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Jähme

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[54] **SHEET TAKE OFF DEVICE FOR PRINTING OR DUPLICATING MACHINES**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 305,551, Nov. 10, 1972, abandoned.

[30] **Foreign Application Priority Data**

Sept. 28, 1972 Germany 2248110

[52] **U.S. Cl.** **101/232;** 271/99

[51] **Int. Cl.²** **B65H 3/10**

[58] **Field of Search** 101/232; 271/94–96, 99, 117, 118, 126, 132, 133, 162, 165, 105, 11, 12

[56] **References Cited**

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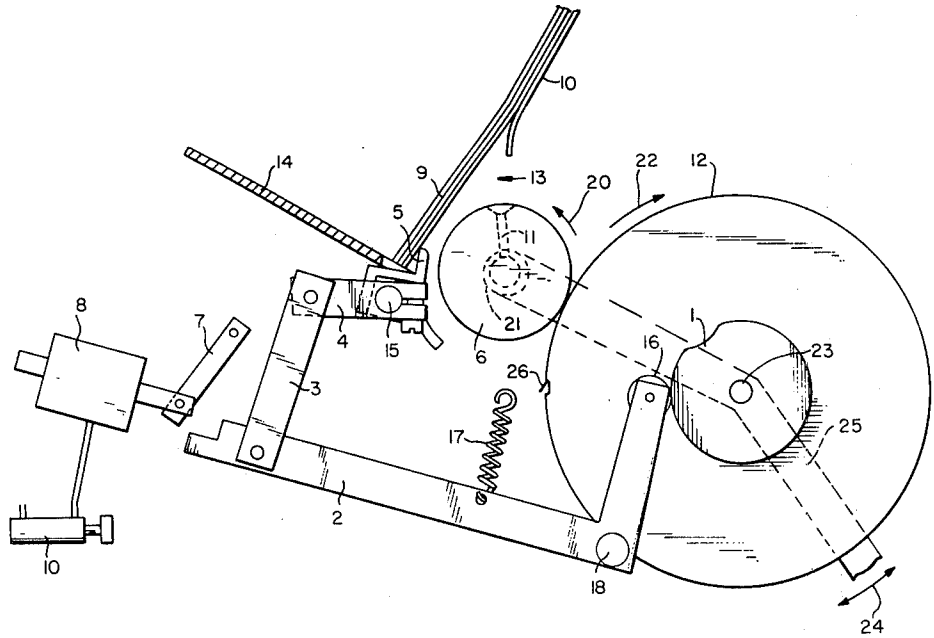
Primary Examiner—J. Reed Fisher

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[57] **ABSTRACT**

The container in which the stack of sheets is placed prior to entering the machine is equipped with an aperture in its lower surface through which sheets are removed individually by a rotating suction roller. A number of fingers are pivoted so that they may be swung into the aperture to push the stack of sheets away from the path of the suction roller so that the roller fails to pick up a sheet, thus inhibiting the sheet take-up process.

