

United States Patent

Hashimoto

[15] 3,687,540

[45] *Aug. 29, 1972

[54] FORM FEEDING DEVICE WITH MEMORY MEANS

[72] Inventor: **Hideo Hashimoto**, Koshigaya-shi, Japan

[73] Assignee: **Kabushiki Kaisha Ricoh**, Tokyo, Japan

[*] Notice: The portion of the term of this patent subsequent to Aug. 29, 1988, has been disclaimed.

[22] Filed: **April 10, 1968**

[21] Appl. No.: **720,272**

[30] Foreign Application Priority Data

Dec. 27, 1967 Japan 42/83315

[52] U.S. Cl. 355/14

[51] Int. Cl. G03b 23/04

[58] Field of Search 271/61, 62, 9, 45, 51; 198/24; 353/103, 85; 355/14, 102, 109

[56]

References Cited

UNITED STATES PATENTS

615,636	12/1878	Regensteiner	271/64
2,266,596	12/1941	Goodwin	271/62
3,272,100	9/1966	Teutsch	355/14

FOREIGN PATENTS OR APPLICATIONS

912,215	12/1962	Great Britain	271/9
---------	---------	---------------------	-------

Primary Examiner—John M. Horan

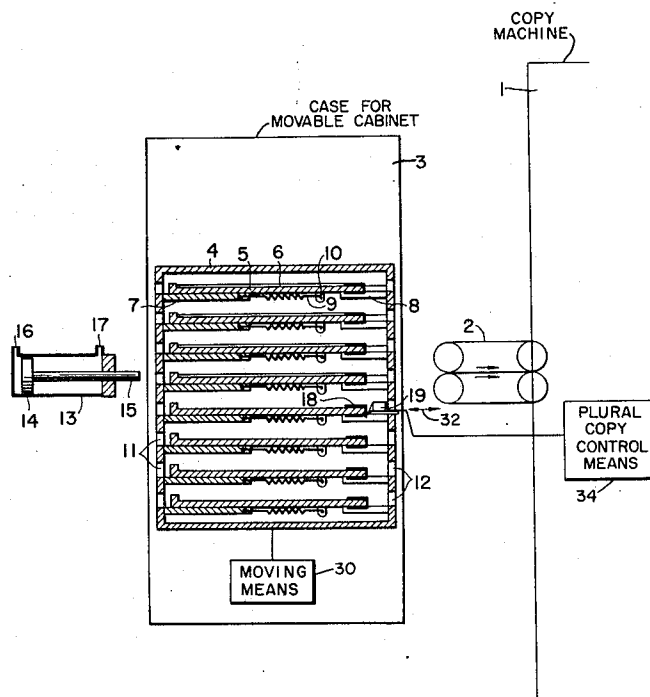
