Jan. 9, 1934. L. L. MATTHEWS 1,942,870

PAPER SORTING MACHINE

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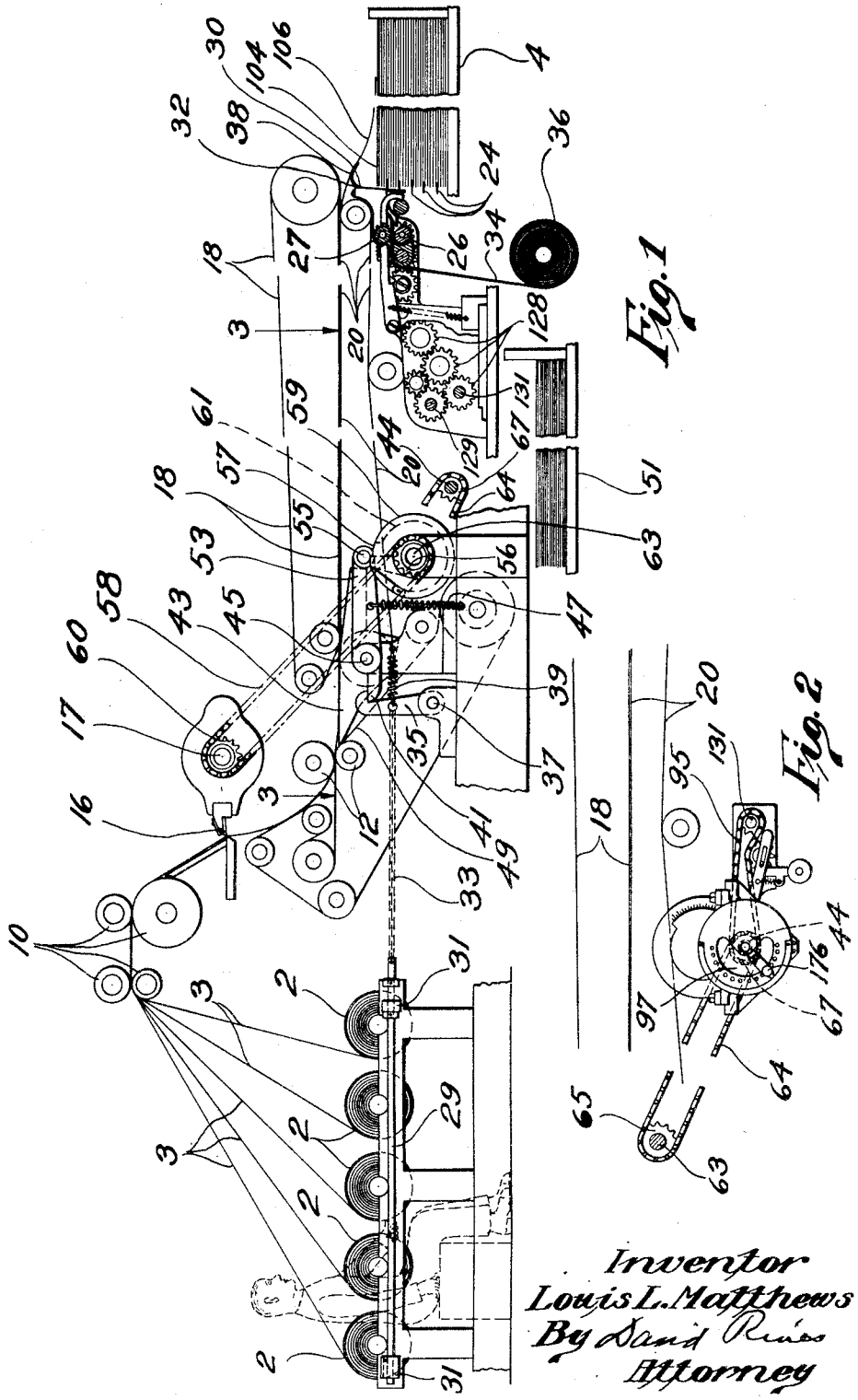


