

[54] MASTER SHEET RETAINER FOR PRINTING MACHINES

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Related U.S. Application Data

[63] Continuation of Ser. No. 769,988, Oct. 23, 1968, abandoned.

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[58] Field of Search .....101/415.1, 132, 132.5, 246, 101/409, 410, 411, 412, 141, 142; 271/80, 82

References Cited

UNITED STATES PATENTS

2,704,028 3/1955 Bruns.....101/415.1
2,681,006 6/1954 Leavens, Jr.....101/409 X

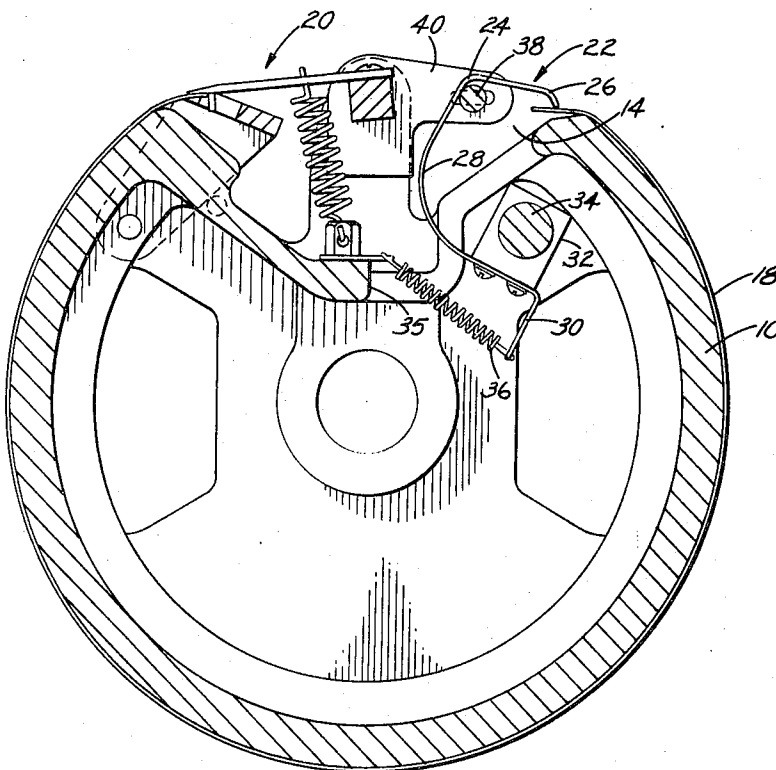
Table with 3 columns: Patent Number, Date, and Inventor/Assignee. Includes entries for Wendte, Finch, Kropp, Rockhill, Lake, and Tonkin et al.

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[57] ABSTRACT

A device for retaining the trailing end of a master sheet on a printing machine drum includes a retainer member movable between an open position for receiving the trailing end and a closed position for holding the trailing end of the master sheet. An actuating means, provided on an impression cylinder in printing relationship with the printing machine drum, acts against the trailing end of the master sheet which acts against the retainer member in such a way as to move the retainer member to the open position and the trailing end of the master sheet under the retainer member. Spring means is provided for restoring the retainer member to the closed position and for maintaining it closed and in holding engagement with the trailing end of the master sheet during a printing operation.

