

[54] TAKE-OFF GRIPPERS IN PRINTING PRESSES

[75] Inventors: **Franz Theisz**, Munich; **Max Pollner**, Schleissheim; **Roland Holl**, Weiterstadt, all of Germany

[73] Assignee: **Roland Offsetmaschinenfabrik Faber & Schleicher AG**, Germany

[22] Filed: **Mar. 6, 1974**

[21] Appl. No.: **448,629**

[30] **Foreign Application Priority Data**

Mar. 9, 1973 Germany..... 2311633

[52] U.S. Cl. 271/85; 214/1 BD; 271/204

[51] Int. Cl. **B65h 29/10**

[58] Field of Search 271/85, 174, 189, 204, 271/205, 206, 84, 268, 136, 183; 214/1 BB, 1 BD

[56] **References Cited**

UNITED STATES PATENTS

2,779,592	1/1957	Hartman	271/136 X
2,927,792	3/1960	Goss	271/136
3,245,682	4/1966	Pfleger et al.	271/136
3,779,545	12/1973	Schuhmann et al.	271/183

Primary Examiner—Richard A. Schacher
Assistant Examiner—Bruce H. Stoner, Jr.
Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[57] **ABSTRACT**

A take-off gripper mechanism for removing sheets from a conveyor associated with a printing press and for depositing such sheets on a pile. A gripper is mounted upon a pendulously pivoted gripper arm operated by a reciprocating push rod having a cam for retracting the gripper arm and a spring for advancing it in accordance with the cam profile. A stop, which reciprocates with movement of the push rod, cooperates with a latch which is movable between latching and released positions. Means are provided for moving the latch into its latching position so that the push rod, arm and gripper are blocked in disabled position, retracted from the pile of sheets and out of the way of oncoming sheets on the conveyor. The latch and its stop are so constructed as to permit the stop to wipe idly by the latch into latched position. This is accomplished by camming the latch out of the way and by interposing a spring between the latch and latch operator for accommodating the camming movement.