6 Claims, 3 Drawing Figures



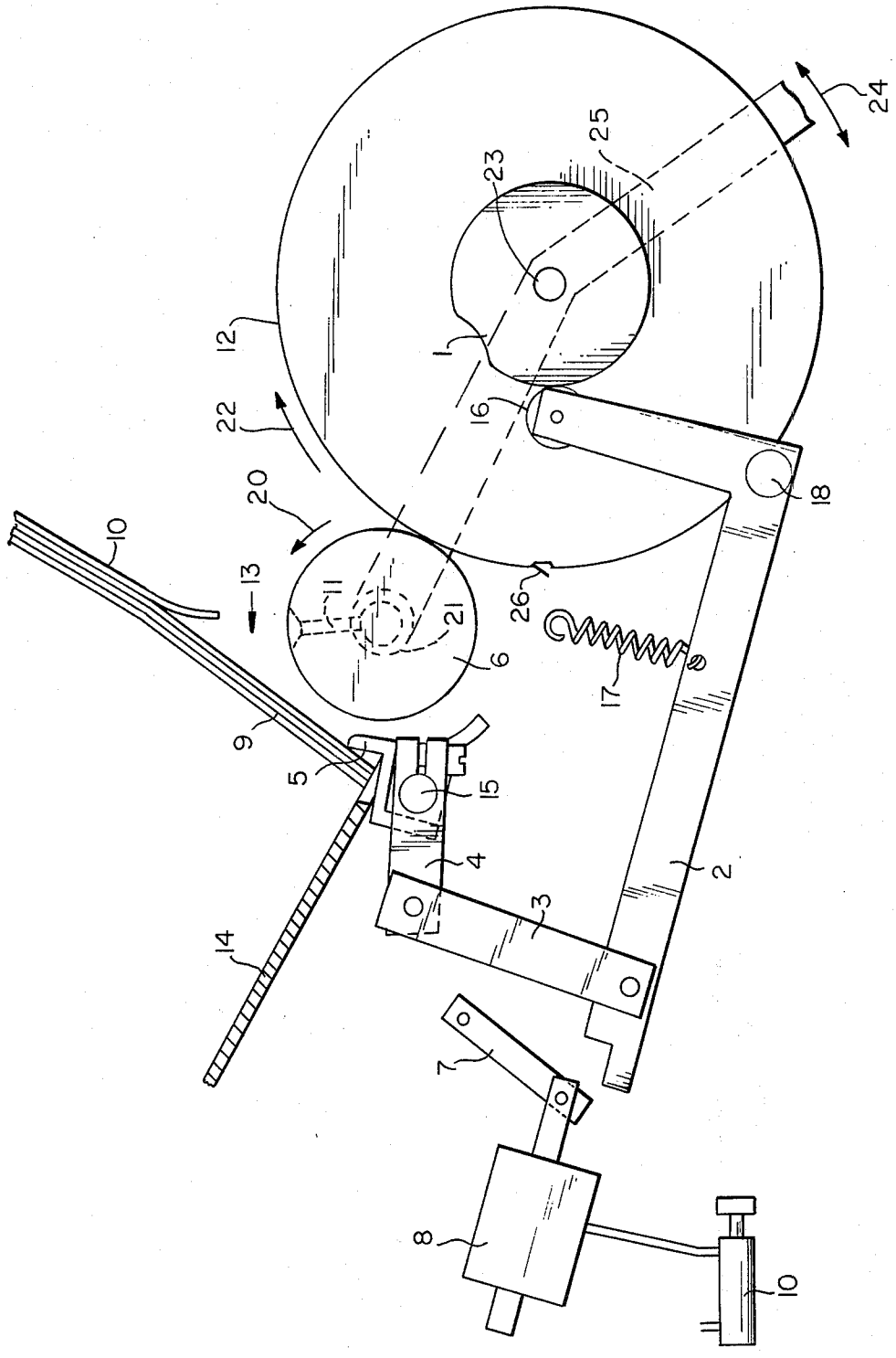


FIG. 1

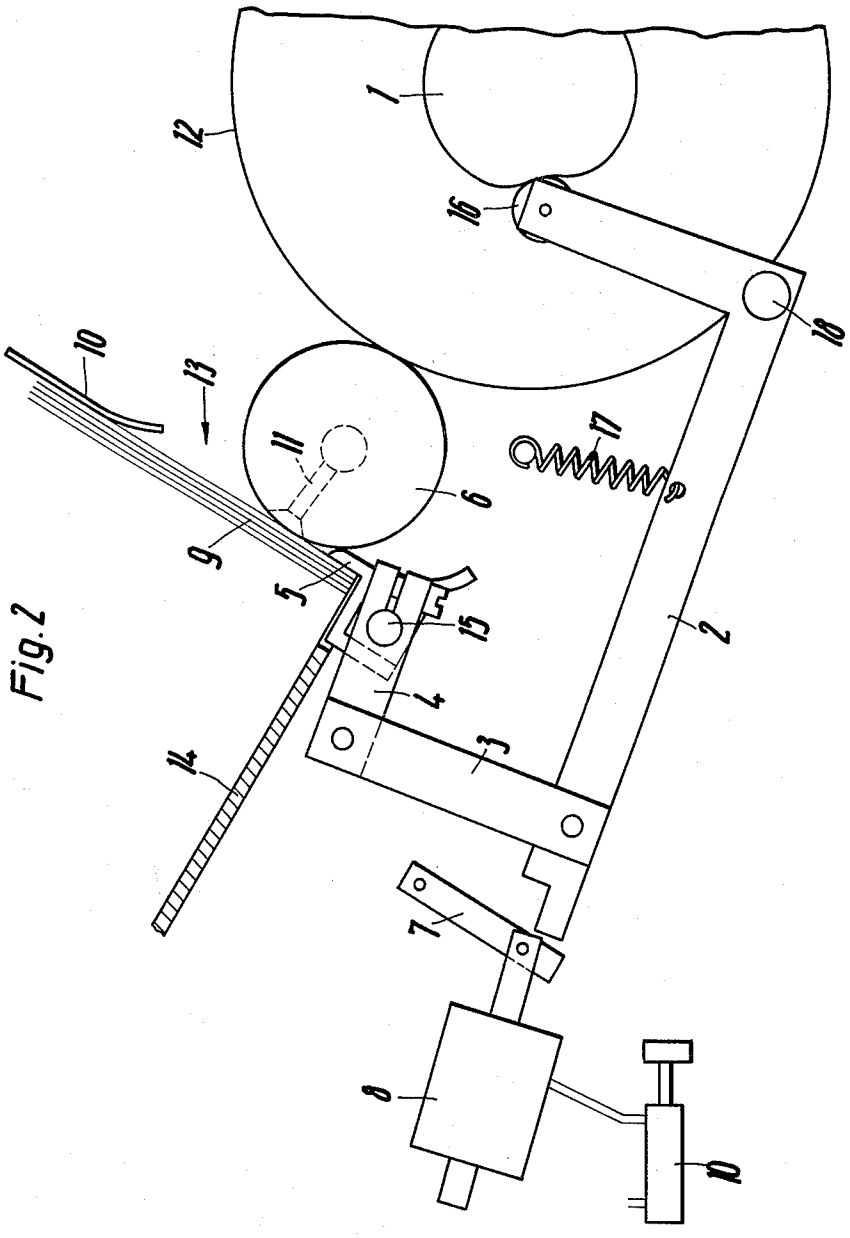


Fig. 2

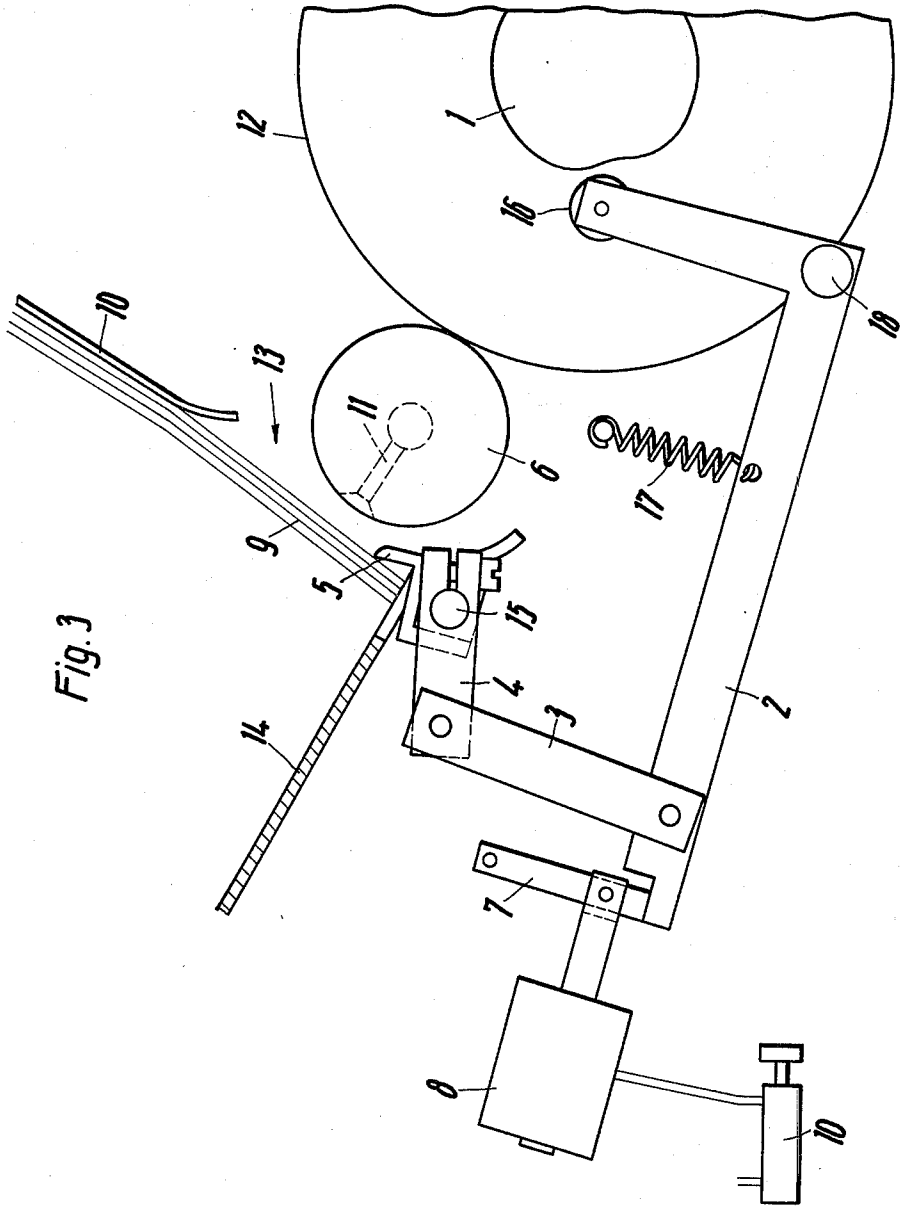


Fig. 3

SHEET TAKE OFF DEVICE FOR PRINTING OR DUPLICATING MACHINES

This is a continuation-in-part of application Ser. No. 305,551, filed Nov. 10, 1972, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to a sheet take-off device for a printing or duplicating machine of the type comprising a container into which a stack of sheets is placed prior to entry into the machine, the sheet-supporting surface of the container having an aperture through which sheets are removed individually from the bottom of the stack by means of a rotatable suction roller.

Various constructions of this kind are known for controlling the sheet feed in offset printing and duplicating machines. Thus for example, the supply of air to the suction means is interrupted or suction air is admitted to these means by pushing a button