13 Claims, 6 Drawing Figures



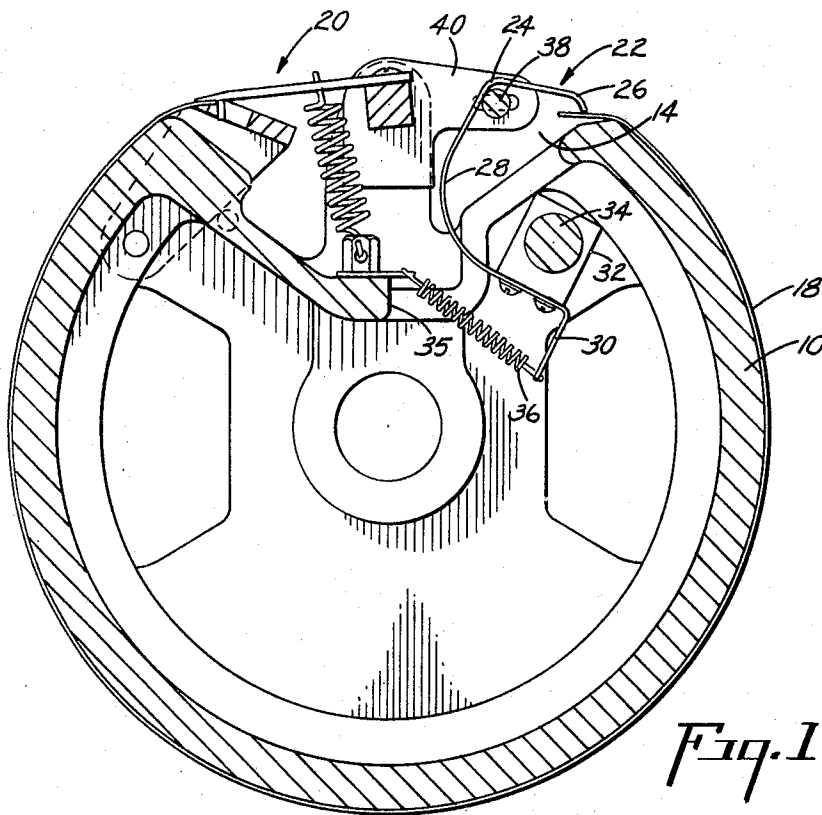


Fig. 1

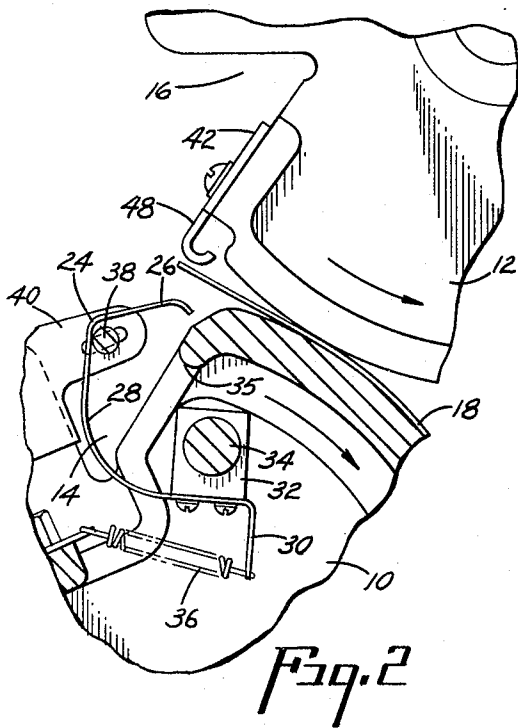


Fig. 2

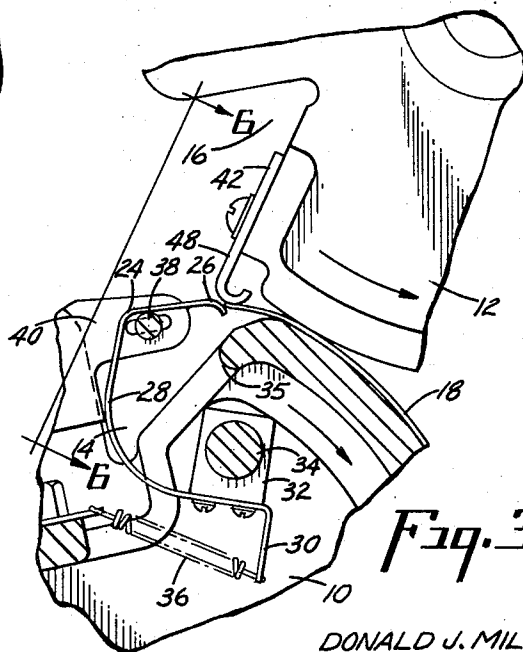


Fig. 3

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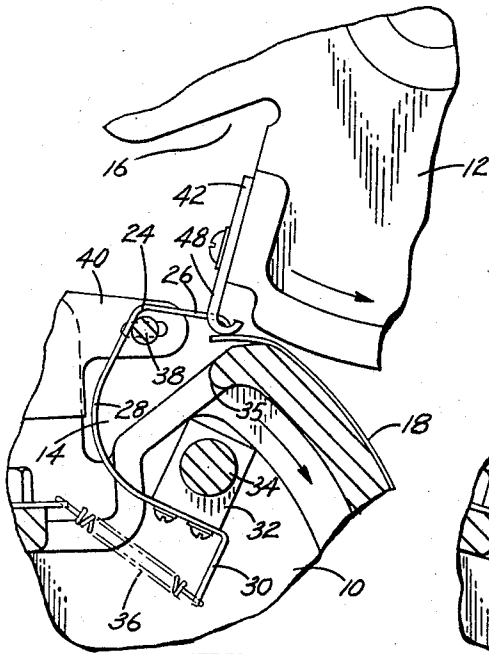


Fig. 4

