March 17, 1953 W. H. SMITH 2,631,850

LOADER FOR SUPPORTING AND ELEVATING TABLES

Original Filed Feb. 2, 1949 2 SHEETS—SHEET 1

Fig. 1.

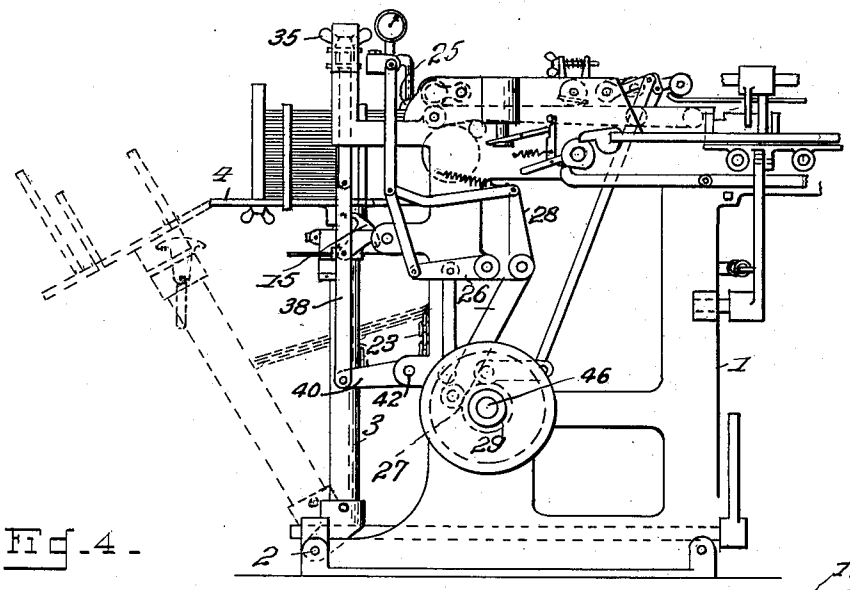
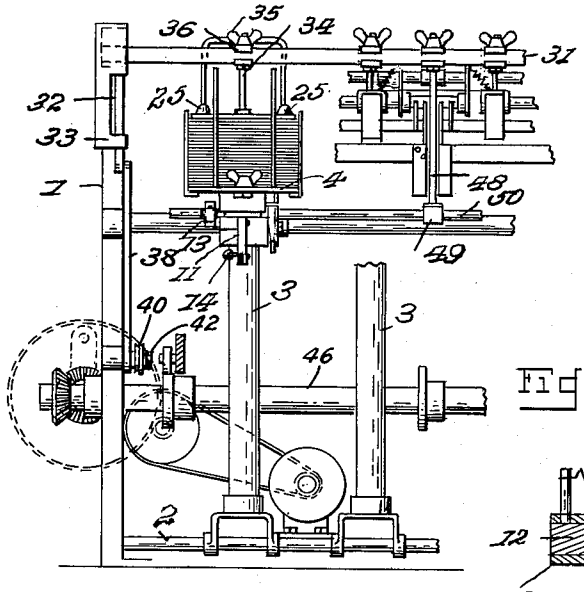


Fig. 4.



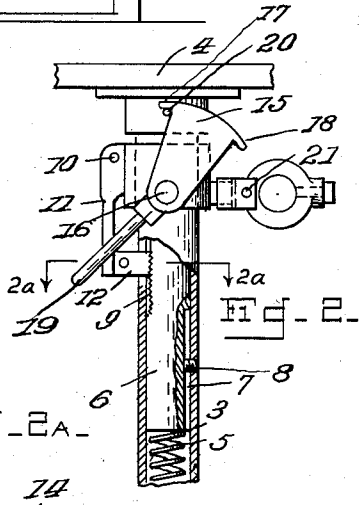
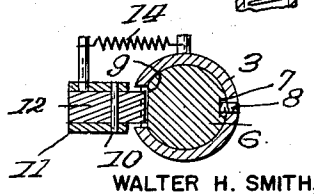


Fig. 2.

Fig. 2A.



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March 17, 1953 W. H. SMITH 2,631,850

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Original Filed Feb. 2, 1949 2 SHEETS—SHEET 2

Fig. 3.

