H. O. FISCHER.

PAPER FEEDING MECHANISM.

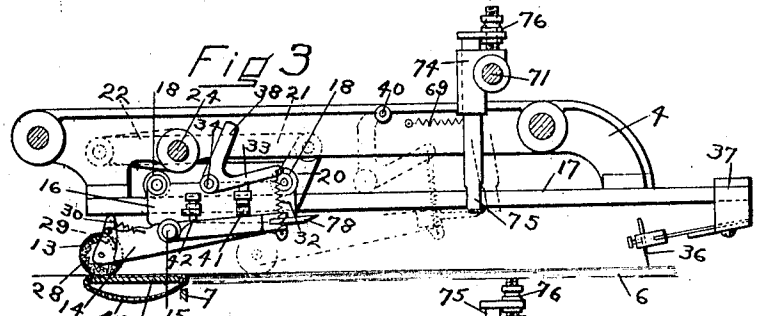
APPLICATION FILED JUNE 19, 1918.

1,298,685

Patented Apr. 1, 1919

2 SHEETS—SHEET 1.

Fig 3



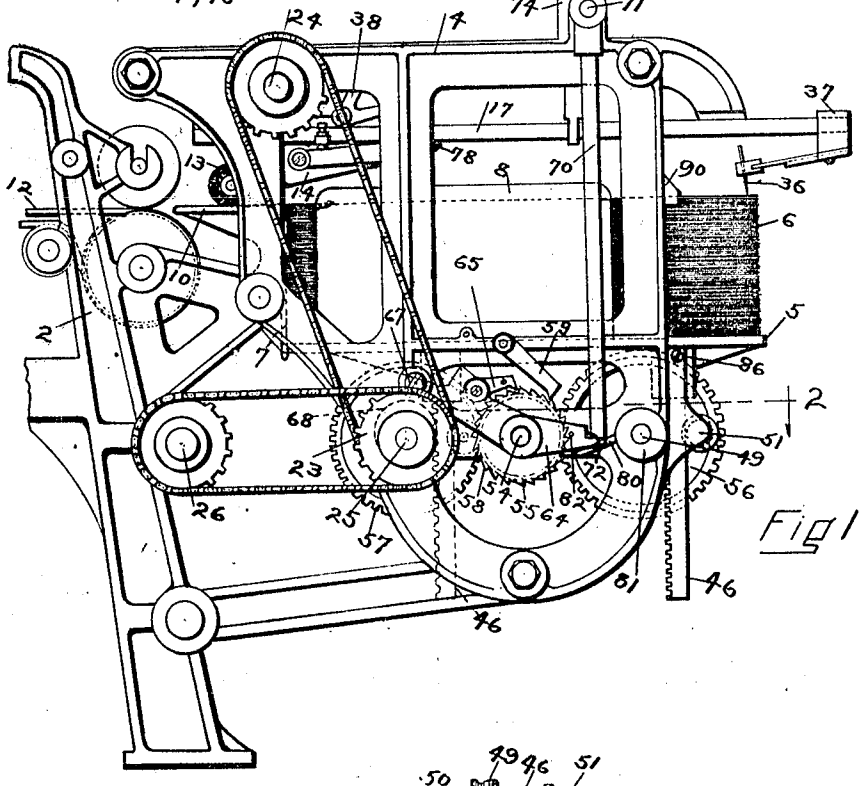


Fig 1

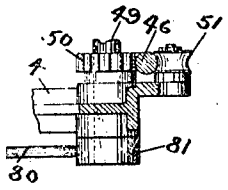


Fig 2

INVENTOR

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By his attorney,

J. H. McCrudden

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2 SHEETS-SHEET 2.