Fig. 1

Fig. 2

Inventor
Louis L. Matthews
By David Rines
Attorney

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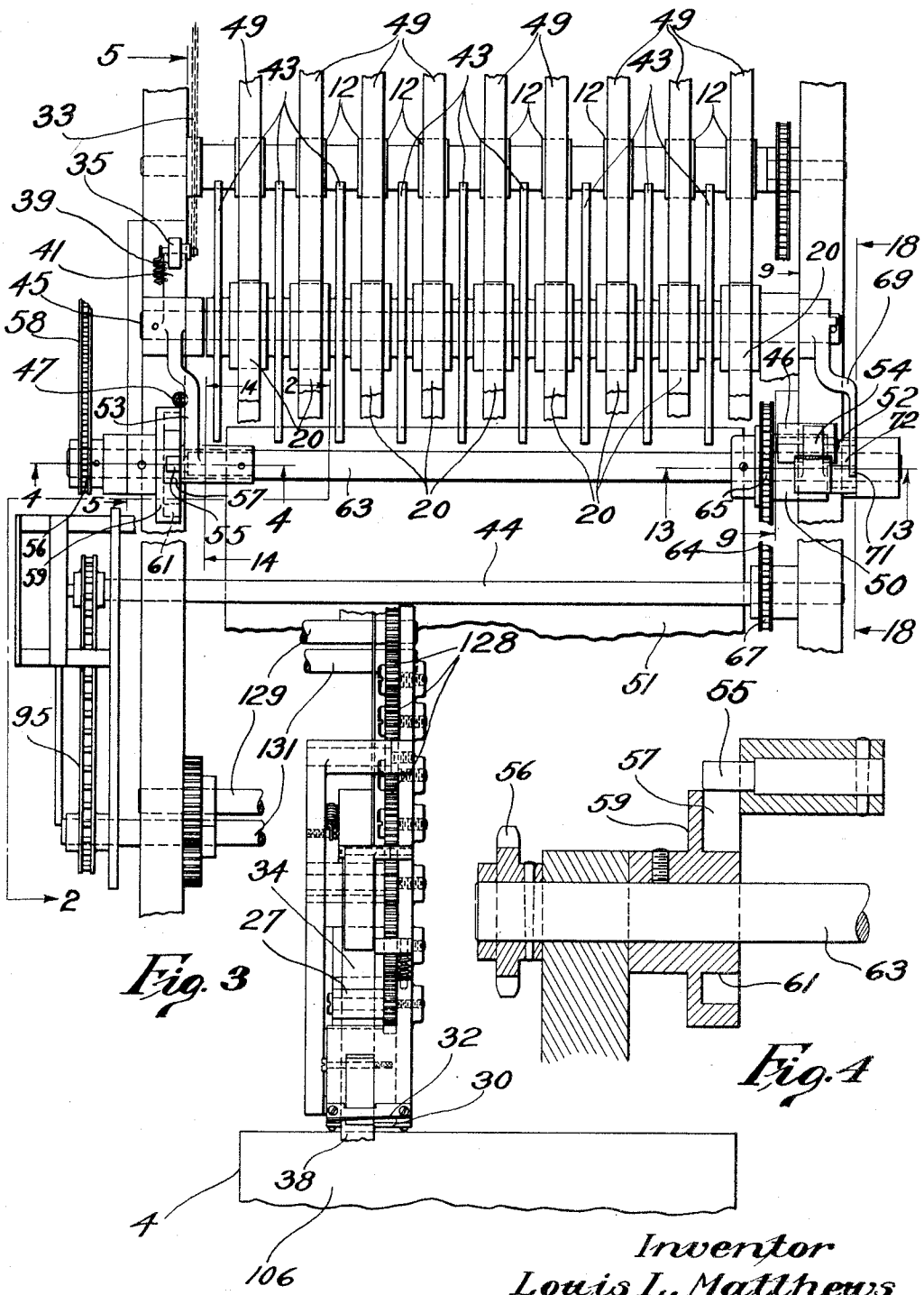


