

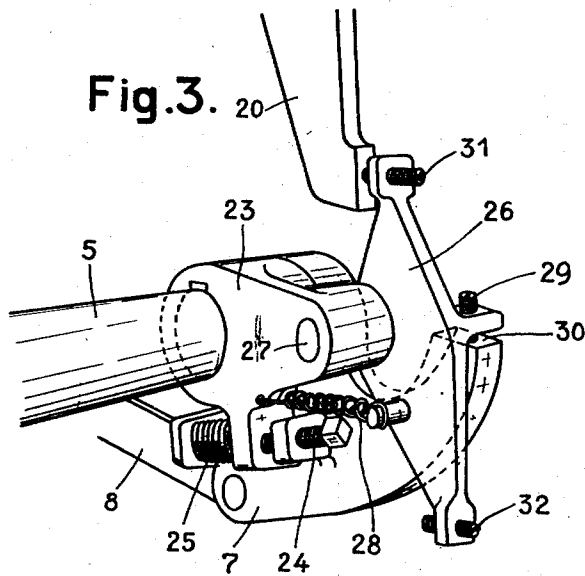
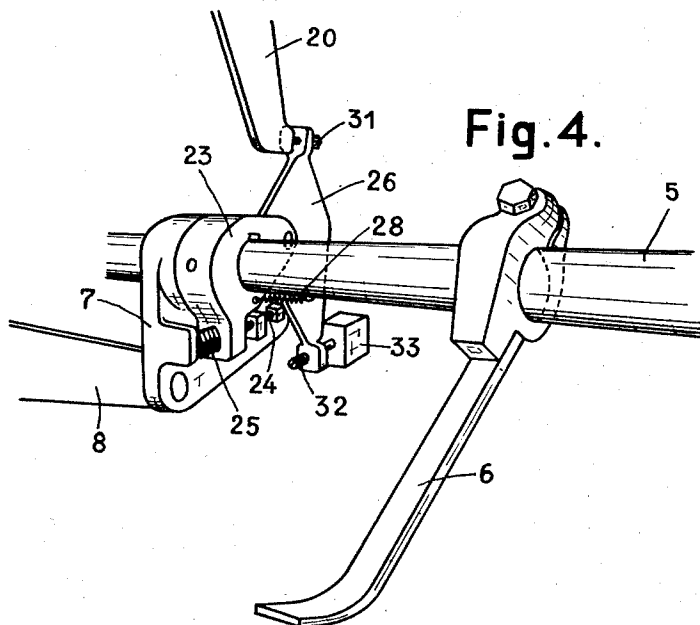
Dec. 25, 1951