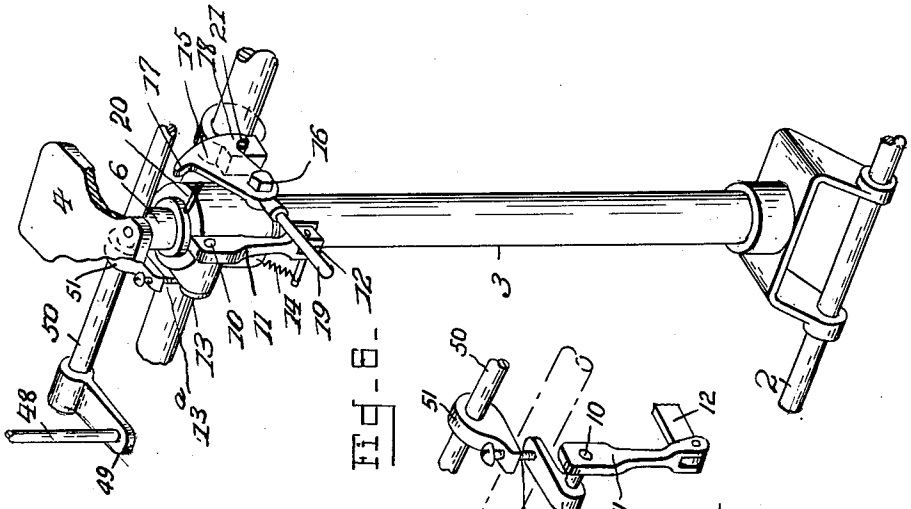
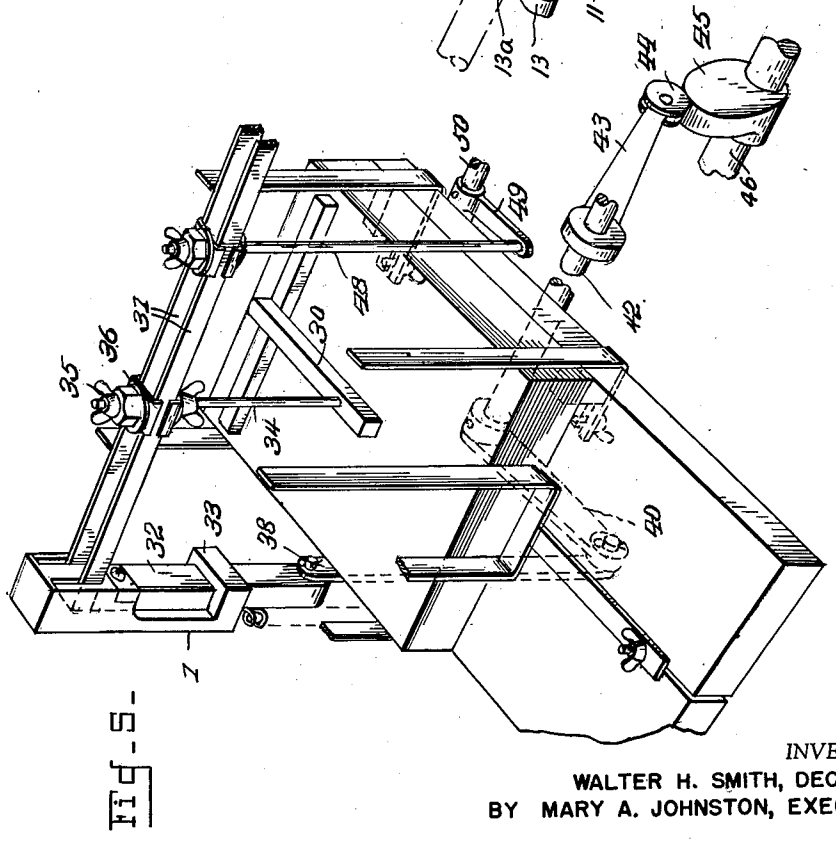


Fig. 6.

Fig. 5.



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LOADER FOR SUPPORTING AND ELEVATING TABLES

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Original application February 2, 1949, Serial No. 74,093. Divided and this application February 24, 1950, Serial No. 145,926

7 Claims. (Cl. 271—62)

1

This invention relates to improvements in a loader for supporting and elevating a table on which a stack of sheets of paper is supported to be fed to a collating machine or printing press.

The object of the invention is to provide means for elevating the stack of paper on a table toward sheet pick-up means, to positively and gradually move the pack upwardly, as the topmost sheet is removed, and to lock the table and its stack of sheets in position to be in readiness for pick-up means to take off the top sheet.

A further object of the invention is to provide table raising and lowering means which can be conveniently tilted away from the feeding mechanism, and the parts locked in loading position to receive the stack of sheets of paper to be collated or printed.