Attorney—Burgess, Ryan & Wayne

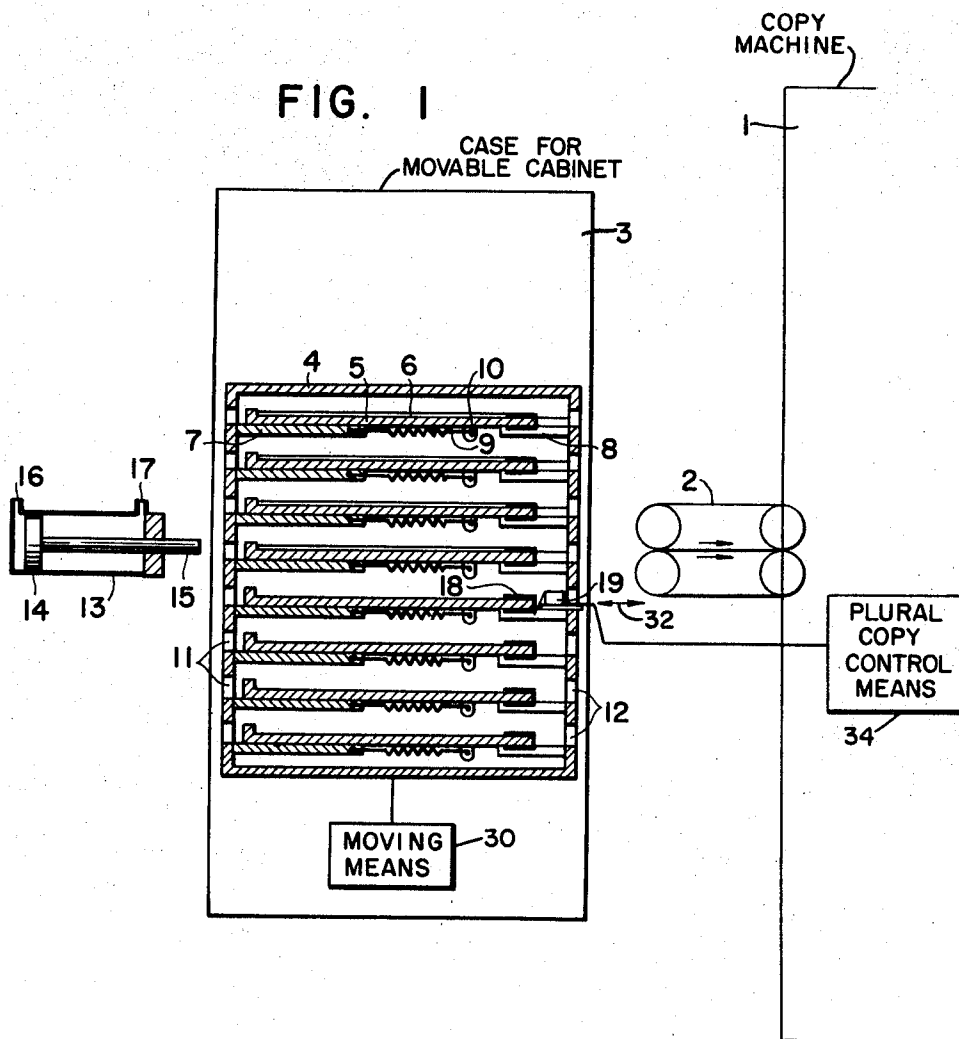
[57]

ABSTRACT

An automatic form feeding device for individually feeding a plurality of original forms to a copying machine and including presettable memory means for each of the original forms for indicating the number of desired copies thereof. The memory means is then used to control the copy machine and to automatically insure the generation of the desired number of copies of each original form without constant operator attention.

4 Claims, 3 Drawing Figures





INVENTOR

Hideo Hashimoto

BY *Burgess, Ryan & Hicks*
ATTORNEYS

FIG. 2

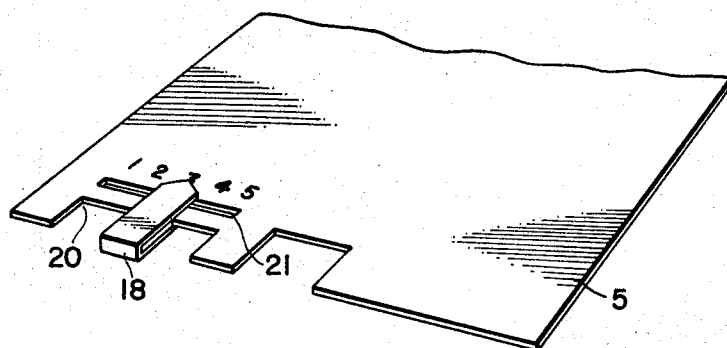
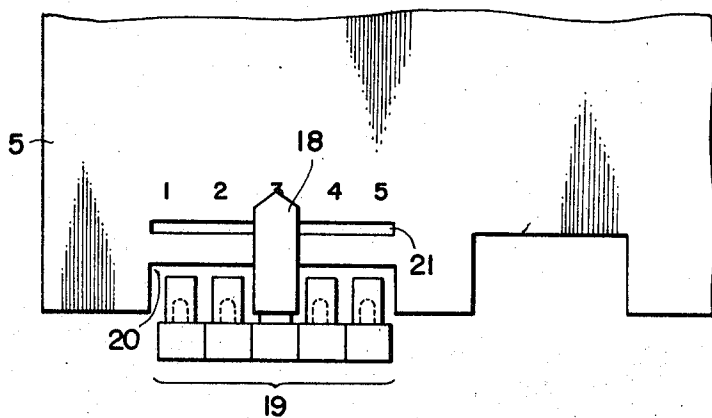


FIG. 3



INVENTOR

Hideo Hashimoto

BY *Burgess, Ryan & Hicks*
ATTORNEYS

FORM FEEDING DEVICE WITH MEMORY MEANS

This invention generally relates to an improvement for use with copying machines.

