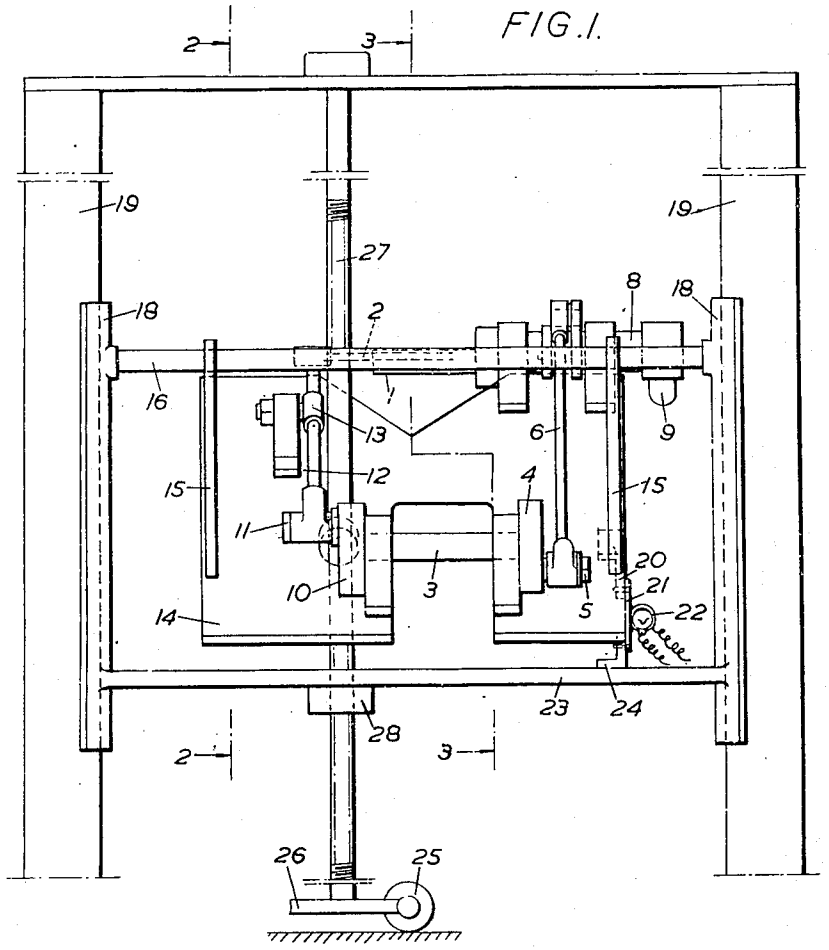
Dec. 22, 1953 A. E. ROSSWALL 2,663,567

DEVICE FOR COUNTING LEAVES OR SHEETS IN PILES OR PACKETS

Filed Aug. 25, 1951 3 Sheets-Sheet 1

FIG. 1.



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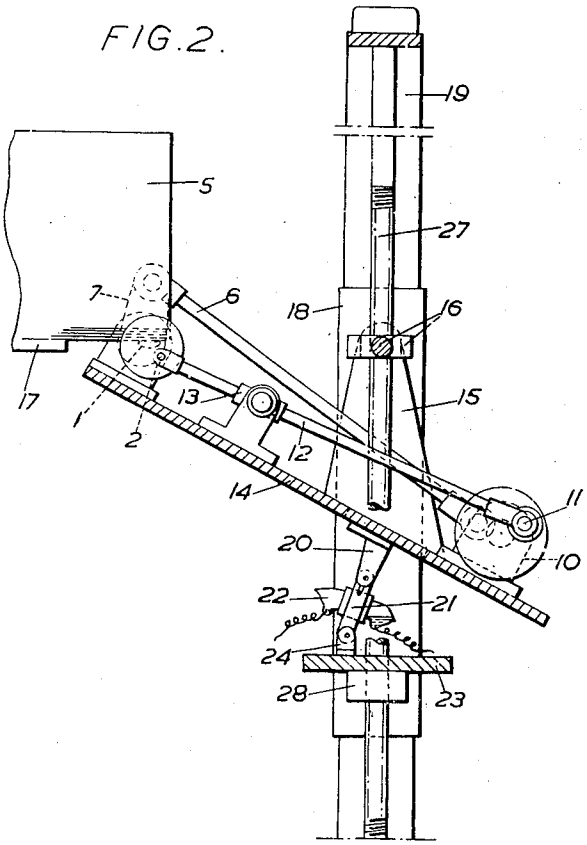
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DEVICE FOR COUNTING LEAVES OR SHEETS IN PILES OR PACKETS

Filed Aug. 25, 1951 3 Sheets-Sheet 2

FIG. 2.