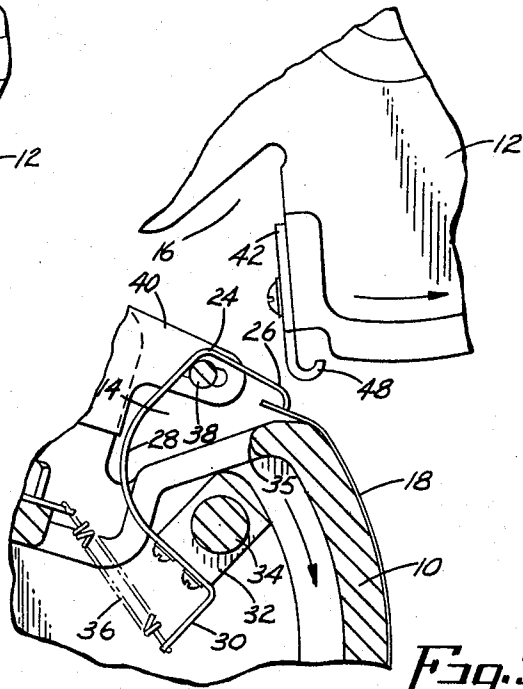


Fig. 5

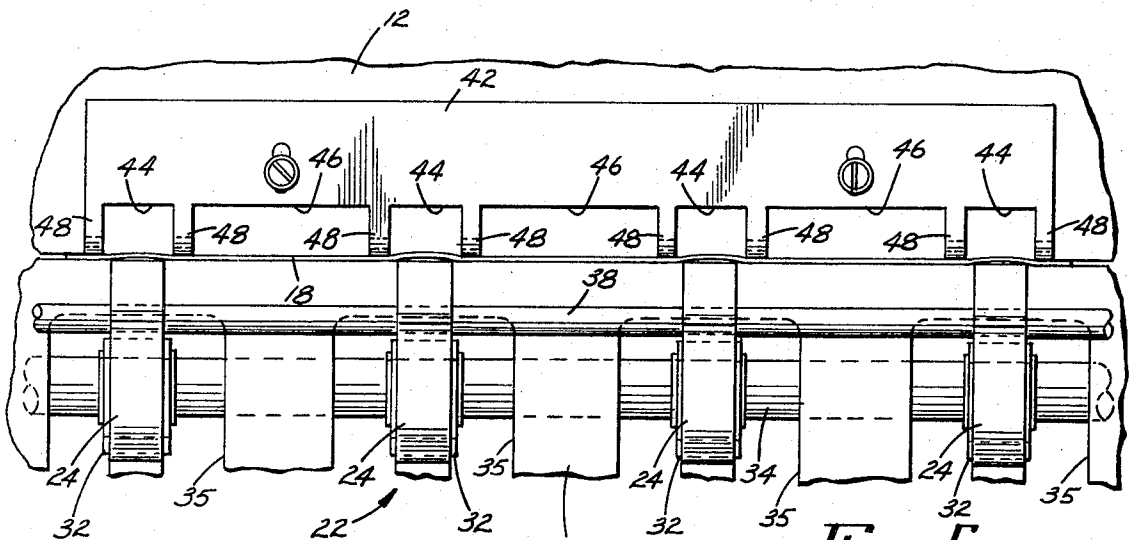


Fig. 6

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**MASTER SHEET RETAINER FOR PRINTING MACHINES**

This application is a continuation of our copending application, Ser. No. 769,988, filed Oct. 23, 1968, now abandoned.