Fig. 3

Fig. 4

Inventor
Louis L. Matthews
By David Rines
Attorney

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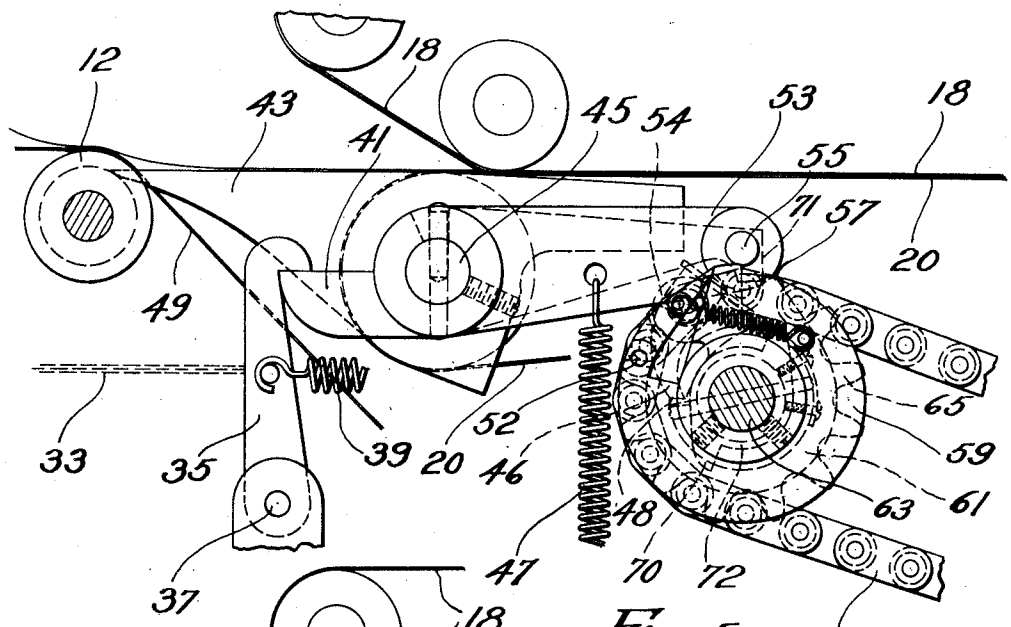