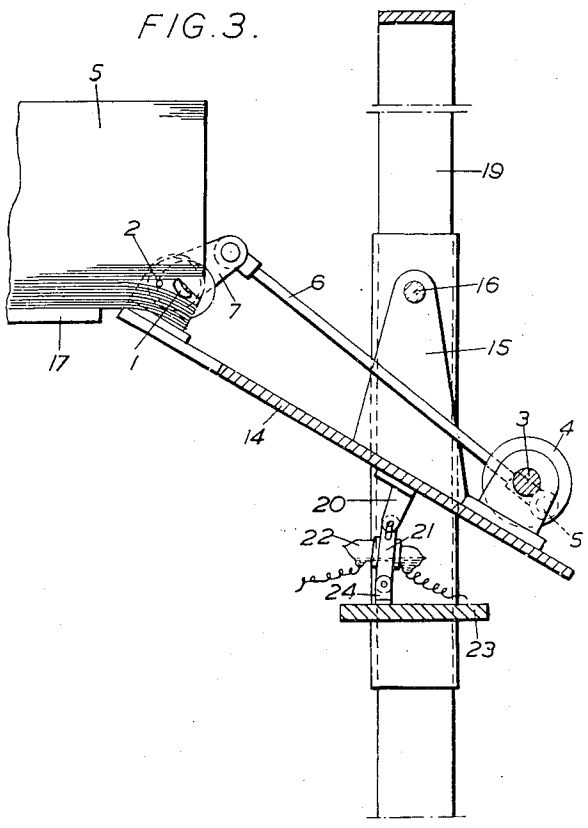
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DEVICE FOR COUNTING LEAVES OR SHEETS IN PILES OR PACKETS

Filed Aug. 25, 1951 3 Sheets-Sheet 3

FIG. 3.



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2,663,567

DEVICE FOR COUNTING LEAVES OR SHEETS IN PILES OR PACKETS

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Application August 25, 1951, Serial No. 243,680

3 Claims. (Cl. 271—18)

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This invention relates to improvements in devices for counting leaves or sheets in a pile or packet. The sheets may lie horizontally in a vertical pile or they may be mounted vertically in a packet. The invention belongs to the type of device described and claimed in United States Patent No. 2,393,814.

It frequently occurs that the pile or packet of sheets contains a large number of sheets and therefore has a considerable depth or thickness normal to the sheets and one object of the present invention is to allow for such movements of the suction nozzle and leaf shifter as will enable them to travel through the pile or packet.

This invention consists in a device for counting leaves or sheets in which the suction nozzle and the leaf shifter and their operating mechanism are carried on a support which has two independent movements, viz. (1) a tilting movement about a horizontal shaft to allow for the limited travel of the suction nozzle and leaf shifter in relation to the pile or packet, and (2) a positive intermittent movement of the support and its associated shaft in a direction normal to the sheets.

Broadly stated, the invention comprises a device for counting leaves or sheets horizontally held in a vertical pile or lying vertically in a packet characterised by the fact that the sheet-separating mechanism is mounted on a support (platform or frame) capable of tilting about a horizontal shaft and also capable of movement normal to the sheets in such a manner that the suction nozzle and the leaf shifter, while performing their work in the pile or packet, climb up or along the pile or packet thereby rotating the support around said horizontal shaft and further characterised by the fact that the device is provided with a lifting or shifting mechanism controlled by the support and serving to impart a lifting or shifting movement to said shaft in such a manner that each partial lifting or shifting movement of the shaft is initiated when the support, during the work of the sheet-separating mechanism in the pile or packet, has been rotated in one direction by a predetermined amount and is finished when the support, by the partial lifting or shifting movement of the shaft has been rotated in the opposite direction by a predetermined amount.