**BACKGROUND OF THE INVENTION**

The present invention relates to a lithographic duplicating machine and, more specifically, to a retaining device for securing the trailing end of a master sheet to the printing drum of the machine. Conventionally, offset lithographic machines are provided with a printing drum or master cylinder for holding a master sheet bearing a direct reading image, a blanket cylinder to which the inked image from the master is transferred, and an impression cylinder for pressing the copy sheet against the blanket to thereby transfer the image from the blanket to the copy sheet.

Still other machines utilize only two cylinders and are termed direct printing machines as opposed to offset. In such machines, a master sheet bearing a reverse reading image is attached to a master cylinder, and the inked image is transferred directly from the master to a copy sheet which is fed between the master cylinder and an impression cylinder.

However, whether the machine is arranged for offset or direct printing, it is necessary to provide some means for securing the master to the cylinder. This may be done by clamping the leading end of the master to the cylinder, or by clamping both the leading and the trailing ends of the master. If only the leading end of the master is clamped, the trailing end tends to flap as the cylinder rotates and, therefore, is subject, possibly, to brushing against the ends of the master insertion guides and other parts. Since the trailing end of the master may accumulate some ink from the form rolls, this brushing of the trailing end against the master insertion guides can ultimately contaminate the same with ink sufficiently to smudge succeeding masters being fed into the unit and subsequently the copy sheets.

Although there are many different kinds of master clamps currently in use (both leading end and trailing end clamps) in most cases these clamps are adapted for manual actuation, i.e., the printing machine must be shut off so that the machine operator may clamp the lead end, rotate the cylinder to wrap the master therearound, and then clamp the trailing end. Since the removal of the master from the cylinder is performed in a similar manner, operation of manually actuated clamping devices is inconvenient and time consuming.

Still other machines incorporate master clamps which are automatic in operation and provide for attaching a master to the cylinder during machine operation. Such clamps are primarily used for securing the lead end of the master, the trailing end being left unclamped. Usually, machines provided with automatically controlled clamping devices also provide means for automatically ejecting the master from the cylinder after the desired number of copies have been made. In this way the time element of clamping and releasing the master, as compared with manually operated clamping members, is greatly reduced.

It is an object of the present invention to provide a retaining device for securing the trailing end of a master sheet to a printing drum while the machine is in operation.

It is another object of the present invention to provide an automatically operated retaining device for holding the trailing end of a planographic printing plate in a gap provided in the cylinder.

Another object of the invention is to provide an automatically operated retaining device for retaining the trailing end of a master sheet wrapped around a printing drum, and means exteriorly of the drum for actuating the retaining means and causing the trailing end of the master sheet to be tucked under and held by the retaining means during machine operation.

Another object of the invention is to provide an automatically operated retaining device which is inexpensive to manufacture, extremely simple in construction and reliable in operation.

Other objects, features and advantages will appear hereinafter as the description proceeds.

**IN THE DRAWINGS**

FIG. 1 is a cross section of a printing drum showing a master sheet attached thereto in accordance with the practice of the present invention;

FIGS. 2, 3, 4 and 5 are fragmentary detail views, partially in section, showing the relationship of the printing drum and an impression cylinder, and the sequence of actuating a retaining device for securing the trailing end of the master sheet to the printing drum; and

FIG. 6 is a view taken on the line 6-6 in FIG. 3 showing an actuator member and the retaining device in initial engagement with the trailing end of the master sheet.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Although the retaining device of the present invention may be used with either the two or the three cylinder machines referred to hereinabove, it will be described in connection with a direct printing, two cylinder machine. Thus, as shown in the drawings, there is provided a printing drum or master cylinder 10 in printing relationship with an impression cylinder 12. The direction of rotation of the cylinders is indicated by the arrows in FIGS. 2 to 5.

The master cylinder 10 is provided with a lengthwise extending gap 14 formed in its periphery and the impression cylinder 12 is provided with a similar gap indicated at 16. As is customary, the cylinders are driven in synchronism and are so arranged that the gaps are in opposed relationship during machine operation.