H. BOBST
CONTROL MECHANISM FOR THE DELIVERY
STACK OF SHEET WORKING MACHINES

2,579,541

Filed April 19, 1946

3 Sheets-Sheet 2



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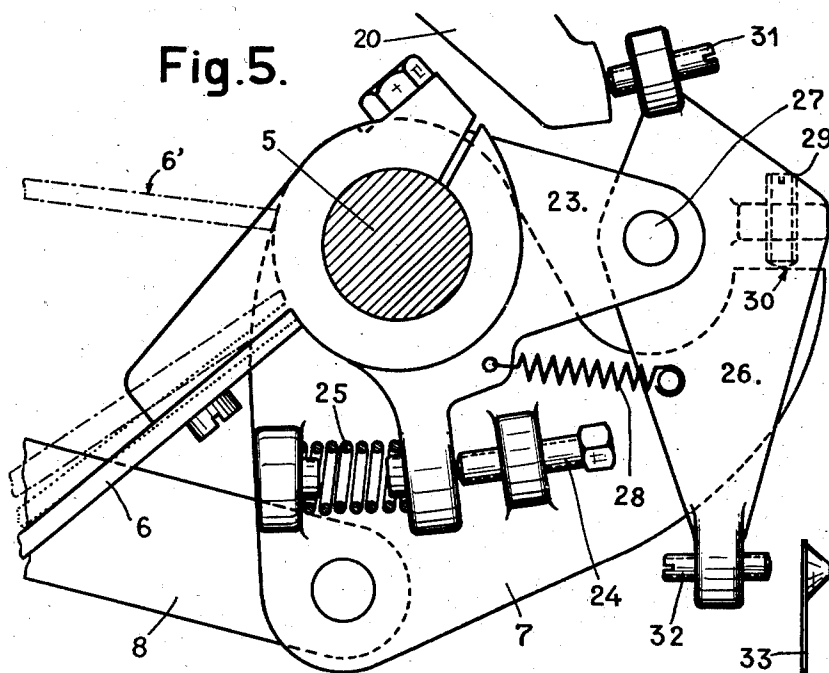
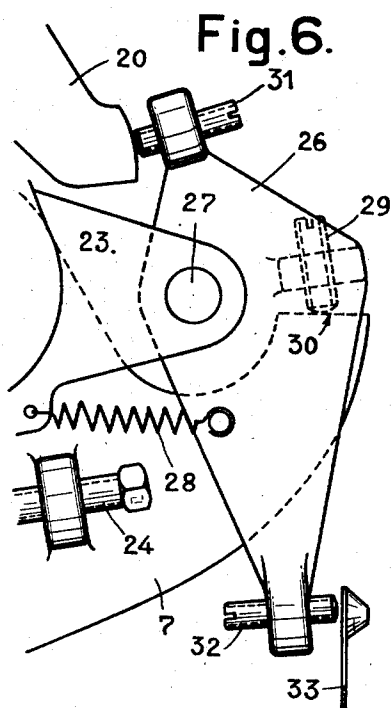
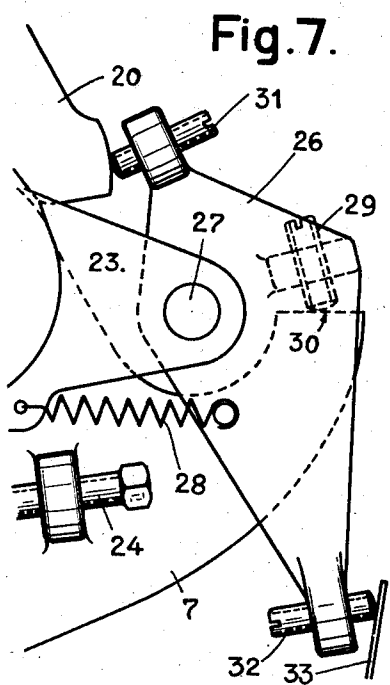
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UNITED STATES PATENT OFFICE

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CONTROL MECHANISM FOR THE DELIVERY
STACK OF SHEET WORKING MACHINES

Henri Bobst, Lausanne, Switzerland

Application April 19, 1946, Serial No. 663,396
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5 Claims. (Cl. 271-88)

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The present invention relates to control mechanism for the formation of a stack of sheets delivered by a machine working such sheets.

Such a mechanism can be applied for instance to printing machines, to cutting out machines and generally to machines intended to work sheets of paper, cardboard, or the like.

As in other machines of this kind, the said mechanism carries the stack of sheets on a support sinking according to needs, so that the upper or last delivered sheet is always at the same level. The support, for example a plate, can be lowered by chains, endless screws, etc., the upper level being constantly controlled by a member hereafter called stack feeler, which rises each time a new sheet arrives and then sinks to operate the control.

Besides this feeler, such machines often have auxiliary means, for example a second stack feeler, acting on means operative to stop the machine if the height of the stack exceeds a predetermined maximum level.

As will be seen, the mechanism according to the present invention makes use of one feeler only. This acts on the sinking mechanism through the intermediary of elements which can perform three distinct functions: stopping the sinking mechanism as long as the stack does not exceed a predetermined height, actuating the said mechanism when at least this height is reached, and simultaneous stopping of the machine when this height is exceeded by a given quantity.

In the accompanying drawing showing an embodiment of the present invention given by way of example:

Fig. 1a is a front view of the mechanism;

Fig. 1b is a detail on an enlarged scale;

Fig. 2 is a vertical cross-section shown perpendicularly to the view of Figures 1a and 1b;

Figs. 3 and 4 are two partial perspective views, one front view and the other from the rear, of the part carrying the feeler and its support oscillating at a constant rate;

Fig. 5 is a view of this support and of the neighbouring members on an enlarged scale and when the feeler meets the upper sheet of the stack at a normal height;

Fig. 6 shows the position occupied by a part of the elements of Fig. 5 when the feeler meets the upper sheet of the stack at a height necessitating lowering of the latter; and

Fig. 7 is a similar view to that of Fig. 6, the level of the stack having however reached the height at which the machine must be stopped.