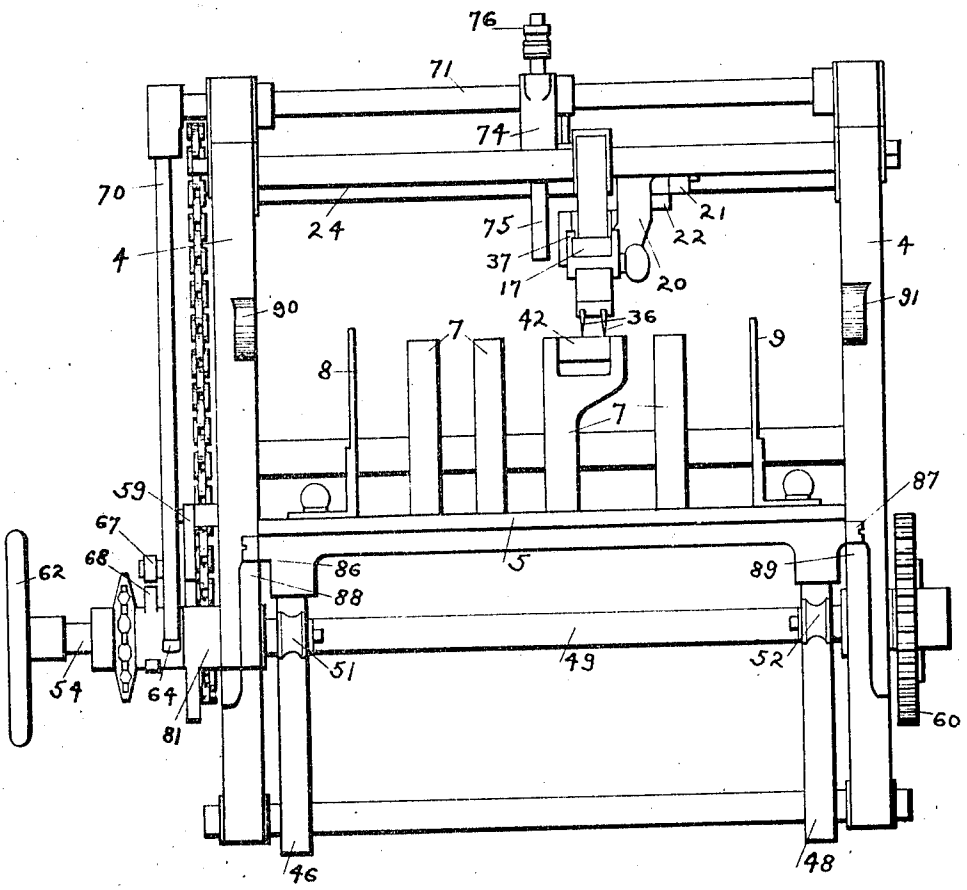


Fig 4

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UNITED STATES PATENT OFFICE.

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PAPER-FEEDING MECHANISM.

1,298,685. Specification of Letters Patent. Patented Apr. 1, 1919.

Original application filed January 6, 1917, Serial No. 141,022. Divided and this application filed June 19, 1918. Serial No. 240,769.

To all whom it may concern:

Be it known that I, HERMANN O. FISCHER, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented certain Improvements in Paper-Feeding Mechanisms, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to mechanisms for feeding sheets of paper or other material in sheet form to wrapping machines, printing presses or other machines in which such material is utilized. The invention is particularly concerned with mechanisms of this general type designed to feed individual sheets from a supply as distinguished from those mechanisms which feed sheet material from a web or continuous strip.

A common type of mechanism of this general character comprises a table on which a stack of wrappers, labels, blanks or similar sheets are supported and a mechanism that feeds the sheets from the top of the stack one at a time to the machine in which they are to be used or to a sheet advancing mechanism of some kind.

The present invention is particularly concerned with the means for separating the topmost sheet in the stack from the adjacent sheets and it aims to devise a simple but thoroughly reliable mechanism for performing this function and for insuring the accurate delivery of a sheet in each cycle of operations of the machine.

The invention also provides novel means for preventing breakage of or injury to the parts which might take place if the supply of sheets in the stack became substantially exhausted.

The invention also includes novel details of construction and combinations and arrangement of parts, the nature and advantages of which will be readily understood from the following description when read in connection with the accompanying drawings, in which—

Figure 1 is a view in side elevation of a sheet feeding mechanism embodying the invention in the form now preferred by me:

Fig. 2 is a cross sectional view on the line 2—2, Fig. 1 showing a detail of construction:

Fig. 3 is a side elevation partly in cross section showing the sheet feeder: and

Fig. 4 is a rear elevation of the mechanism shown in Fig. 1.

The sheet feeding mechanism is shown in the accompanying drawings applied to a wrapping machine of a common type, the frame of this machine being indicated at 2, and the frame of the feeding mechanism being indicated at 4. The latter mechanism comprises a table 5 for supporting a stack of wrapper blanks or sheets 6 designed to be fed to the machine 2. The stack of sheets is maintained against forward movement by front abutments or stops 7 and against lateral displacement by side pieces 8 and 9, see Fig. 4, the side pieces being adjustable toward and from each other. The front abutments 7 have horizontal projections extending forward from their upper ends, as indicated at 10 in Fig. 1, which constitute a platform or apron over which the sheets are advanced within reach of a set of belts 12 which carry them to the wrapping mechanism.

