

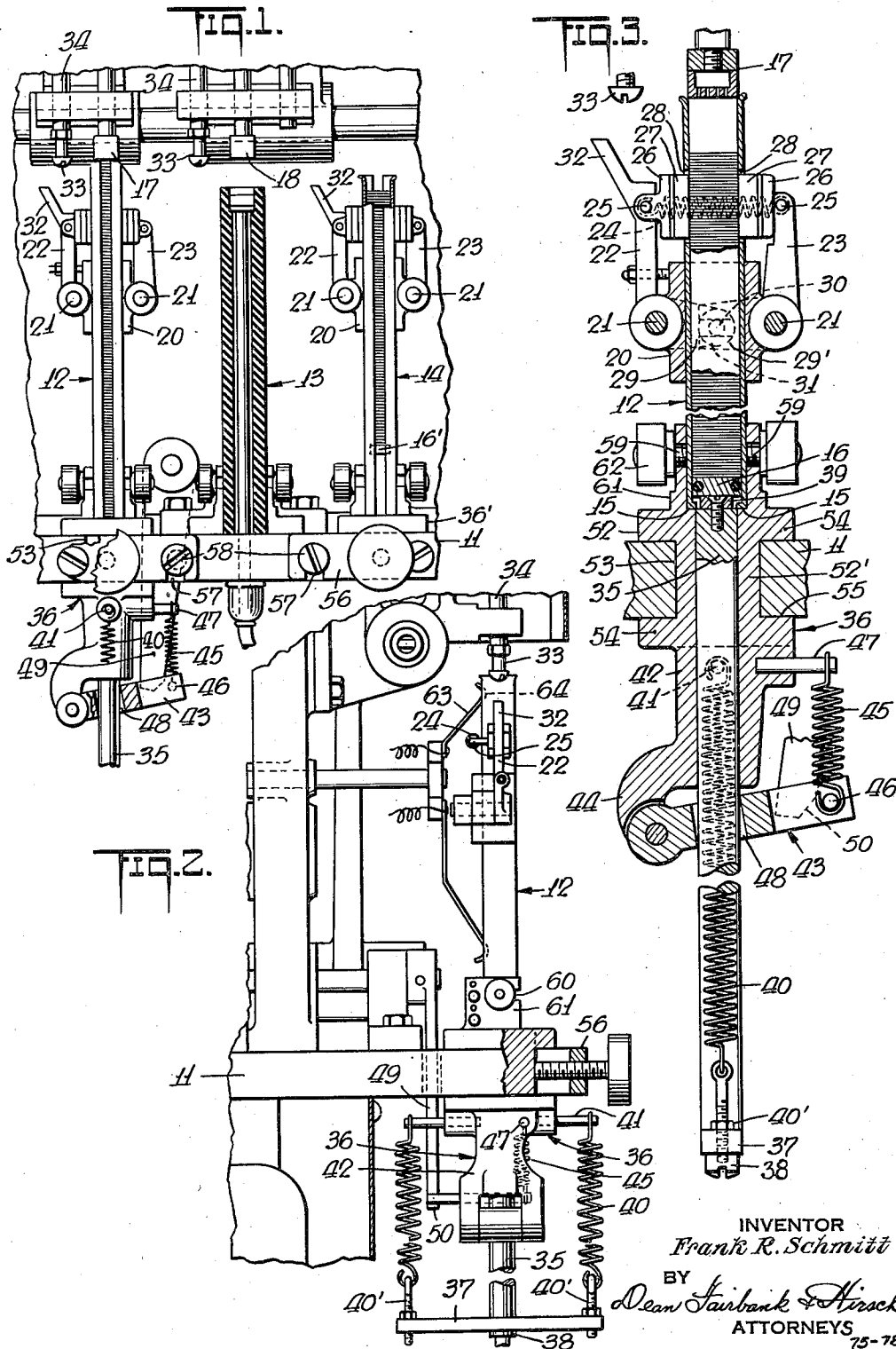
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SHEET FEEDING

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SHEET FEEDING

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9 Claims. (Cl. 271-30)

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The present invention is concerned with the art of sheet feeding and more particularly with magazines for stacked sheets and the control appurtenances thereof, and is especially useful with, though not limited to, the testing of mica sheets used as a dielectric in electrostatic capacitors.

