the guide roll 2 while the spring 21 expands and the roller 22 thereupon descends to move its shaft 22a into the lower portion of the slot 22b. During movement of the drawer 5 back to the fully inserted position, the roller 22 again rides over the guide roll 2 and thereupon descends behind the roll 2 to thereby hold the drawer against unintentional movement from the inserted position. If desired, the illustrated detent roller 22 can be placed in such position that it cooperates with the inner guide roll 3 or with another projection on the frame 1.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. In a device for feeding stacked sheets in a copying machine or the like, a combination comprising a support; a carriage mounted in said support; a stack-supporting platform mounted on said carriage, at least a portion of said platform being movable between a plurality of raised positions and a lower position and said carriage being movable with reference

to said support between an extended position in which said platform is accessible for the placing of a stack of sheets thereon and an inserted position; biasing means provided on said carriage for constantly urging said portion of said platform from said lower position; detent means provided on said carriage for releasably holding said portion of said platform in said lower position in the extended position of said carriage; disengaging means provided in said support and located in the path of movement of said detent means to disengage the latter from said platform in response to movement of said carriage toward said inserted position; and sheet advancing means mounted on said support, said portion of said platform being disposed below said advancing means in the inserted position of said carriage so that the topmost sheet of a stack on said platform is caused to bear against said advancing means under the action of said biasing means.

2. A combination as defined in claim 1, wherein said platform has a front portion and a rear portion, as considered in the direction of movement of said carriage from said extended to said inserted position thereof, said front portion constituting said first mentioned portion of said platform and said advancing means comprising at least one intermittently driven roller so that the topmost sheet of the stack on said platform is caused to bear against said roller in the inserted position of said carriage and such topmost sheet is transported by said roller forwardly when the latter rotates, and further comprising a pair of corner separators provided on said carriage forwardly of said front portion and overlying the front corners of the topmost sheet of the stack on said platform, said corner separators being mounted on said carriage at a level slightly above the sheet which bears against said roller.

3. A combination as defined in claim 1, wherein said platform has a front portion and a rear portion, as considered in the direction of movement of said carriage from the extended toward the inserted position thereof, said front portion constituting said first mentioned portion of said platform and further comprising pivot means mounted on said carriage adjacent to said rear portion of the platform for pivotally supporting said platform for movement of said front portion between said lower position and said raised positions.

4. A combination as defined in claim 3, wherein said front portion is provided with at least one projection and said detent means comprises a device which engages with said projection and holds said front portion in response to movement of said front portion to said lower position when said carriage assumes a position other than said inserted position thereof.

5. A combination as defined in claim 4, wherein said detent means comprises at least one spring-biased lever which is pivotally mounted on said carriage.

6. A combination as defined in claim 5, wherein said disengaging means comprises a stop mounted in said support in the path of movement of said lever and arranged to pivot said lever away from engagement with said projection in response to movement of said carriage to said inserted position.

7. A combination as defined in claim 1, further comprising second detent means for releasably holding said carriage in said inserted position.

8. A combination as defined in claim 1, wherein said carriage is reciprocable between said inserted and extended positions thereof, and further comprising cooperating guide means provided on said carriage and said support for confining the carriage to reciprocatory movement.

9. A combination as defined in claim 8, wherein said guide means comprises at least one guide rail provided on one of the parts including said support and said carriage and guide rolls tracking said rail and provided on the other of said parts.

10. A combination as defined in claim 2, wherein the distance between the topmost sheet and said level is between 0.1 and 0.5 millimeter.

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