3 Claims, 2 Drawing Figures

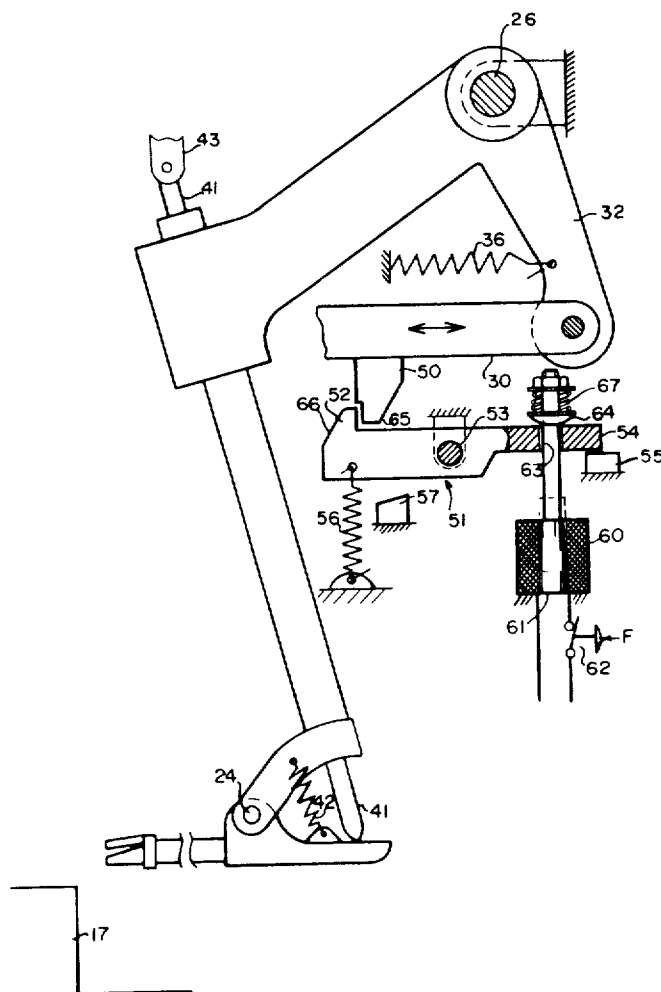


FIG. 1

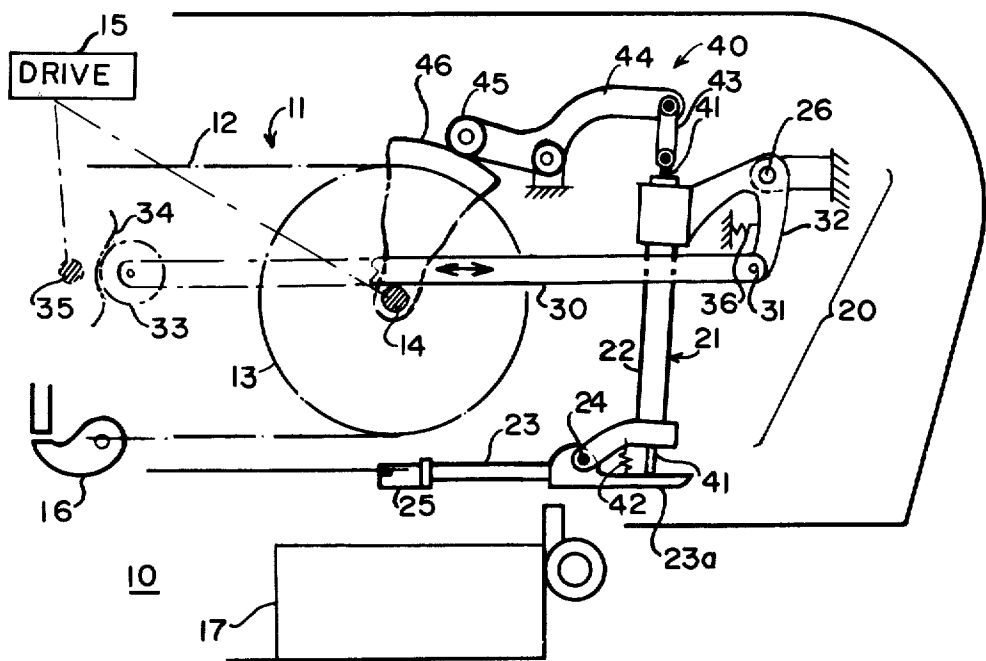
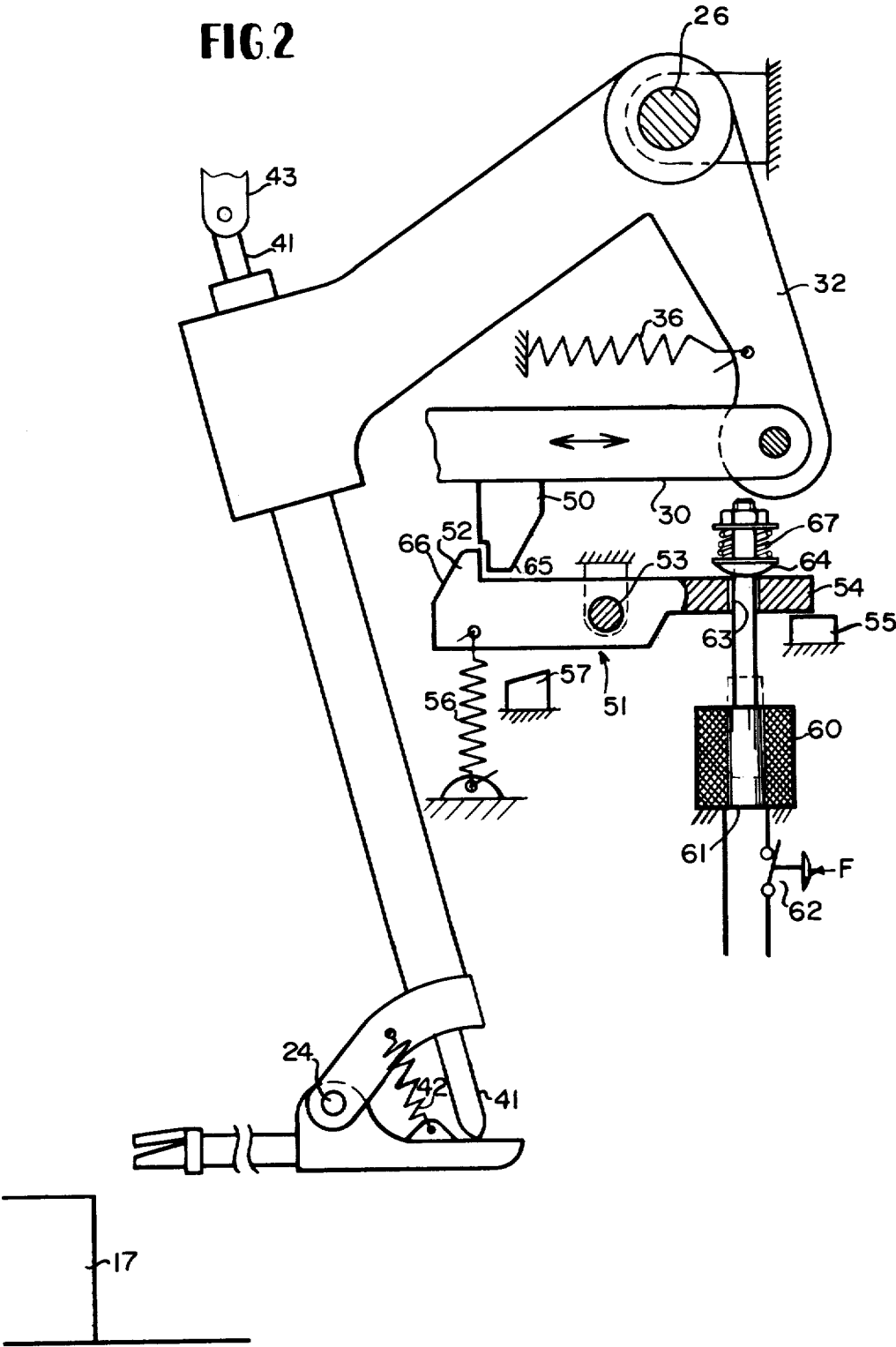