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In the example shown, the sheets issuing from a machine are assumed to be transported across this latter by gripping bars conducted by two endless chains moving parallel one to the other.

A shaft 1 is shown supporting a wheel 2 for one of the transporting chains 3, the other being in front of the drawing.

Fig. 2 shows the position of one of the gripping bars 4, whereas in Fig. 1 the lower section 3 of the chain has been sectioned to better show some essential parts, such as the shaft 5 crossing the frame and carrying in its center the feeler 6 which oscillates continually between its lowest position 6 and its highest position 6'. This movement is imparted to the feeler 6 by a support 7 driven by the connecting link 8, articulated to the lever 9 in turn driven by a connecting link 10 and which, in its turn, drives also the connecting links 11 and 12.

While the connecting link 12, as described in co-pending application Serial No. 661,302, filed April 11, 1946, drives other mechanisms not shown in correlation with the delivery of the sheets (opening the grippers of the gripper bars and controlling a safety device for stopping the machine in case of crowding, for instance), the connecting link 11 reciprocates relatively to a locking mechanism formed by an oscillating plate 13, carrying a pawl 14 which, by means of the ratchet wheel 15, can set in motion the chain 16 supporting the stack of sheets 17.

The to and fro movement of the connecting link 10 causes oscillation of the lever 9 up to 9', the amplitude of the oscillation corresponding to the movement allowed by the elongated hole 18 of the connecting link 11 without modifying the position shown in full line of the plate 13. By this same action, the support 7 is displaced each time to 7', this movement being also of constant amplitude.

A spring 19 urges constantly the plate 13 against the connecting link 11, but an oscillating lock 20, subjected to the influence of a spring 21, opposes this normally by the action of its nose 22 and maintains the plate 13 in a position in which a connecting pin 43 on the plate 13 is disposed intermediate the ends of a slot 18 of link 11 during all reciprocated positions of the latter.

It will be clearly seen that, if this nose 22 were to free the plate 13, the latter would immediately return to the position 13' by turning counter-clockwise in relation to the drawing, the amount allowed by the elongated hole 18 of the connecting link 11. The result of this would be

to push back the pawl about the value of two teeth on the ratchet wheel 15, which at the next movement of the connecting link 11 returning the plate 13 to its starting position, would turn all the more in a direction that may be taken as the sinking direction of the stack 17.

If, at the moment of return of the plate 13 to its starting position, the nose 22 does not immobilize it, it is also clear that, under the force exerted by the spring 19, it will follow the connecting link in its reciprocation, i. e. that it will swing with its pawl and that the stack will continue to sink at each stroke.

This mechanism offers only one particular solution of a sinking mechanism controllable by means such as the lock 20. In conjunction therewith, the support 7 carries, on one hand the lug 23, held between the screw abutment 24 and the pressure spring 25, and on the other hand rocker member 26, supported by the pivot 27 of the lug 23 and induced to turn round this pivot under the action of the traction spring 28, but resting by means of the screw abutment 29 on a rest 30 of the support 7.

The lug 23 is rigid with shaft 5, supporting the feeler 6.

The rocker 26 carries also two other screw abutments 31 and 32, of which 31 cooperates with the free end of the oscillating lock 20 opposed to the nose 22, while abutment 32 cooperates with a switch 33, the purpose of which is to close a circuit causing stoppage of the machine and of the mechanism which it controls.

The operation of rocker member 26 is dependent on certain conditions in correlation with the control operations of the feeler.

In the normal position of the upper level of the stack, in which the feeler oscillates between 6 and 6', the support 7 oscillates between 7 and 7' and all the elements that the latter drives and carries follow without any of these latter becoming displaced in regard to each other.