Fig. 5

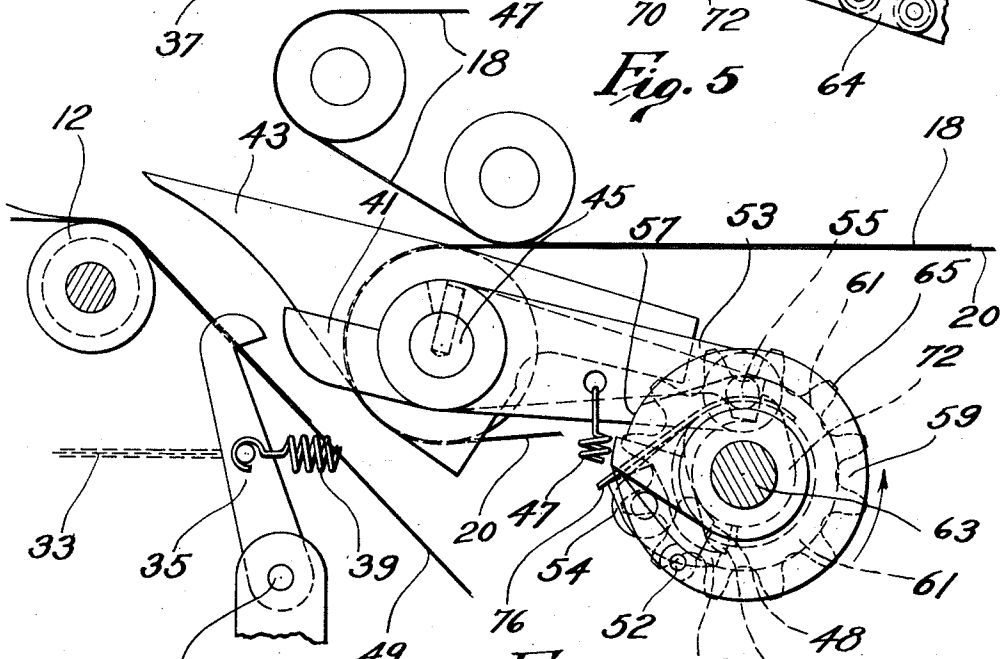


Fig. 6

Inventor
Louis L. Matthews
By David Rines
Attorney

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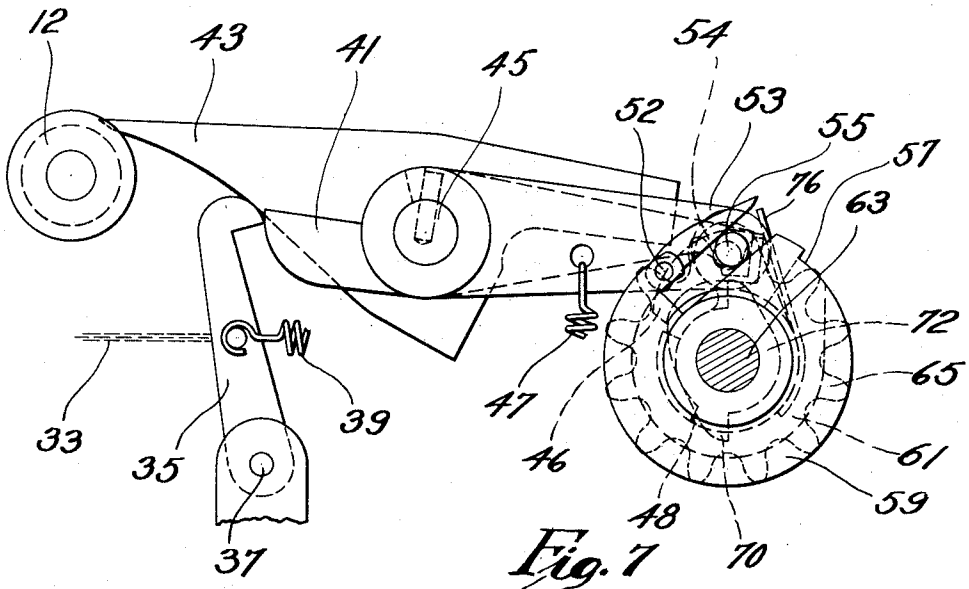


Fig. 7

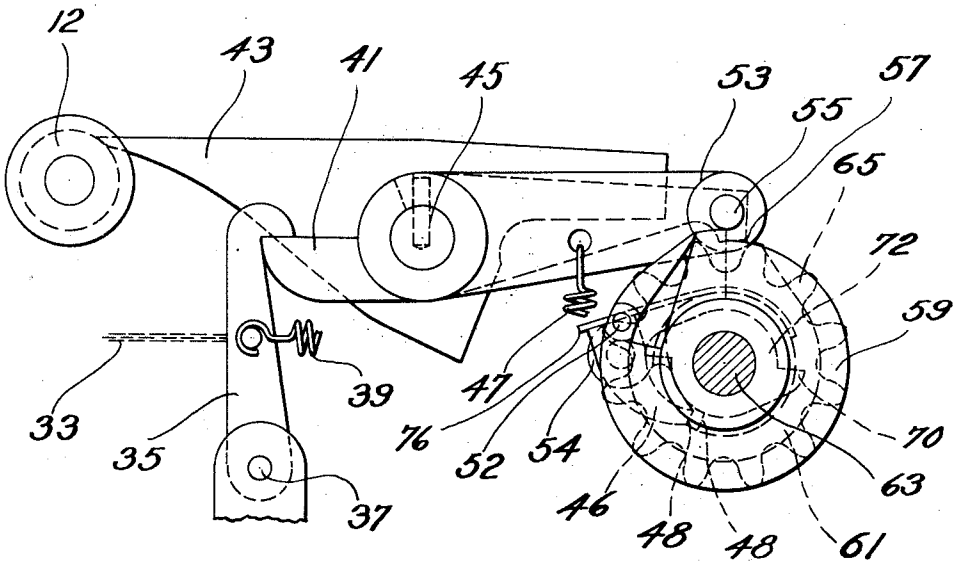


Fig. 8

Inventor
Louis L. Matthews
By David Rines
Attorney

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PAPER SORTING MACHINE

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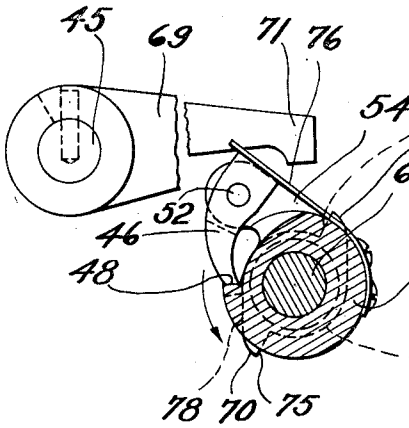