The master cylinder 10 is adapted to carry a planographic printing plate or master 18 on its periphery, the master bearing an image which is successively inked and transferred to a copy sheet during each machine revolution as is well known in the art. As shown in FIG. 1, the leading end of the master is secured to the cylinder by a clamping mechanism indicated generally at 20, and the trailing end of the master is retained by a retaining device indicated generally at 22. Since the leading end clamping mechanism forms no part of the present invention a detailed description thereof is not included herein.

With reference to FIG. 6, it will be seen that the retaining device 22 includes a plurality of retainer members 24. While there are four such retainer members shown in the drawings, it is to be understood that any number of retainer members may be provided depending upon the width of the master to be attached to the drum. Also, since all of the retainer members are the same, only one such member is described in detail hereinafter.

As shown in the drawings, the retainer member 24 is made of thin sheet metal or the like and comprises a finger 26 adapted to extend into engagement with the trailing end of the master 18, and a depending body 28 formed substantially in a "C" shape and terminating in a formed ear 30. The retainer member is fastened to a block 32 and the block is rockable on a shaft 34 rigidly mounted in the end walls of the cylinder 10. The block 32 is retained against endwise movement on the shaft 34 by conventional retaining washers. As best shown in FIG. 6, the retainer member 24 is mounted within the cylinder 10 and projects outwardly through an opening 35 provided in one wall of the gap 14 of the cylinder. A spring 36 is connected at one end to the ear 30 and at the other end to a fixed mounting and serves to bias the retainer member 24 in a clockwise direction about the axis of shaft 34 as viewed in FIG. 1. A stop bar 38 is adjustably mounted in a pair of end plates 40 (only one being shown in the drawings) and is adapted to control the extent of movement of the retainer member 24 by the spring 36.

The impression cylinder 12, shown in FIGS. 2-5, is provided with an actuator 42 fastened to one wall of the gap 16 and extending outwardly towards and slightly beyond the cylinder periphery. As shown in FIG. 6, the actuator 42 is provided with a series of notches or cut-outs 44, each notch being in opposed relation to one of the retainer members 24, and additional cut-outs 46 are provided between the notches 44, so as to form a pair of legs 48 associated with each of the notches

44. Each pair of legs 48 straddle one of the fingers 26 of the retainer members. Thus, the cut-outs 44 provide clearance for the passage therethrough of the fingers 26 of the retaining device during each machine revolution, and the legs 48 of the actuator 42 act against the trailing end of the master (when a master is being attached to the drum) to secure it in place under the fingers 26 of the retaining device as will now be explained.

As shown in FIG. 2, the master 18 is clamped at its lead end to the cylinder 10, and the master is so dimensioned that its trailing end extends partly across the gap 14 as the cylinders are rotated and the gaps 14 and 16 approach opposed relationship. Further rotation of the cylinders, as shown in FIGS. 3 and 6, causes the legs 48 of the actuator 42 to come into contact with the trailing end of the master forcing it in a radial direction against the fingers 26 of the retainer members. Since the trailing end of the master now overlies the cut-outs 44 in the actuator, the fingers 26 are prevented from passing therethrough and are depressed by the portions of the master margin spanning the cut-outs 44. Thus, the legs 48 acting against the master 18 which acts against the fingers 26, pivot the retainer members 24 towards an open position, in a counterclockwise direction about shaft 34 as viewed in FIG. 3.

At this point it should be noted that the pivotal axis of the retainer member, as determined by the location of shaft 34, is so located that radial pressure on the finger 26 will cause a rotation about the axis such that the finger 26 will draw away from the adjacent margin of the gap in a generally tangential direction. Another way that this might be stated is that the pivotal axis of the retainer member 24 leads by a significant amount the end of the finger 26 which is acted upon by the actuator 42 acting against the trailing end of the master. In the form shown, the pivotal axis leads the end of the finger by about one-half inch as measured from the end of the finger to a point on the periphery of the drum where the radius of the drum passing through the pivotal axis intersects the drum surface.