The sheets are advanced from the top of the stack one at a time by means of a reciprocating feeder which comprises a feed roll 13, made of rubber or some other suitable material, mounted on a short shaft which is rotatably supported in the forward end of a feed lever 14. This lever is fulcrumed at 15 on a carriage 16 which is mounted to reciprocate toward and from the belts 12 on a stationary horizontal guide bar 17. The carriage is provided with a pair of rolls 18 which run on the upper surface of the bar 17. For the purpose of giving this carriage its reciprocating movement it is provided with a projection 20 to which a link 21 is connected, and the forward end of this link is pivoted to the free end of a crank 22 fixed on the shaft 24. This shaft is driven by a chain connection with a sprocket wheel rotating freely on a shaft 25, and fast with another sprocket 23 driven by a similar connection with a shaft 26, which forms part of the driving mechanism of the wrapping machine 2. It is obvious that as

the shaft 24 rotates, the carriage 16 will be moved back and forth on the horizontal guide bar 17.

As the feed wheel 13 is carried forward in this manner it is prevented from rotating by means of a ratchet wheel 28 fast with the wheel 13 and a pawl 29 held in contact with said wheel by a spring 30. This construction, however, permits the wheel to rotate freely in a clockwise direction while it moves backwardly in making the idle part of its stroke. A spring 32 having one end connected to the rear end of the lever 14 and its other end connected to one arm of a bell crank lever 33 fulcrumed on the carriage 34, presses the feed roll 13 downward and holds it yieldingly in engagement with the surface of the topmost sheet in the stack. It will now be evident that as the carriage 16 is moved backwardly, to carry the feed roll 13 from the position in which it appears in full lines in Fig. 3 to that in which it is shown in dotted lines, it will roll freely over the surfaces with which it engages; but when the carriage has reached the backward limit of its stroke and starts forward again, the pawl 29 and ratchet 28 will prevent the roll 13 from rotating, and it thus will exert a strong frictional drag on the topmost sheet and carry this sheet forward over the platform 10 and toward the belts 12. A pair of spring pressed needles 36 pierces the margins of upper sheets in the stack at points substantially in line with the direction of the feeding movement of the feed roll 13 and effectually prevents the feed roll from advancing more than a single sheet at a time. These needles are supported by a holder 37 which is adjustably clamped on the bar 17.

In the construction shown the bell crank lever 33 is provided with an arm 38 which, as the carriage 16 nears the rearward limit of its stroke, strikes a stationary pin 40 supported in the frame 4 and swings the lever about its fulcrum 34 in a counter clockwise direction thus tensioning the spring 32 and acting through the lever 14 to increase the pressure of the roll 13 on the upper sheets in the stack 6. This increase in pressure is maintained until the feeder has moved forward far enough to free the arm 38 from engagement with the pin 40, but in the meantime the feeder has started the topmost sheet forward and torn it free from the needles 36, so that thereafter only a relatively light engagement of the feeder with the sheet is required to complete the feeding operation. This novel arrangement not only produces great reliability in the operation of the feeder, but it insures the accurate separation of the topmost sheet from the other sheets in the stack, and it permits the use of a spring of such a tension that it will cause the roll 13 to bear only relatively lightly on the topmost sheet in the stack as it makes its return or idle stroke, and thus avoids any possibility of wrinkling up the sheet which must next be advanced. It will now be noted that the normal tension of the spring 32 can be adjusted by means of a set screw 41 adjustably mounted in the carriage 16 and arranged to bear against the arm 33 of the bell crank lever. A similar set screw 42 adjustably supported by the carriage 16 is positioned for engagement with the feeder lever 14 and limits the movement of this lever under the influence of a spring 32. The front abutment 7 in line with the feed roll 13 is slotted, as shown in Fig. 3, and the horizontal or apron portion 10 of this member is encircled loosely by a strip of webbing 44 or similar material. The upper surface of this strip of webbing is on a level with the other apronlike projections from the upright pieces 7, and in the normal operation of the mechanism it performs the same functions as do the corresponding portions of the other parts 7. If, however, the supply of sheets should be exhausted while the feeder was allowed to reciprocate, the drag of the feed roll 13 on the strip 44, particularly while making its forward stroke, causes this strap to slide freely over the upper surface of the part 10 and thus avoids the wear and strain on the feeder which would otherwise be produced by the heavy drag of the feed roll on the apron if the strip of webbing were not present.