The rocker 26, in particular, alternatively leaves the position shown and returns to it, which carries away and then back successively the screws 31 and 32 without displacing the lock 20 or contacting the switch 33.

The stack remains in position and the machine operates without impediment.

But, if as result of the constant delivering of new sheets, the level of this stack increases, the feeler will prematurely stop on its way down and will therefore at a given moment be unable to sink lower than the position in dotted lines of Fig. 5. The shaft 5 supporting the feeler, as well as the lug 23 will also be stopped in their rotary movement, before completing the total swing which the support 7 being free to turn relative to the shaft 5 undergoes regularly. The result is a difference of amplitude.

Although the rest 30 is brought at each cycle to the same extreme upper position, seen in the three Figs. 5 to 7, this is not the case with the pivot 27 of the lug 23, which is arrested by the feeler and loses contact with the screw abutment 24 while the spring 25 is compressed.

The elements described then take up the limit position, as shown in Fig. 6, in which the pivot 27 occupies, in relation to the rest 30, a lower level than in the normal position of the Fig. 5.

The rocker 26 is thus constrained to oscillate so that its screw abutment 31 approaches the lock, whereas its spring 28 is subjected to a slight tension.

In this new position, the screw abutment 31 will

not only brush the lower end of the oscillating lock 20 but will displace it through a given angle, thus bringing its nose 22 into the position shown in dotted line in the detailed Fig. 1b. The plate 13 is thus freed and responds to the action of the spring 19, to take part in the movement of the connecting link 11, rotating the panel and ratchet 14 and 15.

The direction of this rotation being such as to cause sinking of the stack 17, after a single to and fro movement of the connecting link 11 and a single oscillation of the feeler 22, the plate 13 will again be immobilized and the adjustment interrupted.

If on the contrary this adjustment should not be sufficient, the feeler would continue, at each sinking movement, to occupy a limit position setting in motion the above operation as long as the level of the stack is too high.

Everything so far described is repeated as a matter of course each time it is necessary, as long as the sheets are delivered. However there may be another case, where the stack, for some reason or other has not sunk or has stopped at a height likely to impede the machine from working well. This can as properly come from blocking as from the normal result of an incomplete discharging of the stack.

To remove the stack generally after lowering it a little by hand, a grating 34 (see Fig. 2) is placed on a level slightly lower than the normal upper level, on which the sheets then are allowed to fall while the rest of the stack is removed and the plate supporting it rises to beneath the said grating.

But, if for example the operator forgets to take out the grating, it is obvious that the pile will not be able to come down and that its upper level will rise as the sheets continue to be delivered. The feeler will therefore soon reach a position where it is useless to set in motion the chain 16, since the sheets are stopped by the grating. From the position 6 the feeler will thus pass little by little to the position in dotted line of Fig. 5, then to the further position in dot and dash which follows it.

The lug 23 therefore being stopped now even sooner in its oscillating movement, the difference of level between its pivot 27 and the rest 30 will only be increased thereby, assuming proportions shown in Fig. 7 where difference of amplitude is increased to a maximum.

Taking the rest 30 as a constant support, the rocker 26 will be more inclined than in the preceding case (Fig. 6) proportionately stretching the spring 28 and pushing back the lower end of the oscillating bolt 22, of which the nose will occupy the position in dot and dash of Fig. 1b.

This displacement will in no way modify the sequence of the regulating operations which are moreover useless owing to the presence of the grating. As a result of the strong inclination of the rocker 26, its lower screw abutment 32, which until now was kept away from the switch 33 (Fig. 5) or approached it without setting it in motion, will push it (Fig. 7) and close the electric circuit. The result of closing this circuit is the immediate stoppage of the whole machine, and all accidents are avoided until whatever impeded smooth running of the machine has been repaired.

The functions of the mechanism according to the invention are extremely simple and may be summarized as follows: a to and fro movement

of constant amplitude is imparted to a given member (support 7), independently of the operations to be controlled or regulated, while another member, capable of participating in this movement, disassociates itself more or less according to the level reached by the stack and measured by the feeler, while a further member hangs free (the rocker 26) and measures to some extent the deviation caused and, according to the size of this latter, causes the pile to sink or stops the machine.