Specifically, it relates to an improvement for original form feeding devices commonly used with such machines for automatically and individually feeding original forms into the machine for copying. This invention is directed to such a form feeding device which includes presettable memory means associated with each individual original form for indicating the desired number of copies thereof. In addition, the memory means is effective to automatically control the copying machine to produce the indicated number of copies of each form without further operator attention.

The present invention relates to an automatic original form feeding device for the use of a copying machine.

In order to ensure accurate feeding performance of original forms one sheet at a time to a copying machine, it has already been proposed (Refer to commonly assigned U.S. patent application Ser. No. 720,280 filed Apr. 10, 1968 now Ser. No. 35,539 filed May 7, 1970 corresponding to Japanese patent application 23,419 filed Apr. 14, 1967.) to provide a device whereby the leading edges of the original forms are separately maintained, instead of piling up the original forms in a single stack. In one of the proposed embodiments, a vertically movable cabinet having a plurality of equally spaced slidable shelves is provided within the casing of the automatic feeding device, so that when the cabinet is moved in a vertical direction, the original forms placed on each shelf will be carried consecutively to feeding position.

In the proposed type of device, however, while the original forms may be accurately fed one sheet at a time to the copying machine, repetition of the feeding cycle for the desired original form, which often becomes necessary in the normal course of a copying operation, is unpracticable.

It is an object of this invention, therefore, to eliminate the above-mentioned drawback by providing a device whereby any desired number of copies can be automatically produced for each original form.

For a fuller understanding of the nature and the objects of this invention, reference should be had to the following detail description taken in connection with the accompanying drawings.

FIG. 1 is a cross section view of one exemplary embodiment of the improved original form feeding device of this invention and an associated copying machine.

FIG. 2 is a partial perspective view of an original form carrying shelf provided with a memory means.

FIG. 3 is a plan view of the above-mentioned memory means illustrating its cooperation with a bank of microswitches.

Referring now to FIG. 1, a copying machine 1 is provided with a conveyor belt mechanism 2 which transports original forms from an automatic original form feeding device to the copying machine. Within the casing 3 of the automatic feeding device is provided a vertically movable cabinet having a plurality of shelves 5 equally spaced on top of the other for carrying thereon original forms. 6 represents the original forms placed on each of the shelves. Each shelf is slidably mounted on sliding tables 7 and 8 which are fixed on the vertically movable cabinet 4. Between a downwardly

protruding extension 10 of the shelf 5 and the end of the sliding table 7 is extended a contractable spring 9 which is biased to draw the shelf 5 towards the left facing the drawing. The sliding table 8 is preferably provided on both sides of the movable cabinet 4 so as to permit the running movement of the extension 10 and the spring 9 when the shelf 5 carrying an original form 6 is moved in the direction of the right. 11 and 12 represent respectively openings provided on the front and rear surfaces of the movable cabinet 4. In a suitable position towards left of the casing 3 is provided an operating cylinder 13 and an operating piston 14 slidable therein, the operating piston 14 being fixed with a thrusting lever 15. The thrusting lever 15 is adapted to push a corresponding shelf 5 towards a feeding position. 16 and 17 indicate respectively control conduits through which a pressure liquid is guided into and out of the operating cylinder 13. The movable cabinet 4 is designed to make a descending movement intermittently within the casing 3 in accordance with the pitch interval of the equally spaced shelves 5, the mechanism or moving means 30 for said descending movement being already known in the art and therefore shown only schematically in the drawing.

FIG. 1 indicates a movable cabinet 4 carrying eight shelves, illustrating a mode of operation in which the original forms carried on the lower three shelves are already used for copying operation and the original form on the fourth shelf from the bottom is being used for copying operation within the copying machine 1. When the fourth shelf from the bottom is moved to a feeding position, it will be pushed towards the right by the action of the thrusting lever 15. After the original form on said fourth shelf is held by the belt means 2, the shelf is adapted to return to its original position under the force of the spring 9, whereupon the movable cabinet is descended by one shelf to bring the original form on the fifth shelf from the bottom into a feeding position. The fourth shelf from the bottom thus descended (after just having fed its original copy into the copy machine) is adapted to activate, through a position adjustable operating piece 18, one of the grouped microswitches which move (along the directions of arrow 32) into the movable cabinet through the opening 12 thereby conditioning the plural copy control means 34 in copy machine 1 to make the desired number of copies of the just fed original form.