or actuating a lever so that the suction means are unable to remove further sheets. For this purpose however, the actuation of a valve is necessary and this necessarily leads to a very expensive construction since the valve, despite being actuated a very large number of times, i.e., once each time a sheet is taken off, and despite the associated heavy loading, must always remain airtight so as to continue to be serviceable over a period that is acceptable in terms of the life of the printing and duplicating machine as a whole. A valve of this kind must therefore be constructed to resist wear in a very efficient manner and is thus relatively costly.

Apart from these considerations, the use of a valve is disadvantageous because the necessary air cannot be supplied to and removed from the suction suddenly, and instead a variable time is required to carry out these operations depending upon the size of the suction pump. Limits to the printing speed, that have nothing to do with the design of the machine as such, may be imposed by such delays.

SUMMARY OF THE INVENTION

The present invention therefore seeks to provide a purely mechanical means whereby the sheet take-off operation can be controlled in a simple and reliable manner, i.e., can be stopped and started again, without the need for shutting off and reapplying the suction air.

According to the invention there is provided a sheet take-off device for a printing or duplicating machine of the type comprising a container into which a stack of sheets is placed prior to entry into the machine, the sheet supporting surface of the container having an aperture through which sheets are removed individually from the bottom of the stack by means of a rotatable suction roller. The take-off device includes a plurality of fingers for supporting the stack of sheets in the area of the aperture and means for causing the fingers to be swung towards and away from the lower face of the stack of sheets.