Fig. 9

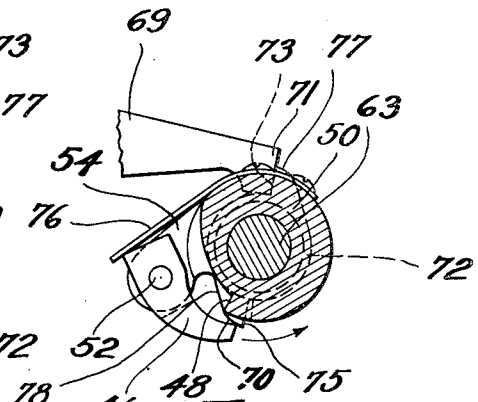


Fig. 10

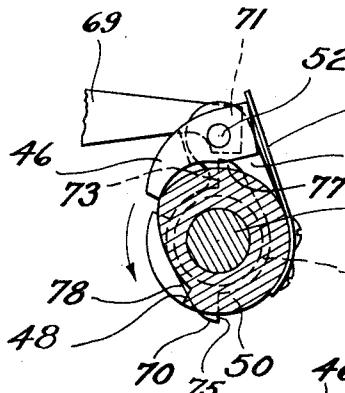


Fig. 11

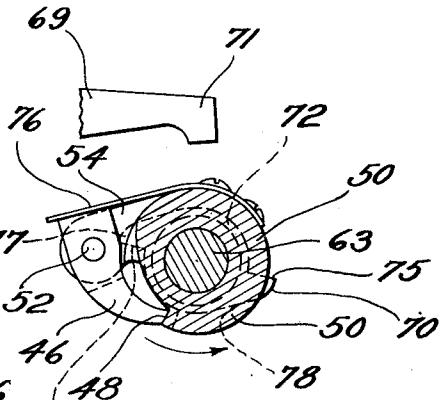


Fig. 12

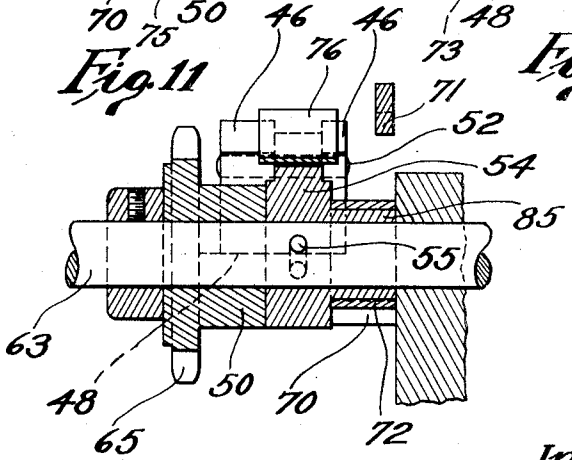


Fig. 13

Inventor
Louis L. Matthews
By David Rines
Attorney

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PAPER SORTING MACHINE

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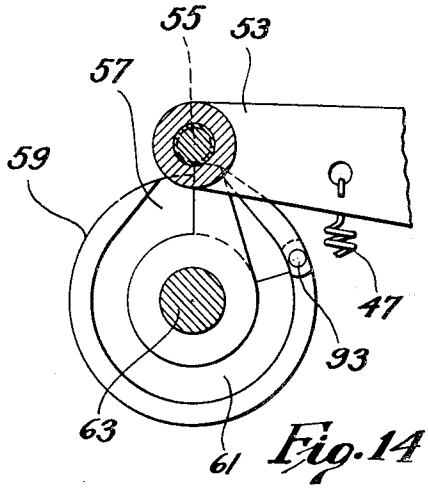