Referring now to FIG. 2 and viewing it towards the feeding direction of the original form, the shelf 5 is provided, at one portion of the front surface, a notch 20 along which the position of the operating piece 18 is adjustable in the lateral direction. The operating piece 18 is further guided, by virtue of its extension not shown, within a slit 21 provided in the shelf 5.

Referring to FIG. 3, the operating piece 18 set for three copies is shown activating a corresponding microswitch within the microswitch group 19. By the action of the microswitch, a counter or plural copy control means 34 provided in the copying machine is set for three copies, which causes repetition of copying operation of the original form just previously fed into the copying machine for three cycles before the original form is delivered out of the copying machine.

It goes without saying that the number of copies presettable on the memory means, which is shown, for

simplicity purpose, up to five in FIGS. 2 and 3, may be varied according to the necessity.

For example, by providing positions from 1 to 9 and a position for 10 for the operating piece, and through combination of said position, a need for presetting 5 more than 10 copies can be easily handled.

With the present invention, all that the operator needs to do is to insert the movable cabinet 4 within the casing 3 of the automatic original form feeding device and start operating the machine, and the operator can 10 engage himself in a different work apart from the copying machine. In the meanwhile, the device embodying this invention not only ensures accurate feeding performance of the original forms into the copying machine, but also enables, through coupling with the 15 action of a counter in the copying machine, production of desired number of copies for each original form.

In the embodiment shown in the drawings, the movable cabinet 4 has been explained to make gradual descending movement, but it must be evident to those 20 skilled in the art that the same effect is obtainable when the cabinet is designed to move upward.

I claim:

1. An automatic copying apparatus for automatically producing a predetermined number of copies of each 25 of a plurality of original forms, said apparatus comprising:

a copy machine having an input conveyor means for accepting original forms and a plural copy control means for causing an adjustable number of copies 30 to be produced for any given input original form, an automatic original form feeding means comprising a vertically movable cabinet having a plurality of equally spaced slidable shelves for carrying original forms thereon and means for successively 35 sliding said shelves towards said input conveyor means when aligned therewith to cause feeding of an original form carried thereon to said input conveyor means,

memory means disposed on each of said shelves for 40 presetting to indicate the desired number of copies to be produced from the original form carried thereon, and

means for successively transferring the information stored by each of said memory means to said plural 45 copy control means in synchronism with the feeding of respectively associated original forms thereby automatically producing the desired predetermined number of copies of each of a plu-

50

55

60

65

ality of original forms.

2. An automatic copying apparatus as in claim 1 wherein:

said memory means comprises a position adjustable operating piece, and

said means for transferring comprises a plurality of adjacent microswitches disposed for selective actuation by said operating piece in dependence upon its particular position adjustment whereby the number of desired copies is represented by the particular microswitches being actuated which, in turn, sets the plural copy control means accordingly.

3. An improvement for use in an automatic copying apparatus comprising; a copy machine having an input conveyor means for accepting original forms, a plural copy control means for causing an adjustable number of copies to be produced for any given input original form, and an automatic original form feeding means including a vertically movable cabinet having a plurality of equally spaced slidable shelves for carrying original forms thereon and means for successively sliding said shelves towards said input conveyor means when aligned therewith to cause feeding of an original form carried thereon to said input conveyor means, said improvement comprising:

memory means disposed on each of said shelves for presetting to indicate the desired number of copies to be produced from the original form carried thereon, and

means for successively transferring the information stored by each of said memory means to said plural copy control means in synchronism with the feeding of respectively associated original forms thereby automatically producing the desired predetermined number of copies of each of a plurality of original forms.

4. An improvement as in claim 3 wherein:

said memory means comprises a position adjustable operating piece, and

said means for transferring comprises a plurality of adjacent microswitches disposed for selective actuation by said operating piece in dependence upon its particular position adjustment whereby the number of desired copies is represented by the particular microswitches being actuated which, in turn, sets the plural copy control means accordingly.

* * * * *