In order that a large number of mica sheets may be stacked in a magazine it is desirable that they be maintained under compression. However, by reason of the resiliency of mica sheets, there would be danger of many of them, when under such compression, being catapulted from the top of the magazine unless some means were provided to retain them therein. As the top of the magazine must be open to allow the mica sheets to be removed from or inserted therein in the successive handling thereof, the retaining means must be constructed so that there will be no restraint on the mica stack when it is desired to remove or insert a mica sheet in the magazine as the case may be and such restraint must be restored after the sheet has been removed or inserted.

It is among the objects of this invention to provide a magazine of the above type which will maintain a stack of mica sheets under compression, which will retain the stack in the magazine and which will automatically release the retaining means when required.

It is among other objects of this invention to provide a magazine in which the stack regardless of its height will be reliably urged into engagement of its upper sheet with the suction head of the sheet feeding mechanism when the latter is in stack engaging position and which will reliably restrain the stack against being catapulted from the magazine during the intervals that the suction head is not in engagement with the stack.

It is among other objects of this invention to provide a mount for said magazine which is simple, rugged and quick to manipulate for instantly yet securely replacing an empty supply magazine or a filled collector magazine.

In order more fully to describe the embodiment herein chosen to illustrate my invention it will be shown and described as applied to the mica sheet classifying machine shown in the parent application Serial No. 461,238, filed October 7, 1942, now Patent Number 2,425,347, of which this application is a division.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of my invention,

Fig. 1 is a fragmentary front elevational view

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of a mica classifying machine utilizing the device herein,

Fig. 2 is a fragmentary side elevational view on a larger scale of the supply magazine and

Fig. 3 is a longitudinal cross sectional view on a larger scale showing the construction of the supply magazine.

Referring now to the drawings, the classifying machine has a bed 11 which supports the operating mechanism including the supply magazine 12 containing the sheets to be tested and classified, the testing block 13, which has been fully described in my above identified application, and the collector magazine 14 for the sheets found to be satisfactory or selected on test. Inasmuch as the supply magazine and the collector magazine are substantially identical in construction, only the former will be described in detail, similar reference numerals being applied to identical parts of the collector magazine for ease in understanding.

Magazine 12 is open at both ends and has an inwardly turned flange 15 at the bottom thereof, forming a shoulder which limits the downward motion of the follower 16 therein. As best shown in Figs. 2 and 3, follower 16 is preferably spring urged by mechanism more fully described hereinafter, which serves to maintain the stack in elevated position within the magazine.

For convenience, the supply and collector magazines may be interchanged. However, since there is no need for urging the sheets upward in the collector magazine, bearing in mind that the sheets are to be delivered thereinto rather than picked off therefrom, it is sufficient to provide a friction follower 16' in said magazine, which is pushed downward as sheets are pressed thereinto in the manner to be described presently.

The sheets from the supply magazine 12 are successively to be picked off therefrom by resort to a pick up suction head 17 normally registering with the supply magazine 12, as shown in Figs. 1 and 3, and transported for laying the sheet upon the testing block 13. The pick up head 17 is constrained to have a constant reciprocating movement from the top of the supply magazine 12, where it picks up a sheet, to the top of the testing block 13 where it deposits the sheet. A selector suction head 18 has a reciprocating movement from the top of the testing block 13 where it picks up the tested sheet and carries it to the top of the collector magazine 14 where it deposits the sheet.