In carrying out the invention, there is specifically provided a table which can be gradually automatically moved upwardly and secured in operative position when feeding sheets of paper to feeding mechanism, or manually depressed and in this depressed position, tilted away from the feeding mechanism for loading a stack of sheets of paper thereon. To control and hold the table in either its feeding position or loading position there is provided a lock, which performs the dual function. Thus when the table is in position to feed sheets of paper to feeding mechanism, it can be locked to the frame, and if manually depressed in its support to remove it from the feeding mechanism and tilted away from the frame for loading purposes, it can be locked in such tilted position.

A further object of the invention is to provide improved means, coordinated with suction pick-up or like means, for urging upwardly the stack of sheets on the table as the top sheet on the pack is picked up and delivered to feeding mechanism. This coordinating improvement involves the provision of specially designed devices to act in time relation with the pick-up devices, so that as a sheet is picked up, the table and stack of sheets will be raised to insure the upper sheet on the stack being at all times at the same level with relation to the entrance of the feeding mechanism to receive the sheet.

Figure 1 is a side elevation of a collating machine illustrating the application of the invention.

2

Figure 2 is a side elevation of the table and its support.

Figure 2*a* is a section on the line 2*a*—2*a* of Figure 2.

Figure 3 is a detail perspective view of the table and its support.

Figure 4 is a front elevation of part of the collating machine shown in Figure 1.

Figure 5 is a detail perspective view of the means employed to hold the pack of sheets on the table.

Figure 6 is a detail perspective view of the trip for releasing the table support.

In order to illustrate one practical use of the invention the loader is shown in connection with a collating machine disclosed in pending application Serial No. 74,093, filed February 9, 1949.

In the drawings 1 indicates the frame of a collating machine and at the front end of the same is a shaft 2, and to illustrate the application of the invention on this shaft, there is illustrated, Fig. 4, a plurality of tubular members 3, each carrying a loading table 4, although but one support and loading table will be specifically described.

Mounted in the tubular member is a spring 5, Fig. 2, and engaging this spring is a table support 6, on the upper end of which is secured a table 4. The support is formed with a groove 7, engaged by a pin 8, in the tubular member to prevent the support turning. The support is also provided with a series of closely related ratchet teeth 9. A lug extends from the upper end of the support 6, and receives a pin 10, and on one end thereof is secured an arm 11, the lower end of said arm carrying a pawl 12, which extends through an opening in the tubular member to cooperate with the ratchet teeth 9. A lever 13, Figs. 3 and 6, is secured to the opposite end of the pin 10, and extends rearwardly toward the frame 1.

The pawl 12 is held in ratchet-engaging position by a spring 14, Fig. 2*a*, to hold the table in its adjusted position, and is operated to disengage it from the ratchet teeth 9 by mechanism to be later described.

It is important that the tubular member and table be securely held in operative position with relation to the sheet feeding mechanism to pick off the top sheet in the stack, and with equal

force it is essential these parts be locked in the tubular member when loading the table with a stack of sheets to be collated or printed. To this end a lock 15 is provided, pivoted to the standard at 16, and provided at its outer opposite end with engaging fingers 17 and 18. The lock is manually controlled and operated by a handle 19. Extending from the support 6, is a pin 20, and on a projection extending from a bracket on the frame 1, is a pin 21, the lock 15, cooperating with these pins to lock the support against movement of the tubular member, in one instance when loading, or in another instance when locking the table to the frame of the machine to position the stack of sheets on the loading table adjacent sheet feeding means.

When it is desired to lock the table to the tubular member for loading purposes, the table is depressed against the tension of the spring 5, and the lock 15 is turned to engage the finger 17, with the pin 20, which locks the table in its lowermost position. Then the table and its support are tilted forward in inclined position for convenience in loading the stack of sheets of paper, as shown in dotted lines in Figure 1, a chain 23 being employed to limit the forward tilting movement.

In order to further illustrate the purpose of the invention, it is shown in connection with pick-up means for introducing sheets of paper to feeding means, although any suitable pick-up means may be employed. The top sheet of the stack on the table is picked up by suction cups 25, arranged adjacent the loading table when the latter is locked to the frame.

The cups 25 are operated by a system of levers 26 actuated by a cam 27 to raise and lower them at the proper time, and a second system of levers 28, actuated by a cam 29, to impart a rearward movement to the cups when raised by the cam 27 to present the end of the sheet picked up, to the sheet feeding means. It is of course to be understood when the cups are lowered to pick up a sheet, vacuum will be induced, and when the sheet is in the grip of the feeding mechanism, vacuum will be cut off.

It is important that the stack of sheets on the loading table be controlled with reference to the pick-up means, and the feeding mechanism. Therefore a presser member 30 is provided to act on the top of the stack to gently engage same when the vacuum cups are lowered to pick up the top sheet on the pack and elevate it immediately the sheet is in the grip of the vacuum cups. The presser member 30 is mounted on a pair of bars 31 connected at their ends to rods 32, vertically reciprocated in guides 33 extending upwardly from the frame.