Upon continued rotation of the cylinders, the legs 48 of the actuator 42 cause the edge of the master to be forced past the ends of the retaining member fingers 26, which then snap forwardly to a position between the legs and overlying the master margin, under the influence of the springs 36, as shown in FIG. 4. Movement of the retainer members 24 to the closed position is arrested by the body 28 of the retainer members striking the stop bar 38.

Further rotation of the cylinders, as shown in FIG. 5, moves the actuator 42 out of engagement with the trailing end of the master which is now retained by the fingers 26. As long as the master is attached to the cylinder, the fingers 26 continue to retain the trailing end and merely pass through the cut-outs 44 of the actuator 42 during each machine revolution, and it is not until the master is removed from the cylinder and a new master placed thereon that the actuator is again effective to push the trailing end into the gap where it is retained by the fingers 26.

Although the retaining device of the present invention does not grip or clamp the trailing end of the master as with piercing pins or clamping jaws, the arrangement of merely providing spring loaded fingers 26 resting against the margin of the trailing end has been found in actual practice to be highly effective in retaining the trailing end. Because of the short span of the master between the edge of the gap 14 where the trailing end leaves the drum surface and the ends of the fingers 26 contacting the master margin, inherent stiffness of the master provides sufficient rigidity to prevent the trailing end from being deformed and inadvertently released from holding engagement by the fingers. Additionally, and particularly on machines equipped with automatic master ejection, with the present retaining device it is an easy matter to remove the master from the cylinder by pulling the trailing end out from under the fingers 26, and there is no requirement for additional mechanism and expense in providing a device for automatically actuating and opening the retaining device to release the trailing end of the master.

From the foregoing, it will be seen that the present invention provides a novel retaining device for holding the trailing end of a master on a cylinder. The retaining device provides for retaining of the master while the machine is in operation, and effectively holds the trailing end of the master against movement during the printing operation.

When the master is removed from the cylinder and a new master is attached thereto, the retaining device is automatically actuated solely by the presence of the trailing end of the master at the retaining position when acted upon by the legs 48 of the actuator 42. These combined features, plus the simple construction and the effective retaining action provided by the fingers for securely holding the trailing end of the master, result in a retaining device that is reliable in operation and inexpensive to produce.

While the preferred embodiment of the invention has been described and illustrated, it is to be understood that this is capable of variation and modification. Accordingly, the aim in the appended claims is to cover all such variations and modifications as may fall within the true spirit of the invention.

What is claimed is:

1. A retaining device for securing the trailing end of a master sheet on the periphery of a printing machine drum having a lengthwise extending gap formed in its periphery, said device comprising:

a retainer member rockably mounted in the drum and projecting into the gap adjacent the drum periphery, said retainer member being movable from a closed position to an open position for receiving the trailing end of the master sheet extending partly across the gap, and back to the closed position in holding engagement with the margin of the trailing end of the master sheet; actuating means exteriorly of the printing machine drum acting against the trailing end of the master sheet which acts against the retainer member for moving the latter to the open position and the trailing end of the master sheet into the gap and under the retainer member; and resilient means associated with the retainer member for biasing the same towards the closed position.

2. A retaining device as set forth in claim 1 which further includes stop means for controlling the extent of movement of the retainer member towards the closed position.

3. A retaining device as set forth in claim 1 in which the retainer member comprises a finger for holding the margin of the trailing end of the master sheet, and the actuating means includes a pair of legs which straddle the finger and act against the trailing end of the master sheet to tuck the same under the finger during movement of the retainer member to the open position.

4. A retaining device as set forth in claim 1 in which there is provided a cylinder in printing relationship with the printing machine drum and driven in synchronism therewith;

said actuating means being mounted on the cylinder and extending outwardly towards and slightly beyond the cylinder periphery at a location to cooperate with and actuate said retainer member.

5. A retaining device as set forth in claim 1 which further includes a plurality of retainer members, each said retainer member having a finger for holding the margin of the trailing end of the master sheet; and

the actuating means comprises pairs of legs, one associated with each said finger, which straddle the finger and act against the trailing end of the master in the vicinity of the finger.

6. A retaining device as set forth in claim 1 in which the retainer member includes a finger for holding the margin of the trailing end of the master sheet; and

the actuating means comprises a clearance notch for passage of the finger therethrough when the retainer member is in the closed position.