It will of course be understood that the suction heads 17 and 18 must be lifted free of the mag-

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azines and testing block before the heads can move laterally from the supply magazine 12 to the testing block 13, and from the testing block 13, and from the testing block 13 to the collector magazine 14 and cannot descend into the magazines until the conclusion of the lateral transfer or transport movement. To bring this action about, it has been found advantageous to move the two suction heads 17 and 18 vertically up and down in their lifting and delivery action and to transport them horizontally in the intervening travel between the stations of pick up and delivery.

As the construction and operation of the suction heads 17 and 18 together with the control mechanism therefor has been fully described in the parent copending application above identified, it will not be described in more detail herein, except insofar as such construction and operation forms part of the present invention.

Means are provided to function upon release of the pick up and selector heads after they have pressed downward upon the stacks in the course of operation for preventing catapulting of the compressed resilient mica sheets from the magazines in which they are stacked.

A sleeve 20 about the supply magazine 12 (see Figs. 1 and 3) is equipped with transverse pins 21 which serve as pivots for a pair of upstanding levers 22 and 23 that are pressed toward each other by a coil spring 24 connecting the upper ends of said levers and desirably anchored to cross pins 25 thereof. Pins 25 serve as pivots for clamping heads 26, each equipped with a resilient shoe 27 desirably of rubber retained by said spring 24 to extend through corresponding slots 28 in the magazine 12 into engagement with the lateral edges of the sheets near the top of the stack. Lever 22 has a horizontal arm 29 at its lower end with a cross pin 30 extending through yoke 31 in the corresponding arm 29' on the lower end of lever 23. Lever 22 desirably has an oblique upper extension lug 32 in the path of movement of a screw head 33 on the extremity of a pilot rod 34 which is parallel to pick up suction head 17 and is adapted to move therewith. As the pick up head 17 is urged downward into the supply magazine 12, the screw head 33 cams the oblique lug 32 of lever 22 outward to release the shoe 27 from the stack of sheets in the magazine and through the transmission of arms 29 and 29' similarly to release the shoe on the other lever 23 so that as the pick up suction head 17 reaches the top of the stack, the shoes 27 no longer clamp the edges of the mica sheets. As head 17 engages the stack and is pressed downward thereon, the latter will be compressed correspondingly to urge the follower 16 downward in the supply magazine. In the subsequent rise of head 17, the screw head 33 will release lug 32 of lever 22 and before the pick up head 17 has left the magazine, the lateral clamping shoes 27 will thus be urged back by spring 24 to grip the edges of the upper sheets in the stack so that the catapulting of sheets under the resilience of the compressed stack will not occur upon withdrawal of the pick up suction head 17 from the supply magazine 12.

Inasmuch as the pick up suction head 17 has a fixed up and down stroke, it is important that the upper dielectric sheet in the supply stack be urged upward so as to assure engagement thereof with the suction head 17, even though the supply in the stack nears exhaustion. To that end, follower 16 is provided with a rod 35 ex-

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tending axially through a socket member 36 which supports the magazine 12. Said socket member 36 comprises an upper socket portion 61, a lower socket portion 42 and an intermediate portion hub 52, whereas socket member 36' which supports the collector magazine 14 comprises only the upper socket portion and the hub portion, the latter two portions being identical to those of the supply magazine 12 and not shown in the drawings. Cross bar 37 is secured to the lower end of rod 35 by a nut 38, rod 35 having a washer 39 at its upper end which engages the underside of follower 16. A pair of long coil springs 40 anchored to the ends of cross bar 37 at their lower ends as at 40', are connected to pins 41 protruding from the lower portion 42 of the magazine socket 36. It is desirable in this connection to have the upward thrust of the springs 40 occur only after the suction head 17 has entered the magazine 12 and while the lateral shoes 27 are released and thus to preclude the exertion of lifting spring pressure on said stack when the suction head 17 is no longer in the magazine 12. If such expedient were not provided, the lifting spring pressure might be sufficient to break off or crack the edges of the mica sheets grasped by the lateral shoes 27.