A rod 34 forms part of the presser bar, and extends through the bars 30 and is threaded to receive an adjusting nut 35 and clamps 36. This arrangement affords means for adjusting the position of the presser member with reference to the top surface of the pack of sheets on the table below. The presser member is vertically movable, and is operated by links 38 pivoted to the rods 32 and levers 40 on a shaft 42, provided with a lever 43, having a roller 44 to engage a cam 45 on the cam shaft 46.

Adjustably mounted on the bars 31 and depending therefrom is a rod 48. This rod is adapted to contact with a short arm 49 on a rock shaft 50 mounted on the frame. On the shaft 50 is a short arm 51, provided at its free end with an adjusting screw 13a which lies directly over the lever 13.

When the presser member 30 lowers toward the top of a stack of sheets on the table, the rod 48 contacts with the arm 49 and depresses the arm 13, which in turn releases the pawl 12 and permits the spring 5 to raise the table and the pack of sheets.

The movement of each presser member is limited, and it not only serves to hold the pack in place in the interval, incident to the distance between the teeth in the table support, but it serves to exert pressure on the stack to exude any air between the sheets.

In practice, the distance between the teeth 9 on the support is about $\frac{1}{16}$ of an inch, so that as the top sheet is picked up and removed, the table and the pack of sheets continue to go up and down under the influence of the presser member on the one hand, and the spring 5 under the table support on the other hand. Then, when the combined thickness of a number of sheets taken from the pack about equals the distance between two teeth, the pawl engages the next tooth. Hence, the pack, within the range of two teeth is delicately raised by the spring 5, and lowered by the presser member and at the same time sheets are retained in closely packed relation, while the vacuum cups are functioning.

When the vacuum cups lift a sheet of paper from the stack on the table, a blast of air is introduced between the top sheet and the next adjacent sheet, through pipes not shown.

For convenience in understanding the operation, one of the loading tables will be described when loading and the steps followed in the transfer of several sheets to feeding mechanism.

The loading table 4 is depressed to lower the support 6 in the tubular member 3, against the tension of spring 5, and the lock 15 is turned to engage the finger 17 with the pin 20, to positively lock the support and the tubular member together. This disengages the finger 18 from the pin 21, thus permitting the table to be tilted away from the frame. The loading table when tilted forward is held in an inclined position by the chain 23. Suitable guides on the table are adjusted to the width and length of the sheets, and a stack of such sheets is put in place. The stack of sheets having been positioned, the table is manually returned to a vertical or operative position, and the lock 15 is turned to release the finger 17 from the pin 20 and engage finger 18 with pin 21. This securely positions the table and its stack in proper position with respect to the feeding means.

The presser member 30 is adjusted with reference to the top of the stack of sheets, and the machine is started. The suction cups are first lowered to engage the top sheet in the stack to lift the sheet upwardly and thence move it rearwardly to the entrance of the feeding mechanism. As the forward end of the sheet is lifted by the suction cups, it encounters a finger and is flipped past same to insure that but one sheet on the stack is removed. As the sheet is lifted from the pile, blasts of air are ejected between the top sheet and the adjacent sheet, to insure separation of the sheets so that but one sheet at a time will be lifted.

About the time the cups engage the top sheet of the stack, the rod 48 strikes the arm 49, and the screw 13a depresses lever 13, which releases the pawl 12 from the teeth 9, allowing the spring 5 to urge the pack on the table upwardly, against the presser member 30 to compensate for the sheet withdrawn. However, as previously stated,

the stack of sheets is gently packed together by the presser member and against the tension of the spring 5, with the result that in the rapid operation of the machine, the table is more or less vibrated up and down, equal to the distance between two teeth, the extent of vibratory movement depending on the number of sheets removed from the stack between two teeth.

The mechanism is so timed that the presser member quickly descends on the stack, while the vacuum cups act somewhat more slowly when picking up a sheet than on their delivery stroke to deliver the sheet to the feeding mechanism, and it might be stated when the sheet is being fed to the feeding means the pressure member remains up, lowering to the stack quickly as soon as the rear end of the sheet has been withdrawn from under the pressure member to release the pawl 12 from the ratchet teeth 9.

The operation of one table and its support has been described, but two such tables and supports have been shown in the drawing merely to indicate that in use the tables and supports can be duplicated. However, they are all operated together and yet, by reason of the lock-out arrangement, any one or more in the group can be cut out without cutting out use of the others.