It is of course understood that the chains supporting the stack can be moved by hand. This is particularly well shown in Fig. 2.

On the shaft 35 supporting these chains is arranged a hand wheel 36, while shaft 35 is, on the other hand, connected with the ratchet 15 by means of a second ratchet 37 and a pawl 38 acting in the opposite direction of the pawl 14 and of the ratchet 15.

The stack can therefore be raised by hand by putting the shaft 35 and its ratchet 37 in motion in the direction in which it unmeshes from pawl 38, and it can also be lowered by rotating, by means of the same mechanism, the ratchet 15 which unmeshes in this case tooth by tooth from the pawl 14. As, however, any descent of the stack by its own weight must be obviated, the ratchet 15 is braked, having to this end a sleeve 42, extending through the frame 39 of the machine and frictionally braked by the action of the discs 40 subjected to the pressure of a spring 41.

In the case where the stack is lowered by hand, it will be necessary to overcome by means of the hand wheel 36, the friction of discs 40 caused by the spring 41.

What I claim is:

1. In a sheet working machine wherein the sheets are delivered from the machine to a stack, and having a mechanism for lowering the stack including a rotatable actuating shaft; a control mechanism comprising a ratchet fixed on said actuating shaft, a plate rockably mounted on said actuating shaft, pawl means on said plate engaging said ratchet for rotating the latter in step-by-step manner in response to rocking of said plate, an oscillating lever fulcrumed intermediate its ends, a first connecting link pivotally connected to one end of said lever for reciprocation by the latter and formed with a longitudinal elongated slot, a pin fixed on said plate engaging in said slot, means locking said plate in a position where the pin thereon is intermediate the ends of said slot at all reciprocated positions of said first connecting link whereby the oscillation of said lever is not communicated to said plate for rocking the latter, a rockable feeler shaft, a swinging feeler fixed on said feeler shaft, a support disposed on said shaft and turnable relative to the latter, a second connecting link pivotally connecting said support to the other end of said oscillating lever, resilient means operatively connecting said support to said feeler shaft so that the angular amplitude of the oscillation of said support is normally equal to the angular amplitude of the oscillation of said feeler, said feeler being normally angularly related to said support so that contact of said feeler with the top of the stack when the latter has reached a predetermined height restricts the angular amplitude of the oscillation of said feeler to provide a differential between the angular amplitudes of the oscillation of said feeler shaft and said support, releasing means for said locking means oper-

atively connected to said feeler shaft and said support and operative in response to a predetermined differential between the angular amplitudes of oscillation of said support and said feeler shaft to release said locking means, and spring means connected to said plate constantly urging the latter to rock in one direction for disposing said pin against one end of said slot whereby release of said locking means renders said spring means effective to move said pin against said one end of said slot for transmitting the oscillation of said lever to said plate.

2. In a sheet working machine wherein the sheets are delivered from the machine to a stack, and having a mechanism for lowering the stack including a rotatable actuating shaft; a control mechanism according to claim 1, wherein said locking means includes a pivoted latching lever having a keeper formed on one end for engagement with said plate to resist rocking of the latter in the direction urged by said spring means, and second spring means connected to said latching lever and constantly urging the keeper formed on said latching lever into engagement with said plate; and wherein said releasing means, when operative, rocks said latching lever keeper away from said plate to release the latter and permit rocking thereof.

3. In a sheet working machine wherein the sheets are delivered from the machine to a stack, and having a mechanism for lowering the stack including a rotatable actuating shaft, and means for stopping the machine including an electric circuit effecting the stopping of the machine when closed; a control mechanism comprising a ratchet fixed on said actuating shaft, a plate rockably mounted on said actuating shaft, pawl means on said plate engaging said ratchet for rotating the latter in step-by-step manner in response to rocking of said plate, an oscillating lever fulcrumed intermediate its ends, a first connecting link pivotally connected to one end of said lever for reciprocation by the latter and formed with a longitudinally elongated slot, a pin fixed on said plate engaging in said slot, means locking said plate in a position where the pin thereon is intermediate the ends of said slot at all reciprocated positions of said first connecting link whereby the oscillation of said lever is not communicated to said plate for rocking the latter, a rockable feeler shaft, a swinging feeler fixed on said feeler shaft, a support disposed on said shaft and turnable relative to the latter, a second connecting link connecting said support to the other end of said oscillating lever, resilient means operatively connecting said support to said feeler shaft in a manner so that the angular amplitude of the oscillation of said support is normally equal to the angular amplitude of the oscillation of said feeler, said feeler being normally angularly related to said support so that contact of said feeler with the top of the stack when the latter has reached a predetermined height restricts the oscillation of said feeler to provide a differential between the angular amplitudes of the oscillation of said feeler shaft and of said support, releasing means for said locking means operatively connected to said feeler shaft and said support and operative in response to a predetermined differential between the angular amplitudes of oscillation of said support and said feeler shaft to release said locking means, spring means connected to said plate constantly urging the latter to rock in one direction for disposing said pin