To this end the rod 35 extends through an aperture 48 in a brake arm 43 pivoted to a lug 44 on the lower portion 42 of the magazine socket 36 and urged obliquely upward by a coil spring 45 anchored at one end to a cross pin 46 through the free end of said brake arm 43 and at the other end to a pin 47 in the lower portion 42 of said socket 36, so that the diagonally opposite edges of the aperture 48 in the brake arm 43 will grip the rod 35 and brake or lock the same against exertion of the springs 40.

Momentarily to release brake arm 43 at the desired instant, there is provided a cam lever 49 having an oblique lower cam end 50 engaging the cross pin 46 so that when the lever 49 is shifted to the right in Fig. 3 through but a small angle, the brake arm 43 will be pushed downward slightly to relax its grip upon the rod 35 which will thus be spring urged upwardly in magazine 12 for the desired purpose.

As the mechanism for pivoting lever 49 has been fully described in the parent application above identified, it will not be more fully described herein inasmuch as it forms per se no part of this invention.

Desirably the supply magazine 12 and the collector magazine 14 are removable from the bed of the machine for replacement. To this end, the hub 52 of socket 36 and 36' is provided with a reduced portion 52' therein, forming flanges 54. The socket is laterally introduced through a corresponding slot 53 in the bed of the machine, the flanges 54 on the socket hub 52 engaging the faces 55 of said bed. Each socket is kept in place by a corresponding latch 56 pivoted at one end to the edge of the bed 11 to one side of the slot 53 and having a notch 57 at the opposite end thereof which straddles the shank of a screw 58 at the opposite side of said slot.

The upper portion 61 of the socket has lateral slots 60, through which lateral studs 59 protruding outward from the lower part of the magazine are laterally introduced. The magazine is secured in place by the tightening of the nuts 62 that are threaded upon said studs.

The machine is also equipped with means for automatically interrupting the operating circuit when the supply magazine is empty or when the

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collector magazine is full. To this end the follower 16 in the supply magazine 12 is brought into contact with a leaf spring 63 (Fig. 2) which protrudes into the magazine through a slot 64 therein so that the follower 16 when it reaches its uppermost position closes a grounding circuit (not shown) which interrupts the operation of the machine.

In a similar way the collector magazine 14 is provided with a contact spring, not shown, engaging the corresponding follower 16' therein when the latter reaches the lower end of the magazine, i. e., when the magazine is full. This connection will also cause the machine to stop when the collector magazine is filled.

In operating the machine with the magazines hereindescribed, it is desirable to have a supply of fully loaded supply magazines and empty collector magazines on hand so that when a replacement magazine is needed, it may be quickly inserted in the socket without any excessive delay in the operation of the machine.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In an automatic machine for handling resilient sheets stacked under compression, a magazine, a follower in said magazine, a suction head near the upper part of said magazine, means imparting to said head a fixed vertical stroke to engage the top sheet of the stack, clamp means normally urged laterally to grip the upper part of the stack within the magazine, and means correlated with the movement of said head for opening said clamp when the head enters the magazine and for releasing said clamp for reclosure thereof prior to removal of the head from the magazine.

2. In an electrically operated machine for handling resilient sheets stacked under compression, a magazine, a follower in said magazine, a suction head near the upper part of said magazine, means imparting to said head a fixed vertical stroke to engage the top sheet of the stack, clamp means normally urged laterally to grip the upper part of the stack within the magazine, means correlated with the movement of said head for opening said clamp when the head enters the magazine and for releasing said clamp for reclosure thereof prior to removal of the head from the magazine, and means actuated by said follower to interrupt the operating circuit of the machine when the follower reaches the extremity of its movement in said magazine.

3. In an electrically operated machine for handling sheets, a supply magazine, a spring urged follower in said supply magazine to urge the sheets upward therein, a pick up head near the upper part of said magazine, means imparting to said head a fixed vertical stroke to pick up the uppermost sheet from the supply magazine, clamp means normally used laterally to grip the upper part of the stack within the magazine, means correlated with the movement of said head for opening said clamp when the head enters the magazine and for releasing said clamp for re-

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closure thereof prior to removal of the head from the magazine.