7. A retaining device as set forth in claim 1 in which the retainer member is mounted for movement about a pivotal axis parallel to the axis of the drum and includes a finger for holding the margin of the trailing end of the master sheet, said

finger terminating proximate the cylinder periphery at a position trailing the pivotal axis of the retainer member.

8. A retaining device for securing the trailing end of a master sheet on the periphery of a master cylinder having a lengthwise extending gap formed in its periphery, and an impression cylinder in printing relationship with the master cylinder, said impression cylinder having a lengthwise extending gap formed in its periphery in opposed relation to the gap in the master cylinder; said retaining device comprising:

a retainer member rockably mounted in the master cylinder and projecting into the gap adjacent the cylinder periphery, said retainer member being movable from a first position to a second position for receiving the trailing end of the master sheet extending partly across the gap of the master cylinder, and back to the first position in holding engagement with the margin of the trailing end of the master sheet;

actuating means mounted in the gap of the impression cylinder and extending outwardly towards and slightly beyond the cylinder periphery for acting against the trailing end of the master sheet which acts against the retainer member to move the same to the second position, and then to move the trailing end of the master sheet into the gap of the master cylinder and under the retainer member; and

resilient means associated with the retainer member for urging the same to the first position.

9. A retaining device for securing the trailing end of a master sheet on the periphery of a master cylinder having a lengthwise extending gap formed in its periphery, and an impression cylinder in printing relationship with the master cylinder, said impression cylinder having a lengthwise extending gap formed in its periphery in opposed relation to the gap in the master cylinder; said device comprising:

a retainer member rockably mounted in the master cylinder movable from a closed position to an open position and back to closed position in holding engagement with the trailing end of the master sheet extending partly across the gap;

means for urging the retainer member towards the closed position; and

actuating means mounted in the gap of the impression cylinder for moving the retainer member to the open position.

10. A retaining device for securing the trailing end of a master sheet on the periphery of a printing machine drum having a lengthwise extending gap formed in its periphery, said device comprising:

a retainer member movably mounted in the drum at said gap;

means for moving the retainer member from a closed position to an open position for receiving the trailing end of the master sheet when the master sheet extends to partly

bridge the gap, and back to the closed position in holding engagement with the margin of the trailing end of the master sheet;

actuating means acting against the trailing end of the master sheet which acts against the retainer member for moving the retainer member to the open position and the trailing end of the master sheet into the gap and under the retainer member; and

means associated with the retainer member for urging the retainer member towards the closed position.

11. In a duplicating system having a master cylinder provided with a lengthwise extending gap formed in its periphery and a retaining device for securing the trailing end of a master sheet on the periphery, said device comprising:

a retainer member mounted in the master cylinder and projecting into the gap adjacent said periphery, said retainer member being movable from a closed condition to an open condition and return to the closed condition;

means for urging the retainer member from the open condition to the closed condition for holding engagement with the trailing end of a master sheet extending partly across the gap; and

actuating means acting against both the trailing end of the master sheet and the retainer member for moving the retainer member to the open condition and the trailing end of the master sheet into the gap into said holding engagement to be held in the gap by the retainer member upon return of the retainer member to the closed condition.

12. The invention as defined in claim 11 wherein the means for urging the retainer member from the open condition to the closed condition includes biasing means,

whereby the retainer member is moved against the biasing means to the open condition and is moved under the biasing means to the closed condition.

13. In a duplicating system having a retaining device for securing the trailing end of a master sheet on the periphery of a printing machine drum having a lengthwise extending gap formed in its periphery, said device comprising:

a flexible retainer member mounted in the drum at said gap, said retainer member being normally in a master sheet holding condition for holding engagement with the trailing end of a master sheet when the master sheet extends partly across the gap and being conditionable by flexure for a non-holding condition; and

actuating means acting against both the trailing end of the master sheet and the retainer member for altering the retainer member condition from the master sheet holding to the non-holding condition and for moving the trailing end of the master sheet into the gap into said holding engagement to be held in the gap by the retainer member upon return of the retainer member to the master sheet holding condition.

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