It is obvious that as the feeder removes sheets from the top of the stack 6 it will reduce the height of the stack in a very short time to such a point that it could not continue to advance sheets in the desired manner if some means were not provided to elevate the stack and maintain the top of the stack at substantially a constant and predetermined height. For the purpose of elevating the stack, the table 5 is supported by two pairs of racks, one pair at each side of the table, indicated respectively at 46 and 48. The two front racks 46 and 48, Figs. 1 and 4, mesh with pinions mounted fast on a shaft 49, one of these pinions being indicated at 50 in Fig. 2. Idle rolls 51 and 52, respectively, hold the front racks 46 and 48 in engagement with their respective pinions. The rearward pair of racks 46 and 48 are similarly supported and guided, the pinions with which they mesh being mounted fast on the shaft 25. A shaft 54, lying between and parallel to these two shafts, has a pinion 55 mounted fast thereon which meshes with two gears 56 and 57 mounted respectively on said shafts, and the shaft 54 also has similar gear connections with said shafts at the opposite side of the table, the gear on the shaft 49 being indicated in Fig. 4 at 60. The shaft 54 has affixed thereto a ratchet wheel 58 with which a pawl 59 engages and pre-

vents counter clockwise rotation of the shaft, and it also carries a hand wheel 62 (see Fig. 4). It will now be evident that when the hand wheel 62 is turned to rotate the shaft 54 in a clockwise direction, as it appears in Fig. 1, this motion will be transmitted through the gear connections just described to the racks 46 and 48, thus raising the table 5 and the pawl 59 will act through these connections to maintain the table in its raised position.

A power driven mechanism is provided to operate through these connections to give the table 5 a step by step elevating movement. This mechanism comprises a lever 64 mounted to oscillate on the shaft 54 and carrying a pawl 65 which is pivoted thereto and has its free end resting on the periphery of the ratchet wheel 58. One arm of this lever also carries a roll 67 adapted to run on the periphery of a cam 68 revolving with the sprocket wheel 23 on the shaft 25. This cam thus is operative to oscillate the lever 64 and this movement is transmitted by the pawl 65 to the ratchet wheel 58, rotating this wheel one tooth at a time, and thus operating through the gear connections with the table to elevate the table step by step. Normally, however, this roll is held out of contact with the cam by means of a latch mechanism which comprises a rod 70 supported at its upper end in a rock shaft 71 mounted in bearings formed on the frame 4 of the mechanism, the lower end of this rod being adapted to engage in a seat 72 formed in the arm of the lever 64 opposite to that which carries a roll 67. When in this position the rod 70 holds the roll 67 at a point substantially at the outer limit of travel of the highest part of the cam 68 and thus maintains the table elevating mechanism in an inoperative condition. The rock shaft 71 also carries a bracket 74 in which a rod 75 is mounted for vertical adjustment, by means of an adjusting nut 76, and the lower end of this rod lies in the path of travel of a tail piece 78 which is fixed to the rearward end of the feeder arm 14.

It will be evident from an inspection of Figs. 1 and 3 that as the height of the top of the stack 6 is reduced, due to the removal of sheets from the stack, the feed roll 13 will drop and the tail piece 78 on the rearward end of the feed lever 14 will be correspondingly raised. When the height of the upper end of stack has been reduced to a point predetermined by the adjustment of the rod 75, this tail piece 78 will engage the lower end of the rod 75 as the feeder nears the backward limit of its stroke and swing the rod rearwardly about the axis of the rock shaft 71, thus moving the lower end of the rod 70 out of engagement with the seat 72. The weight of the lever 64, and the parts carried thereby, is so disposed with reference to its fulcrum, that this lever will immediately rock in a counter clockwise direction until the roll 67 rests on the periphery of the cam 68. The table elevating mechanism thus is thrown into operation and raises the table one step. The release of the latch mechanism is only momentary, for the reason that the feeder starts forward again immediately after having tripped the latch, and as soon as the latch is disengaged from the feeder the rod 70 is swung back by a spring 69 toward its normal or upright position. The seat 72 in the lever 64 is at this time above the lower end of the rod so that the side of the rod strikes the end of the lever and rests against it until the cam 68 swings the lever far enough to allow the lower end of the rod to move into the seat 72 again. The latch thus resets itself immediately after it has been tripped by the feeder and it allows the table elevating mechanism to make only one elevating movement, acting thereafter to maintain said mechanism in an inoperative condition until the latch is again tripped by the feeder. The table, of course, is raised only a small fraction of an inch at each operation of the table elevating mechanism so that the top of the stack of sheets is maintained at substantially a constant height. Normally the stack of sheets maintain the roll 13 at such a height that the tail piece 78 slides under the lower end of the rod 75 and the latch thus is tripped only when it is necessary to operate the table elevating mechanism in order to restore the upper end of the stack to the desired height. In other words, the connection between the feeder and the power driven mechanism which elevates the table enables the feeder to control the operation of said mechanism, and the feeder really constitutes a "feeler" acting to detect variations in the height of the top of the stack and to bring the power driven mechanism into operation when the top of the stack drops below a predetermined level.