The arrangement in accordance with the invention constitutes a rapid and reliable sheet-feed control means made up of simple mechanical elements. By moving the lower face of the stack slightly away from the suction roller, the action of the suction air is inhibited, i.e., the suction roller is unable to pick up a sheet.

The fingers are preferably secuted to a pivot shaft to which is secured a rocking lever, which lever is connected via a cranked lever to a cam cooperating with a rotating disc. In particular, the cranked lever can be selectively fixed at a position in which the fingers are swung towards the lower face of the stack by means of a magnetically actuated blocking device. It may also be of advantage to swing the fingers away from the lower face of the stack of sheets for the purpose of removing sheets from the bottom of the stack.

Thus, the fingers which extend below the front edge of a stack of sheets and which are swung with the aid of a controlling cam disc briefly away from the front edge of the bottom sheet of the stack to allow the bottom sheet to be removed, and then swung toward the stack, in synchronization with the rotating suction roller, so that when the suction roller moves into the zone of the lower face of the stack, as described in German Pat. No. 1,084,737, a gap is formed between the suction roller and the stack that is just large enough to render the suction air supplied to the suction roller ineffective.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be better understood, an embodiment thereof will now be described by way of example only and with reference to the accompanying drawings in which:

FIG. **1** is a diagrammatic side view of an embodiment of the invention, the sheets of paper being lifted by the swung fingers;

FIG. **2** shows the same embodiment, the fingers being seen at the moment at which a sheet is being picked up by the suction roll; and

FIG. **3** again shows the same embodiment, the sheet-feed being interrupted by a blocking means.

DETAILED DESCRIPTION OF THE INVENTION

A stack **9** of sheets of paper are placed in a container for the purpose of being taken off by a suction roller **6.** The base plate **10** of the container is inclined to the horizontal at an angle of approximately 60°. The suction roller **6** picks up the bottom sheet for example in the manner described in German Pat. No. 1,084,737. Specifically, the suction roller rotates in direction **20** about its own axis **21,** for instance by engagement between gears (not shown) associated with roller **6** and an impression cylinder **12,** which is rotated in direction **22** about its axis **23** by any suitable means which would be understood by those skilled in the art, and at the same time is reciprocated about the axis **23** of the impression cylinder **12** of the offset printing and duplicating machine by reciprocation in directions **24** by crank arm **25,** which is moved by known means such as an eccentric mechanism. The suction roller **6** grasps the bottom sheet of the stack as a result of the reduced pressure set up in a suction passage **11,** which is continually in communication with a source of vacuum (not shown), and transfers such grasped sheet to the impression cylinder **12** as a consequence of its rotary and swinging movement. When the grasped sheet is applied to the impression cylinder, the lower end thereof is picked up by a clamping device such as **26** which is operated in a known manner, and carried along thereby. It will be understood that clamping device **26** overcomes the force of the vacuum which carries the sheet from roller **6** to cylinder **12.**

The suction openings on the periphery of suction roller **6** are located near to and parallel with the lower edge of each of the sheets forming the stack **9** and extends to the plane of the lower face of the stack through a take-off opening **13** in the baseplate **10** of the stack

container. The sheets in the stack container are supported at their bottom edges on a stack rail **14** to prevent them from sliding downwards.

A plurality of fingers **5**, which extend below the lower face of the stack through the take-off opening **13**, are fixedly mounted on a pivot shaft **15** arranged parallel with the lower edge of each of the sheets forming the stack **9**. One end of shaft **15** also has fixedly connected thereto a rocking lever **4** which is connected by way of a draw rod **3** to one end of a cranked lever **2** which can be swung about a pivot **18**. The other end of the cranked lever **2** is provided with a cam follower **16** which rolls over a cam disc **1**, rotatable with the impression cylinder **12**, the follower being biased towards the cam disc by a spring **17**.