This application is a division of pending application filed February 2, 1949, Serial No. 74,093.

What is claimed is:

1. A loader for positioning a pack of papers to feeding mechanism, comprising a tilting support swingable between operative and loading positions, a table mounted on said tilting support, a spring urging said table upwardly, means controlling upward movement of said table, and a lock for holding the support in operative position to withdraw a sheet from the top of a pack of sheets on the table or hold the table to said support when in a tilted position to load the table with a pack of sheets.

2. A loader for positioning a pack of sheets of paper to feeding mechanism, comprising a loading table, means for mounting the table to tilt for loading stacks of sheets thereon, means for automatically raising the table as sheets are fed from the stack, means for locking the table-mounting means when the table is in sheet-feeding position and for holding said table when it is tilted to loading position, and means engaging the top of the pack of sheets to hold same on the table in opposition to the means for automatically raising the tables when the top sheet of the pack is being withdrawn.

3. Apparatus for supplying sheets from a pack to sheet feeding mechanism, comprising a frame, a support tiltably mounted on said frame for movement between operative and loading positions, a table slidably carried by said support, means carried by said support and urging said table upwardly to elevate a pack of sheets to feeding position when said support is in operative position, and a lock on said support and alternatively engageable with said frame to hold said support in operative position or with said table in opposition to said means when said support is in loading position.

4. Sheet feeding mechanism comprising a frame, a normally substantially upright standard pivotally mounted on said frame for movement between loading and feeding positions, a support slidably mounted on said standard, a sheet pack supporting table carried by said support, means carried by said standard and connected with said support for sliding said support upwardly on said standard to elevate said table and lift the pack of sheets to feeding position, and a lock on said standard and movable between two operative positions, said lock in one of said operative positions engaging said frame to hold said standard in operative position and said lock in the other of said operative positions engaging said support to hold said table in lowered position when said standard is in loading position.

5. Mechanism as defined in claim 4 wherein said lock comprises an arm pivotally mounted on said standard and having latches on opposite sides thereof, a keeper on said support for cooperation with the latch on one side of said arm, and a keeper on said frame for cooperation with the latch on the opposite of said arm.

6. Sheet feeding mechanism comprising a frame, a normally substantially upright tubular member pivotally mounted on said frame for movement between loading and feeding positions, a support slidably mounted in said tubular member, a sheet pack supporting table carried by said support, a spring in said tubular member and biasing said support upwardly to elevate said table and lift a pack of sheets to feeding position, a ratchet on said support, a pawl pivotally mounted on said tubular member, spring means biasing said pawl against said ratchet to hold said support against said spring, a crank arm fixed with said pawl, a carriage vertically slidable on said frame adjacent the operative position of said table, means on said frame for reciprocating said carriage, a pair of parallel bars on said carriage and spanning the operative position of said table, a pair of clamps adjustably mounted on said bars, a presser member for engaging a pack of sheets on said table and having a supporting rod adjustably secured to one of said clamps, a plunger adjustably secured to the other of said clamps, a rock shaft journalled on said frame, a lever fixed on said rock shaft for engagement by said plunger to rock said shaft, a striker arm fixed on said rock shaft for engagement with said pawl crank arm to pivot said pawl from said ratchet to release said support to the influence of said spring, a keeper on said support, a keeper on said frame adjacent the operative position of said tubular member, and an arm pivotally mounted on said tubular member and having two latches extending in opposite directions, one of said latches being engageable with said frame keeper to lock said tubular member in operative position and the other of said latches being engageable with said support keeper to hold said support and table in depressed position when said tubular member is pivoted to loading position.

7. A loader for positioning a pack of sheets of paper to feeding mechanism comprising a frame, a rock shaft journalled on said frame, a tubular member hinged on said frame for swinging between operative and loading positions, a support carried by said tubular member, a spring in the tubular member to urge the support upwardly, a table on the support for supporting a pack of sheets, a pawl and ratchet in engagement between the tubular member and support to periodically permit the table and its pack of sheets to be elevated by the spring biasing said support, an element above the table to engage the top of the pack of sheets, a reciprocal carriage for the element, a lug on said rock shaft, a rod depending from the reciprocal carriage to engage said lug, means between the rock shaft and pawl to disengage the pawl from the ratchet and

means for reciprocating said carriage to depress the element on the pack of papers and simultaneously depress the rod to engage the lug to release the pawl, means for withdrawing the top sheet on the pack, and a lock operative to lock the tubular member to the frame in operative feeding position or hold the support to the tubular member when the latter is tilted on its hinge from operative position for loading purposes.

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Executrix of the estate of Walter H. Smith, deceased.

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