In the particular case where the sheets in a vertical pile lie horizontally, the invention is characterised by the fact that the sheet-separating mechanism is mounted on a support capable of tilting about a horizontal shaft and

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also capable of vertical movement in such a manner that the suction nozzle and the leaf shifter, while performing their work in the pile, climb up the pile, thereby rotating the support around said horizontal shaft, and further characterised by the fact that the device is provided with a lifting mechanism controlled by the sheet-separating mechanism and serving to impart a lifting movement to said shaft in such a manner that each partial lifting movement of the shaft is initiated when the support, during the work of the sheet-separating mechanism in the pile, has been rotated in one direction by a predetermined amount and is finished when the support, by the partial lifting movement of the shaft, has been rotated in the opposite direction by a predetermined amount.

Preferably the device comprising the suction nozzle and leaf shifter is supported by a platform or frame suspended from a horizontal shaft which is carried by a runner vertically movable on guides, which runner under control by the tilting of the supporting platform or frame, is caused to perform the intermittent lifting movement thereof. Thus the runner may be intermittently lifted by means of a rotary but axially stationary screwed spindle engaging a nut mounted on the runner.

In one form of the device an electric switch controlled by the rotation of the support about the horizontal shaft is adapted alternately to energise and de-energise an electric motor arranged to effect the necessary movement of the screwed spindle. The switch may be a mercury switch which is tiltable by the tilting movement of the support.

The nature of this invention and the manner in which it is performed will be appreciated from the embodiment of the invention illustrated in the accompanying drawings in which:

Figure 1 is a front view of the machine,

Figure 2 is an elevation of the machine as viewed in the direction of the arrows 2 in Figure 1, and

Figure 3 is another elevation of the machine as viewed in the direction of the arrows 3 in Figure 1.

The sheet-separating mechanism illustrated is of a construction known per se and comprises a suction nozzle 1 and an arm or leaf shifter 2 adapted to work in a vertical pile S of horizontal sheets to be counted, in such a manner that the nozzle attracts the sheets one by one and the arm 2 releases each sheet attracted by the suction nozzle. The suction nozzle is adapted

to be oscillated, for instance from a shaft 3 actuated in a manner not specifically shown, by means of a crank disc 4 secured thereto and having a crank pin 5, a pitman 6, a rocking lever 7 and a shaft 8 supporting the suction nozzle 1, said shaft being provided with a bore and, for instance, at 9 connected to a source of vacuum, whereas the arm 2 is adapted to be rotated around the suction nozzle 1 by means of a crank disc 10, a crank pin 11 and a pitman 12 passing through a sleeve 13 rotatively mounted.

According to the invention the entire sheet-separating mechanism is mounted for tilting or rotational movement about a horizontal shaft 16 which in the embodiment shown is secured by mounting the sheet-separating mechanism on a platform 14 which by means of arms 15 is coupled to said horizontal shaft 16. The system tilting about the shaft 16 is then so balanced that the platform 14 tends to rotate clockwise in Figures 2 and 3 under the influence of a non-balanced force of suitable size. The platform 14 will therefore occupy an inclined position in which the suction nozzle 1 according to Figure 2 is pressed by a suitable force against the bottom face of the lowermost sheet in the pile S which is supposed to be supported by a stationary base indicated at 17. Preferably the pile is so placed that the suction nozzle 1 is situated below one of the corners of the pile.

In experiments as made it has been found that the sheet-separating mechanism when mounted for tilting about the shaft 16 in the manner above described, said shaft being preferably situated approximately at the level of the suction nozzle 1, will, so to speak, by itself climb up the pile and then separate the sheets in the pile S individually by the oscillating movement of the suction nozzle 1 effected by the pitman 6, while the leaf shifter arm 2 by its rotating movement effected by the pitman 12 round the suction nozzle 1 releases each sheet attracted by the suction nozzle therefrom so that the suction nozzle then attracts the sheet immediately thereabove in the pile S. In this way the sheet-separating mechanism climbs up the pile S as may be seen from a comparison between Figures 2 and 3. This automatic climbing of the sheet-separating mechanism ensures that all of the sheets are actually separated one by one even if their thickness should vary.