The cam disc **1** is so shaped that the fingers **5** normally occupy the position illustrated in FIG. **1**, i.e., they are swung by means of the lever connection **2, 3, 4** and the shaft **15** so that they tilt towards the stack with the result that the lower edges of the sheets of the stack are moved out of the plane of the lower face of the stack in the zone of the take-off opening **13**. Therefore, the suction roller is unable to pick up the lowermost sheet of the stack. Only when the suction roller **6** has reached the take-up position illustrated in FIG. **2** are the fingers **5** swung back by the action of the cammed disc **1** in cooperation with the spring **17** so that that portion of the stack near the take-off opening **13** is also located in the plane of the lower face of the stack. Therefore, the suction roller **6** will contact the lowermost sheet and can pick up the lowermost sheet. Thereafter, the fingers **5** will again move the stack out of the plane of the lower face of the stack. This cycle is repeated for each take-off movement.

The upward and downward movement of the cranked lever **2** can be arrested, with the aid of a blocking lever **7**, in the position with the fingers **5** swung toward the stack, i.e., when the stack of paper is moved out of the plane of the lower face of the stack. For this purpose a switch **10**, energizing an electromagnet **8**, is actuated so that the blocking lever **7** is shifted from the position shown in FIG. **1** into the illustrated in FIG. **3**, with the result that the feed of the paper is interrupted despite the fact that the machine continues to run. If the switch **10** is switched off, the blocking lever **7** returns to the position seen in FIG. **1** and thus releases the lever **2** so that the paper feed is resumed.

It will be readily apparent to those skilled in the art that the fingers **5** are designed, with respect to the negative pressure in suction passages **11**, to be of a size such that when the fingers are in the position of FIG. **2**, the lowermost sheet of the stack can be pulled over the fingers **5**.

Further, those skilled in the art will understand that the rotation of roller **6** and cylinder **12** and the reciprocation of roller **6** may be achieved in numerous ways other than shown herein, and that the specific devices shown herein are exemplary only, and are offered merely as a background to understand the operation of the present invention which is the provision of fingers **5** and the mechanism for moving such fingers between the positions shown in FIGS. **1** and **2**.

Those skilled in the art will understand that the rotation of roller **6** and cylinder **12** and the reciprocation of roller **6** are performed in a sequence to carry out the obvious intention of the invention.

What I claim is:

1. In a printing or duplicating machine of the type including a container means for supporting and storing a stack of sheets prior to their being fed into said machine, said container having an aperture therein, and a rotatably mounted suction operated take-off roller means operable to sequentially grasp and remove the lowermost of said sheets through said aperture in said container and feed them to said machine, the improvement comprising:

a plurality of fingers mounted adjacent said aperture; and

means for moving said fingers back and forth between a first position wherein an end of said lowermost sheet is in the path of the periphery of said roller means and can be grasped and removed by said roller means, and a second position wherein said fingers push said stack of sheets away from said path of the periphery of said roller means and said lowermost sheet cannot be grasped and removed by said roller means; said means for moving comprising a pivot shaft, said fingers being fixedly mounted on said pivot shaft; a rocking lever fixedly connected at a first end thereof to said pivot shaft; a draw rod connected at a first end thereof to a second end of said rocking lever; a pivotally mounted cranked lever connected at a first end thereof to a second end of said draw rod, said cranked lever having at a second end thereof a cam follower; a rotatable cam having a cam surface thereon; and means to urge said cranked lever toward a position with said cam follower in contact with said cam surface; whereby as said rotatable cam is rotated, said crank lever is pivoted as a function of the contour of said cam surface, said pivot shaft is accordingly pivoted by said draw rod and said rocking lever, and said fingers are moved between said first and second positions thereof by said pivot shaft.

2. The improvement claimed in claim **1**, wherein said rotatable cam is mounted on and rotatable with an impression cylinder of said machine.

3. The improvement claimed in claim **1**, wherein the suction applied to said take-off roller is continuously applied.

4. The improvement claimed in claim **1**, further comprising means to selectively lock said cranked lever at a position wherein said fingers are in said second position thereof.

5. The improvement claimed in claim **4**, wherein said means to lock comprises a blocking lever, and means for selectively moving said blocking lever into contact with said cranked lever to hold said cranked lever in opposition to the force of said means to urge.

6. The improvement claimed in claim **5**, wherein said means for moving said blocking lever comprises a selectively operable electromagnet.

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