FIG. 2



TAKE-OFF GRIPPERS IN PRINTING PRESSES

When operating a printing press at high speed, sheets must be conveyed away in quick succession. When a sheet or a series of sheets is poorly engaged by the conveyor or when buckling occurs as a result of taking an inspection sheet, the result may be a jamming condition in which sheets are piled up in a crushed state thereby endangering the various parts of the delivery mechanism. In order to protect the take-off gripper mechanism against damaging itself or associated parts, pressmen have in the past resorted to manually holding back the arm of the take-off gripper which, because of its rapid swinging motion, constitutes a severe safety hazard.

It is accordingly an object of the present invention to provide means for promptly disabling the sheet take-off mechanism by remote action and prior to shut down of the entire press installation. It is a related object to provide means for safely and promptly stopping the action of the take-off mechanism in the event of an incipient or actual jamming condition and before the reciprocating movement of the take-off arm can result in damage to the delivery mechanism or create a hazard to the press operator.

It is a more specific object of the present invention to provide means for disabling the take-off mechanism in its retracted position, safely withdrawn from the conveyor and pile of sheets, free of any stress or risk, by isolating the take-off mechanism from the cam which normally drives it. It is a related object of the invention in one of its aspects to provide a take-off gripper having both horizontal and vertical motion and in which means are provided for disabling the hazardous horizontal component of motion while leaving the harmless vertical component unaffected.

It is an object of the invention in one of its aspects to provide a latch which is set into latching condition by an electric solenoid but in which resilient means are interposed between the solenoid and the latch for accommodating the camming of the latch which occurs when the latter is struck by a movable, cooperating stop.

It is a general object of the present invention to provide disabling means for a take-off mechanism which is safe to the operator and to the machine itself and which may be incorporated, with only trivial expense in sheet delivery mechanisms of new design or, as an attachment, to sheet delivery mechanisms which are already in the field. It is a further general object to provide a latching arrangement which is simple, utterly reliable, and free from any problems of wear or maintenance.

Other objects and advantages of the invention will become apparent upon reading the attached detailed description and upon reference to the drawings, in which:

FIG. 1 is a diagram showing a sheet delivery mechanism to which the invention is applied, with certain portions of the mechanism being schematically indicated by dot-dash lines; and

FIG. 2 shows the invention with a portion of FIG. 1 repeated at an enlarged scale, and with the gripper arm in retracted position.

While the invention has been described in connection with a preferred embodiment, it will be understood that we do not intend to be limited to the particular embodiment shown but intend, on the contrary, to cover the various alternative and equivalent constructions in-

cluded within the spirit and scope of the appended claims.

Turning now to FIG. 1, there is shown a sheet delivering mechanism 10 having a conveyor 11 in the form of an endless chain 12. The chain 12 is trained about suitable pulleys, one of which is indicated at 13 having a shaft 14 connected to a source of driving power 15. Arranged at spaced intervals along the conveyor chain 12 are grippers 16, only one of which is shown, and the construction of which, per se, is not part of the present invention. Located under the "end" portion of the conveyor is means for defining a pile of sheets 17.