against one end of said slot whereby release of said locking means renders said spring means effective to move said pin against said one end of the slot for transmitting the oscillation of said lever to said plate, a normally open switch interposed in said electric circuit, and switch closing means actuated by said support and said feeler shaft, said switch closing means being constructed and arranged to close said normally open switch in response to a predetermined differential between the angular amplitudes of the oscillation of said support and said feeler, which last mentioned differential is substantially greater than said differential to which said releasing means is responsive.

4. In a sheet working machine wherein the sheets are delivered from the machine to a stack, and having a mechanism for lowering the stack including a rotatable actuating shaft; a control mechanism comprising a ratchet fixed on said actuating shaft, a plate rockably mounted on said actuating shaft, pawl means on said plate engaging said ratchet for rotating the latter in step-by-step manner in response to rocking of said plate, an oscillating lever fulcrumed intermediate its ends, a first connecting link pivotally connected to one end of said lever for reciprocation by the latter and formed with a longitudinally elongated slot, a pin fixed on said plate and engaging in said slot, spring means connected to said plate and urging the latter to rock in one direction for disposing said pin against one end of said slot for transmitting the oscillation of said lever to said plate, a pivoted latching lever having a keeper formed on one end for engagement with said plate to hold the latter in a position where said pin is intermediate the ends of said slot at all reciprocated positions of said first connecting link so that the oscillation of said lever is not then communicated to said plate, second spring means connected to said latching lever and constantly urging said keeper on the latter into engagement with said plate, a rockable feeler shaft, a swinging feeler fixed on said feeler shaft, a support disposed on said shaft and turnable relative to the latter, a second connecting link pivotally connecting said support to the other end of said oscillating lever, resilient means operatively connecting said support to said feeler shaft so that the angular amplitude of the oscillation of said feeler shaft is normally equal to the angular amplitude of the oscillation of said feeler, said feeler being normally angularly related to said

support so that contact of said feeler with the top of the stack, when the latter has reached a predetermined height, restricts the angular amplitude of the oscillation of said feeler to provide a differential between the angular amplitudes of the oscillation of said feeler shaft and of said support, a radially extending arm fixed on said feeler shaft, a rocker pivoted on the free end of said arm, a supporting surface on said support spaced radially from the axis of oscillation of the latter, and an abutment on said rocker spaced from the axis of pivoting of the latter for contact against said supporting surface so that said rocker is immobile relative to said arm when the angular amplitudes of the oscillations of said feeler shaft and of said support are equal and is pivoted relative to said arm when a differential exists between the angular amplitudes of such oscillations, one end of said rocker engaging said latching lever and rocking the latter for releasing said plate when said rocker is pivoted relative to said arm in response to a predetermined differential between the amplitudes of oscillation of said support and said feeler shaft.

5. In a sheet working machine wherein the sheets are delivered from the machine to a stack, and having a mechanism for lowering the stack including a rotatable actuating shaft and means for stopping the machine including an electric circuit effecting the stopping of the machine when closed; a control mechanism according to claim 4, including a normally open switch interposed in the electric circuit, and a switch closing abutment formed on the other end of said rocker to engage said normally open switch and close the latter when said rocker is pivoted a predetermined degree relative to said arm, said predetermined degree being substantially greater than the pivoting of said rocker relative to said arm which effects release of said latching lever keeper from said plate.

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