Fig. 14

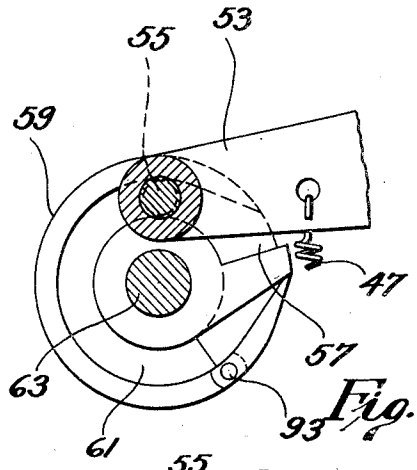


Fig. 15

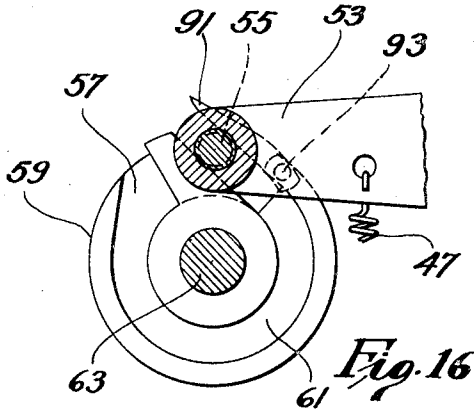


Fig. 16

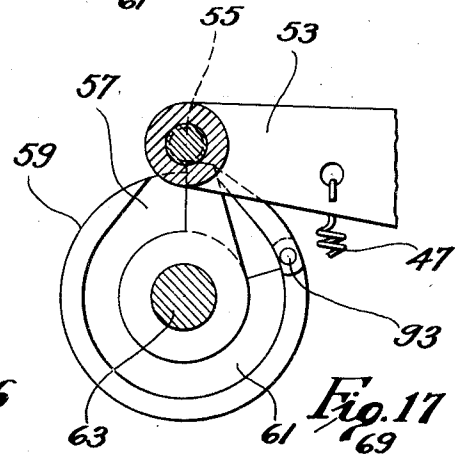


Fig. 17

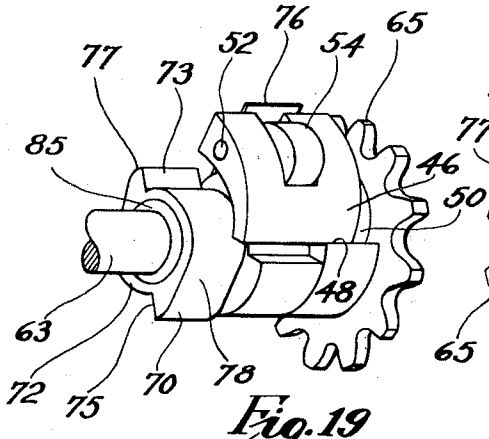


Fig. 19

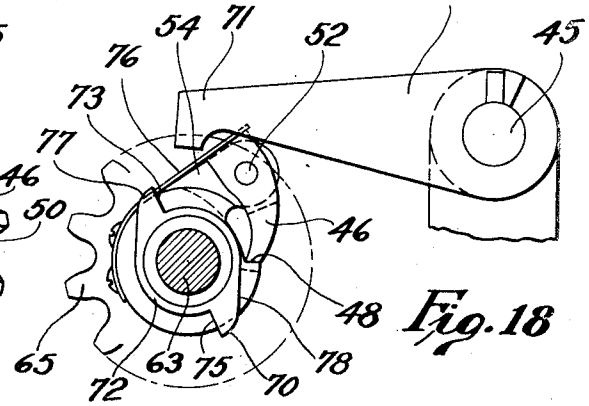


Fig. 18

Inventor
Louis L. Matthews
By David Rines
Attorney

Patented Jan. 9, 1934 1,942,870

UNITED STATES PATENT OFFICE

1,942,870

PAPER-SORTING MACHINE

Louis Landaff Matthews, Westerly, R. I., assignor to Charles B. Maxson and Julian W. Maxson, both of Westerly, R. I.

Application January 14, 1930. Serial No. 420,752

13 Claims. (Cl. 93—93)

The present invention relates to paper-feeding machines, and more particularly to sorting attachments for such machines.

A chief object of the invention is to provide an improved paper-sorting machine of the above-described character. Other objects will appear hereinafter and will be particularly pointed out in the appended claims.