For the purpose of removing sheets, one-by-one, from the grippers on the conveyor chain we provide a take-off mechanism 20. The take-off mechanism includes a take-off arm 21 which is of L shape, made up of vertical member 22 and a horizontal member 23 which are pinned together by a pin 24. Connected to the end of the horizontal member 23 is a take-off gripper 25. The arm 21 is pendulously pivoted, at its upper end, for swinging movement about a stationarily mounted pin 26. For oscillating the take-off arm 21, a reciprocating push rod 30 is provided which, at its right-hand end, has a pin connection 31 with vertical operating arm 32 which is integral with the take-off arm.

To positively move the push rod 30 in the gripper-retracting direction, that is, to the right as viewed in the figures, the push rod is provided at its left-hand end with a cam follower 33 which engages a cam 34 having a shaft 35, the shaft being coupled, as indicated, to the drive mechanism 15 for movement in synchronism with the movement of the conveyor chain. While the specific profile of the cam 34 is a matter of detailed design, the cam may be understood to be of "heart" shape, with the cam follower, in FIG. 1, shown occupying the "low" point and with the take-off gripper 25 thus in its forwardly advanced position.

For moving the push rod 30 impositively toward its advanced position, and for keeping the cam follower normally bottomed on the profile of the cam, a return spring 36 is provided, connected to the operating arm 32, and anchored, at its opposite end, to the frame.

In order to impart to the gripper 25 a vertical component of movement, which is in addition to its horizontal swinging movement, an auxiliary mechanism 40 is provided which includes a plunger 41 telescoped within the vertical member 22. The lower end of the plunger engages an extension 23a on the member 23, the latter member being "bottomed", with respect to the tip of the plunger, by means of a biasing spring 42.

For the purpose of actuating the plunger 41 in a sequence which is timed with the phasing of horizontal movement, a linkage is provided which consists of a simple link 43 which is connected to one end of a centrally pivoted lever 44. The opposite end of the lever carries a cam follower 45 which rides against the profile of an auxiliary cam 46. The cam 46, only a portion of which is shown, is mounted upon the conveyor shaft 14.

It will be apparent, then, that as the cam 34 is rotated by the drive 15, the push rod 30 is positively pushed to the right, that is, in a direction to retract the gripper 25. At the same time, rotation of the cam 46, by rocking of the lever 44, imparts a vertical component of movement to the take-off gripper 25. After the push rod 30 has been fully pushed to its retracted position and the

"high" of the cam 34 has been reached, the return spring 36 on the operating arm 32 causes the cam follower 33 to follow the profile of the cam, impositively, in the left-ward or advancing direction. Such cycle is endlessly repeated, causing the take-off gripper to traverse a closed loop path in which the gripper 25 grips the leading edge of a sheet carried by the gripper 16 on the conveyor chain. When the gripper on the conveyor chain is released from the sheet by a conventional means (not shown), the take-off gripper is accelerated in the retracting direction to remove the sheet from the conveyor and to release the sheet over the pile 17 onto which it settles by gravity. The means for producing timed operation of the take-off gripper 25 is entirely conventional and outside of the scope of the present invention.

In accordance with the invention, a stop is coupled to the push rod for reciprocating movement therewith, and a latch is arranged adjacent the path of movement of the stop, the latch being mounted for movement between a latching position and a released position, the latch in latching position serving to captively retain the stop so that the push rod 30, arm 21 and gripper 25 are thereafter held in retracted position, accompanied by stressing of the spring 36 and separation of the cam follower 33 from the cam 34.

Thus, referring to FIG. 2, a stop 50 is provided secured to the lower edge of the push rod and which co-operates with a centrally pivoted latch 51 having a hook 52, pivot 53, and tail 54. The tail 54 is positioned, with the latch in latching position, by a stop 55. For biasing the latch to its released position, a biasing spring 56 is provided having an associated stop 57.

The means for moving the latch to its latching position includes a solenoid 60 having a plunger 61, the solenoid being connected in an electrical circuit which includes a pushbutton or other type of switch 62. The upper end of the plunger extends through a clearance opening 63 in the latch and terminates in an abutment or shoulder 64.

In accordance with one of the aspects of the invention, a sloping surface is interposed between the stop 50 and latch 51 so that when the latch is moved to the illustrated latching position, the stop 50 is enabled to "wipe" idly by the latch into position behind the latch hook where the stop is subsequently retained. In the present instance, two sloping surfaces are used, which cooperate with one another, a surface 65 on the stop and 66 on the latch which, upon engagement, cooperate with one another to cam the left-hand end of the latch member downwardly. For the purpose of accommodating such idle camming movement, the abutment 64 on the solenoid plunger is not rigidly connected to the plunger but is coupled to the plunger via a coil spring 67.