4. The combination set forth in claim 3 in which means are provided near the top of said magazine under control of said follower automatically to interrupt the operating circuit of the machine when the supply magazine is empty.

5. In an electrically operated machine for handling sheet material, a collector magazine, a follower in said collector magazine, a suction head near the upper part of said magazine, means imparting to said head a fixed vertical stroke to deposit a sheet in said collector magazine, clamp means normally urged laterally to grip the upper part of the stack within the magazine, means correlated with the movement of said head for opening said clamp when the head enters the magazine and for releasing said clamp for reclosure thereof prior to removal of the head from the magazine, and means near the bottom of said magazine actuated by said follower to interrupt the operating circuit of the machine when the magazine is full and requires replacement.

6. In an automatic machine for handling sheets which are resilient when stacked under compression, a bed, a supply magazine rising therefrom, a follower therein having a rod extending therebelow, spring means urging said rod upward to lift a supply stack of sheets in said magazine, a pick up head near the upper part of said supply magazine, means imparting to said head a fixed vertical stroke to engage the top sheet of the stack and to pick the same up preparatory to transporting the same, means comprising a brake normally locking said rod against the impulse of said spring, clamp means laterally gripping the upper part of the stack within the magazine, and means for opening said clamp and releasing said brake when the head enters the magazine and for releasing said clamp and resetting said brake prior to removal of the head from the magazine.

7. In an automatic machine for handling resilient sheets which are stacked under compression, the combination of a bed, a carrying socket with a reduced hub removably mounted in a lateral slot in said bed, releasable means to retain the socket against shifting out of said slot, a magazine removably mounted in said socket, releasable means to retain said magazine in said socket, a follower in said magazine, a suction head near the upper part of said magazine, means imparting to said head a fixed vertical stroke to engage the top sheet of the stack, clamp means urged laterally to grip the upper part of the stack within the magazine, and means correlated with the movement of said head for opening said clamp when the head enters the magazine and for releasing said clamp for closure thereof prior to removal of the head from the magazine.

8. In an automatic machine for handling resilient sheets which are stacked under compression, the combination of a bed, a socket member having an upper socket portion, a lower socket portion and an intermediate reduced portion adapted to be releasably accommodated in a lateral slot in said bed, latch means for releasably locking the socket in said slot, a magazine in said upper socket portion, releasable means to retain said magazine in said socket, a follower in said magazine having a rod extending therebelow, spring means affixed to said lower socket portion urging said rod upward to lift a supply stack of sheets in said magazine, a pick up head

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near the upper part of said supply magazine, means imparting to said head a fixed vertical stroke to engage the top sheet of the stack to pick up the same preparatory to transporting the same, means comprising a brake supported on said lower socket portion normally locking said rod against the impulse of said spring, clamp means urged laterally to grip the upper part of the stack within the magazine, and means correlated with the movement of said head for opening said clamp and releasing said brake when the head enters the magazine and for releasing said clamp for closure thereof and releasing said brake prior to removal of the head from the magazine.

9. In apparatus of the character described, the combination of a bed, a supply magazine rising therefrom, a socket mounting the same upon said bed, a follower in said magazine, a rod through said socket, spring-urged means for pressing said rod upward against said follower to lift the stack of sheets in the magazine, a brake arm pivoted under said socket through which said rod extends, spring means urging said brake arm upwardly to clamp said rod and preclude the exertion of lifting spring pressure upon said stack,

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clamp means upon said magazine including a pair of arms spring-urged toward each other, each having a shoe extending through a corresponding slot in the magazine for resilient pressure engagement of the sheet edges near the upper part of the magazine, a pick up head for engaging a sheet at the top of the magazine, means for releasing the brake arm to cause the stack to be spring-urged upward against the head, and means for causing both said clamp means and said brake arm to be restored to operativeness prior to the withdrawal of the head from the magazine.

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