After the sheet-separating mechanism in this manner has climbed up the pile S to a certain extent and the platform 14 thereby has been tilted from its position in Figure 2 to the position in Figure 3, the shaft 16 is raised a certain distance at a rate of speed exceeding the rate of speed at which the sheet-separating mechanism climbs up the pile whereby the platform 14 is moved to a position in which it is less inclined than in Figure 3, for instance occupies a position of inclination corresponding to that shown in Figure 2, but with the suction nozzle spaced at some distance from the bottom of the pile. Obviously, during this lifting movement of the shaft 16, the sheet-separating mechanism continues to climb up the pile S. The raising of the shaft 16 ceases when the platform 14 has been rotated to the lower position shown in Figure 2 and the shaft 16 remains then stationary until the sheet-separating mechanism has climbed up a further distance in the pile whereupon the shaft 16 once more is raised.

In the embodiment of the invention above described the intermittent lifting of the shaft 16 is effected in the following manner.

As may be seen from Figure 1, the shaft 16 is mounted in a runner 18 which is vertically movable on posts 19. Secured to the bottom face of the platform 14 is a lever 20 performing a rocking movement in response to the rotation of the platform 14 about the shaft 16 above described and engaging a lever 21 preferably by means of a pin and an oblong slot. The lever 21 forms a support for a switch in the form of a mercury tube 22 and is mounted for rotation on a base 23 associated with the runner, by means of an angular support 24 secured to the base 23. When the platform 14 occupies the position of inclination as shown in Figure 2 the lever 20 maintains the lever 21 in such a position that the mercury switch 22 is open, as indicated in Figure 2, but when the sheet separating mechanism according to the foregoing climbs up the pile, and the platform 14 then is rotated to occupy the position shown in Figure 3, then the lever 20 and thereby the lever 21 and the mercury switch 22 supported thereon are tilted to occupy such a position that the mercury switch is closed as indicated in Figure 3. Thus, current is supplied through the switch 22 to an electromotor diagrammatically indicated at 25 and resting on a floor or some other stationary base. The motor 25 actuates by means of a worm gear 26 an axially stationary rotary screw spindle 27 engaging a nut indicated at 28 and secured to the runner 18. Thus whenever the switch 22 by the rotation of the platform 14 is caused to occupy the position shown in Figure 3, the motor 25 is energized so that it will begin to rotate the screw spindle 27 whereby the latter by means of the nut 28 moves the runner up the posts 19. The shaft 16 is thereby raised which in turn results in that the platform 14 is caused to occupy the position of inclination shown in Figure 2 whereby the mercury switch 22 is inclined at such an angle that it is opened as indicated in Figure 2. Thus, the current to the motor 25 is interrupted and consequently the rotation of the screw spindle 27 ceases and, therefore, the runner stops. After the sheet separating mechanism according to the foregoing has climbed a further distance up the pile S the switch 22 is again closed whereby the screw spindle 27 is rotated by the motor 25 so that the runner and thereby the shaft 16 are once more raised.

Obviously the invention is not restricted to the form described in details in the foregoing and illustrated in the drawings but may be realised in many other forms within the scope of the subsequent claims. Thus, the raising movement of the shaft 16 need not be affected by an intermittently rotating electromotor but the rotation of the platform 14 may be utilised to produce the intermittent raising of the shaft 16 by purely mechanical means, for instance, by using the tilting movements of the platform 14 for engaging and disengaging a clutch by means of which a lifting mechanism for the runner is actuated from any suitable source of power.

Again, instead of using the platform 14, a frame mainly composed of two vertical side plates, may carry the shaft 16 and may also carry the spindles of the cranks 4 and 10 and other operating parts of the sheet transferring mechanism.

The device as a whole may be used for counting vertical sheets arranged in a packet and in that case the intermittent shifting of the horizontal shaft 16 takes place in the horizontal direction.