It is obvious that if the supply of labels on the table were allowed to become nearly exhausted, the automatic elevating mechanism might raise the table to a point where it would break the needles 36 and possibly also injure some of the other parts. In order to prevent an occurrence of this kind a mechanism is provided which automatically throws the chuck elevating mechanism into an inoperative condition when the table has been elevated to a predetermined point. This mechanism comprises a rod 80, Figs. 1 and 2 projecting radially from a collar 81 fixed to the shaft 49, the rod being operative at a certain point in its travel to engage a pin 82 projecting laterally from the lever 64. The rod 80 is so positioned angularly with reference to the shaft 49 that as this shaft is rotated in elevating the table 5, the

rod will engage the pin 82 and press it down just before the table has reached a point at which a further elevation might damage some of the parts. The pressure of the rod 80 on the pin 82 operates through the lever 64 to maintain the cam roll 67 out of engagement with the cam 68 and thus prevents any further table elevating movement.

The lower limit of movement of the table 5 is determined by a pair of stops 86 and 87 projecting from opposite sides of the table and shoulders 88 and 89 on the machine frame, the stops being adapted to rest, respectively, on the shoulders. A similar pair of stops 90 and 91 formed on the frame 4 lie in the path of travel of the stops 86 and 87 as the table is raised and limit the elevating movement of the table 5. The automatic stop mechanism above described is arranged to throw the table elevating mechanism out of operation before the stops 86 and 87 can engage the stationary shoulders 90 and 91, but the latter arrangement is provided particularly for the purpose of limiting the elevating movement of the table when it is fed upwardly by hand.

While I have herein shown and described the best embodiment of this invention of which I am at present aware, it is obvious that the invention is capable of embodiment in many other forms differing in detail from that herein disclosed while still retaining its essential features and characteristics. I do not, therefore, desire to be limited to the exact details of construction shown.

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

1. In a sheet feeding mechanism, the combination with a support for a stack of sheets, of a reciprocating feeder operative by frictional engagement with the topmost sheet in the stack to feed the sheet forward, a spring having one end connected to said feeder and acting to press the feeder against the topmost sheet in the stack, a movable member supporting the other end of said spring, and a part in the path of movement of said member operative to move the member in a direction to tension said spring while the feeder is near the rearward limit of its stroke.

2. In a sheet feeding mechanism, the combination with a support for a stack of sheets, of a reciprocating feeder operative by frictional engagement with the topmost sheet in the stack to feed the sheet forward, a spring acting to hold said feeder in engagement with said sheet and means for increasing the tension of the spring on the feeder during the first part of the feeding stroke.

3. In a sheet feeding mechanism, the combination with a support for a stack of sheets, of a reciprocating carriage movable over the top of said stack, a feed roll, a lever mounted on said carriage and supporting said roll, a spring acting on said lever to press the roll against the topmost sheet in the stack, means coöperating with said roll to hold it against rotation during the forward stroke of said carriage, but permitting it to rotate freely during its return stroke, and means operative to increase the tension of said spring during the first part of the forward stroke of said feeder.

4. In a sheet feeding mechanism, the combination with a support for a stack of sheets, of a reciprocating carriage movable over the top of said stack, a feed roll, a lever mounted on said carriage and supporting said roll, means coöperating with said roll to hold it against rotation during the forward stroke of said carriage, but permitting it to rotate freely during its return stroke, a spring connected at one end to said lever and acting to press the roll against the topmost sheet in the stack, a movable member supporting the other end of said spring, and a part in the path of movement of said member operative to move the member in a direction to tension said spring while the feeder is near the backward limit of its stroke.

5. In a sheet feeding mechanism, the combination with a support for a stack of sheets, and a reciprocating feeder constructed and arranged to feed the sheets one at a time from the top of said stack, of a stationary member over which said feeder moves in advancing a sheet, and means between said member and said feeder constructed and arranged to be moved by the drag of the feeder on it.

6. In a sheet feeding mechanism, the combination with a support for a stack of sheets, and a reciprocating feeder constructed and arranged to feed the sheets one at a time from the top of said stack, of means over which said feeder travels during part of its advancing movement constructed and arranged to move with the feeder when the feeder engages it in making said movement.

7. In a sheet feeding mechanism, the combination with a support for a stack of sheets, and a reciprocating feeder constructed and arranged to feed the sheets one at a time from the top of said stack, of a stationary member over which said feeder moves in advancing a sheet, and a strap loosely encircling said member and free to be moved relatively to said member by the drag of the feeder on it.

In testimony whereof I have signed my name to this specification.

HERMANN OTTO FISCHER.