The invention will be explained in connection with the accompanying drawings, in which Fig. 1 is a diagrammatic view, partly in side elevation, partly in section, and with parts broken away and other parts displaced for clearness, of a paper-cutting-and-feeding machine, with the present invention embodied therein, the counter shown in Fig. 2 being omitted from Fig. 1, in order not to confuse the showing; Fig. 2 is a fragmentary elevation, partly in section, upon the line 2—2 of Fig. 3, looking in the direction of the arrows, of a portion of the machine shown in Fig. 1, illustrating the location of the counter; Fig. 3 is a section taken upon the line 3—3 of Fig. 1, but upon a larger scale, parts being broken away and other parts displaced, in order that the section may be contained within the limits of the sheet of drawings; Figs. 4 and 5 are further enlarged sections taken upon the lines 4—4 and 5—5, respectively, of Fig. 3, looking in the directions of the arrows; Figs. 6 to 8, inclusive, are views similar to Fig. 5, showing further steps in the operation of the illustrative machine; Figs. 9 to 12, inclusive, are sections corresponding to Figs. 5 to 8, inclusive, respectively, but taken upon the line 9—9 of Fig. 3, looking in the direction of the arrows; Fig. 13 is a section taken upon the line 13—13 of Fig. 3, looking in the direction of the arrows, and upon a larger scale; Figs. 14 to 17, inclusive, are views corresponding to Figs. 5 to 8, inclusive, respectively, taken upon the line 14—14 of Fig. 3, looking in the direction of the arrows; Fig. 18 is a section taken upon the line 18—18 of Fig. 3, looking in the direction of the arrows, upon a larger scale; and Fig. 19 is a perspective of a detail.

The present invention is, for illustrative purposes, shown applied to a paper-sheet-cutting-and-feeding machine of well-known type, such as is commonly employed in paper mills to sever the rolls 2 of paper, Fig. 1, that are produced in the paper-making machines, into individual sheets, and to feed and stack the severed sheets into lay-boys 4. For simplicity of illustration, a single lay-boy 4 alone is illustrated herein. Any desired, convenient number of rolls 2 of paper may be operated upon simultaneously in the same machine, and five such rolls are illustrated diagrammatically in Fig. 1. The webs 3 of paper from the rolls 2 are led together to feed rolls 10, by which the paper is advanced to a rotary cutter 16, by which the strips are severed into sheets of the desired length. The axis of rotation of the cutter 16 is indicated at 17. After the sheets are thus severed, they are led to feed rolls 12, and from there to tapes 18 and 20. These tapes then feed the sheets into the lay-boy 4, which is automatically lowered from time to time to maintain approximately uniform the level of the sheets that are stacked therein. As they are delivered into the lay-boy 4, the sheets are automatically counted; and thin, paper tags 24 (Fig. 1) are automatically inserted between adjacent, predetermined sheets 104 and 106 (Fig. 1) at the completion of each count to separate or mark the bundles or reams of sheets so delivered and counted.

As the webs 3 travel from the rolls 2 upward toward the feed rolls 10, an operator, stationed nearby, shown in dotted lines at the left of Fig. 1, carefully inspects them for defects. As soon as he detects a defective web, he pulls backward upon a rod 29, Fig. 1. This effects a backward sliding movement of the rod 29 in its bearings 31, causing a pull upon a chain 33. This pull upon the chain 33 moves a catch 35 outward, about a pivot 37, from the normal position of Figs. 1, 3 and 5 to that of Fig. 6. This movement of the catch 35 releases a cooperating lug 41 that is integral with a switch 43. The switch 43 may consist, as illustrated in Fig. 3, of a number of spaced, switch fingers. The switch fingers and the lug 41 are integral with, or fixed to, a pivoting rod 45. The release of the lug 41 permits a spring 47 to actuate the switch 43 about its pivot 45, from the normal position of Figs. 1, 3 and 5 to the position of Fig. 6.