The successful operation of the suction nozzle 1 and the leaf shifter 2 results in the successive operation of a counter of the cyclometer type, and it is an important subsidiary feature of this invention that if, for any reason, the suction nozzle and leaf-shifter failed to shift a leaf, the counter or cyclometer should not advance by one unit. It will be understood that while the suction nozzle is pressed against a sheet and the sheet is lying snugly in the concave part of the suction nozzle, the degree of vacuum in the suction nozzle is fully maintained, but if there is no sheet actually closing the orifice or orifices in the concave portion of the suction nozzle, the degree of vacuum suddenly falls, and the actuating device of the counter or cyclometer is controlled by the degree of vacuum in the suction nozzle. Further there is on the front of the machine a vacuum gauge which shows when the vacuum supplied to the suction nozzle is above a predetermined figure (say 50 centimetres of water) and behind the vacuum gauge is a vertical chamber exposed to the vacuum and supplied with a microswitch which is adapted to cut out the main driving motor of the machine when the vacuum falls below the specified figure. The machine may be fixed and the packet may move.

I claim:

1. A device for counting leaves arranged in packet form, comprising an oscillatory pneumatic leaf detacher for successively engaging and detaching the leaves of a packet and a leaf shifter movable in a closed path about the leaf detacher whereby the leaves are successively shifted from one side to the other of said detacher, operating mechanism for the leaf shifter and leaf detacher, a support carrying the suction nozzle and the leaf shifter and their operating mechanism, a slide, a pivotal connection between the support and slide, which connection has a pivot axis parallel with the planes of the leaves, a slideway for the slide extending in a direction normal to the faces of the leaves, and means imparting intermittent movement to the slide along the slideway, said slideway being vertically disposed and the pivot axis of the connection between the support and the slide being horizontal whereby operation of the suction housing and the leaf shifter cause them to climb up the pile, thereby rotating the support about the horizontal axis, the lifting mechanism actuating the slide, a control therefor actuated by a predetermined rotation of the support in one direction so as to initiate the lifting movement and actuated by a predetermined rotation of the support in the opposite direction to stop the lifting mechanism.

2. A device for counting leaves arranged in packet form, comprising an oscillatory pneumatic leaf detacher for successively engaging and detaching the leaves of a packet and a leaf shifter movable in a closed path about the leaf detacher whereby the leaves are successively shifted from one side to the other of said detacher, operating mechanism for the leaf shifter and leaf detacher, a support carrying the suction nozzle and the leaf shifter and their operating mechanism, a slide, a pivotal connection between the support and slide, which connection has a pivot axis parallel with the planes of the leaves, a slideway for the slide extending in a direction normal to the faces of the leaves, and means imparting intermittent movement to the slide along the slideway, said means comprising an electric motor from a transmission between the electric motor and the slide, an electric switch in circuit with the motor, which switch is actuated by the pivotal movement of the platform about the horizontal axis.

3. A device for counting leaves arranged in packet form, comprising an oscillatory pneumatic leaf detacher for successively engaging and detaching the leaves of a packet and a leaf shifter movable in a closed path about the leaf detacher whereby the leaves are successively shifted from one side to the other of said detacher, operating mechanism for the leaf shifter and leaf detacher, a support carrying the suction nozzle and the leaf shifter and their operating mechanism, a slide, a pivotal connection between the support and slide, which connection has a pivot axis parallel with the planes of the leaves, a slideway for the slide extending in a direction normal to the faces of the leaves, and means imparting intermittent movement to the slide along the slideway, said slideway being vertically disposed and the pivot axis of the connection between the support and the slide is horizontal, the platform being swung by the pivotal connection from said slide so that the pneumatic leaf detacher is held upwardly against said leaves, and said means imparting the intermittent movement of the slide along the slideway comprises an electric motor, a threaded vertical spindle driven thereby and a nut on said slide engaged by said spindle, an electric switch in circuit with the electric motor, actuating means for said switch on the platform whereby the switch is opened and interrupts the motor circuit at a predetermined angular position of the platform.

AXEL EDVIN ROSSWALL.

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Number	Name	Date
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