On advantage of such arrangement is that the operating pushbutton 62 may be pressed at any time regardless of the phase position of the push rod. Thus, when the solenoid is energized imparting clockwise rocking movement to the latching member to place it in its latching condition, the chances are that the stop member 50 will be at some position to the left of the latch. However, as the push rod 30 moves to the right, and the sloping surfaces 65, 66 come into engagement, the latch is cammed in a counterclockwise direction, with yielding accommodation at the spring 67, so that the latch may move without corresponding movement of

the solenoid plunger. After the stop 50 "clears" the hook 52, the latch member is again rocked into the illustrated position so that the push rod is captively retained to disable the take-off arm against further advancing movement. Retention of the push rod maintains the return spring 36 in its extended condition, disabling the return spring so that it is no longer effective in maintaining the push rod 30 bottomed on the surface of cam 34, so that the cam follower 33 is clear of the cam surface and any further rotation of the cam, therefore, takes place idly.

Since disablement of the take-off arm occurs with the latter fully retracted both from the conveyor and from the pile of sheets, there is no possibility that the take-off arm will worsen the jamming, or incipient jamming condition and no possibility that it will provide a risk to the mechanism or a hazard to the operator.

Thus, when the operator notes an incipient jam, his first and instinctive move is to press the disabling push-button 62 which can be done without any necessity for observing the phase position of the push rod. Note that while the take-off arm is immediately captively blocked against horizontal reciprocating movement, the vertical drive means consisting of lever 44 and plunger 41 is not affected and may be allowed to continue to operate idly until the drive 15, associated with the conveyor, is turned off. After the take-off arm has been silenced, the operator can then promptly, but in more leisurely fashion, cut off the main press drive to alleviate the jamming condition. There is no necessity or incentive for the operator to attempt to restrain the mechanism manually, as has been common in the past.

I claim as my invention:

1. In a sheet delivery mechanism for a printing press having a drive and a conveyor for conveying sheets individually in spaced relation, means defining a pile of sheets at the end of the conveyor, a take-off mechanism comprising an L-shaped take-off arm having a horizontal member and a vertical member, the horizontal member having a take-off gripper at its end and the vertical member being pendulously pivoted for horizontal swinging movement of the gripper between an advanced position and a retracted position, a reciprocating push rod coupled to the vertical leg at one end and having a cam follower at the other, a cycling cam coupled to the drive for causing the push rod to positively retract the arm and gripper, a return spring coupled to the arm for impositively advancing the arm and gripper while maintaining the cam follower seated against the cam thereby to swing the take-off arm so that the gripper thereon removes sheets from the conveyor and deposits them one by one on the pile, a stop coupled to the push rod for reciprocating movement therewith, a latch arranged adjacent the path of movement of the stop and mounted for movement between a latching position and a released position, and means for temporarily holding the latch in latching position so that upon movement of the push rod by the cam to retracted position the latch captively engages the stop so that the rod, arm and gripper are thereafter held in retracted position accompanied by stressing of the return spring and separation of the cam follower from the cam so that the take-off member is disabled in a position retracted away from the pile and out of the way of oncoming sheets on the conveyor.

2. The combination as claimed in claim 1 in which the horizontal and vertical members are pinned to-

5

gether for relative rocking movement and in which means including an auxiliary cam and cam follower coupled to the drive are provided for imparting a synchronized vertical swinging movement to the horizontal member as it moves between its advanced and retracted positions.

3. In a sheet delivery mechanism for a printing press having a drive and a conveyor for conveying sheets individually in spaced relation, means defining a pile of sheets at the end of the conveyor, a take-off arm having a take-off gripper at its end and mounted for horizontal movement of the gripper between an advanced position and a retracted position, means including a driven member connected to the arm for cyclicly retracting and advancing the arm and gripper thereby to cycle the gripper along a path of movement for removing sheets from the conveyor and for depositing them one by one

6

on the pile, a stop coupled to the arm for movement therewith, a latch arranged adjacent the path of movement of the stop and mounted for movement between a latching position and a released position, means including an electromagnet for temporarily holding the latch in latching position, a sloping surface interposed between the stop and latch so that the latch is momentarily cammed out of the way as the arm is moved to its fully retracted position followed by latching of the arm in its fully retracted position, and a spring interposed between the electromagnet and the latch for accommodating the cammed movement of the latch as it is engaged by the stop so that the arm and gripper are thereafter held in retracted position away from the pile and out of the way of oncoming sheets on the conveyor.

* * * * *

20

25

30

35

40

45

50

55

60

65