Ordinarily, with the switch 43 in the normal position, illustrated in Figs. 1, 3 and 5, the sheets severed by the cutter 16 travel through between the feed rolls 12 and over the switch 43 to the tapes 18 and 20, as before described. When the switch 43 occupies the position of Fig. 6, however, the corresponding defective sheet becomes deflected by the switch 43 on to tapes 49, by which it is delivered to an auxiliary, or defective-sheet, lay-boy 51. Of course, all five sheets from the five rolls 2 become deposited together in the lay-boy 51 as a unit; just as, when the rod 29 is not moved, all five sheets become deposited in the lay-boy 4 as a unit. If a web 3 is defective to the extent of more than a single sheet length, the operator will maintain his hold upon the sliding rod 29 to cause the switch 43 to be maintained in the position illustrated in Fig. 6 until all the defective sheets have thus become side-tracked to the auxiliary lay-boy 51. After the operator lets go his hold upon the rod 29, the switch 43 will become automatically restored to its normal position by mechanism now to be described.

The lug 41 has an extension 53 provided with a roll 55 that normally, when the catch 35 is effective, occupies the position illustrated in Figs.

1. 3 and 5. Upon the release of the catch 35, however, the action of the spring 47, in pivoting the lug 41 upward, causes the extension 53 to be pivoted downward, thus forcing the roll 55 also downward. The roll 55 is thus permitted to enter a cam opening 57 (shown in section in Figs. 4 and 14 to 17) provided upon the periphery of a cam roll 59. The opening 57 communicates with an interior cam 61 that extends around the center of the cam roll 59. Once the roll 55 has entered the opening 57, therefore, it is confined by the interior cam 61 until after a complete revolution of the cam roll 59. The interior cam 61 is so shaped, as shown more particularly in Figs. 14 to 17, as positively to cause the roll 55 to ride out of the cam 61, and on to the periphery of the cam roll 59, at the end of a complete revolution of the cam roll 59, a spring-pressed latch 91 yielding about its pivotal point 93 to permit this. The lug 41 is thus caused to return to its normal position, illustrated in Figs. 1, 3, 5 and 6. If the operator has meanwhile let go of the rod 29, a spring 39 has restored the catch 35 to its normal position. The catch 35 is thus enabled to reengage the lug 41, preventing the roll 55 from again entering the cam opening 57 until after the rod 29 is again actuated. In its normal position, the roll 55 rests upon the point of the cam roll 59 illustrated more particularly in Figs. 14 and 17. The opening 57 of the cam groove 61 commences at a point adjacent to the high point of the cam roll 59, as is also shown in these figures.

The roll 55 is illustrated in Figs. 6 and 15 while still confined by the interior cam 61. In Figs. 7 and 16, the roll 55 is about to be forced on to the exterior of the cam roll 59 by the walls of the interior cam 61, and the catch 35 is shown in position ready to engage over the lug 41, as soon as this is accomplished. The final operation, with the roll 55 out of the cam 61, and the catch 35 reengaged with the lug 41, is shown in Figs. 8 and 17. The parts are so timed that the switch 43 shall open just before the defective sheet has reached the feed rolls 12, and shall close again before the next perfect sheet has reached these feed rolls. There is another reason for so timing the parts, as will be explained in connection with a description of the counter and its connecting mechanism.

The cam roll 59 is operated in timed relation to the other elements, as described, by being driven directly from the knife shaft 17. To this end, it is fixed to a shaft 63, provided with a sprocket wheel 56. A sprocket chain 58, mounted over a sprocket wheel 60 upon the shaft 17, drives the sprocket wheel 56. The cam roll 59 thus makes one complete revolution corresponding to each revolution of the cutter shaft 17.

The defective sheets becoming thus sidetracked into the lay-boy 51, the number of sheets separated by the tags 24 would be reduced accordingly, and it becomes necessary to correct the count for the number of defective sheets removed. In order to explain how this is effected, it will be necessary to describe, first, the operation of the counting and tag-inserting mechanism.

The tag-inserting mechanism comprises feed rolls 26 and 27, intermittently driven from a shaft 44, Figs. 1 and 3, through a train of gearing 128 and either of two shafts 129 and 131. These feed rolls automatically advance a paper strip 34 intermittently as it is unwound from a reel 36. The end 38 of the paper strip is thus, at the proper time, intermittently inserted by the feed rolls 26 and 27 between the said two adjacent sheets 104 and 106 (Fig. 1) of the stack, and, after it is severed by knives 30 and 32 (shown more clearly in Fig. 3), constitutes a tag 24. The shaft 44 is continuously rotated by mechanism hereinafter to be described, but the shafts 129 and 131, one or the other, as the case may be, are intermittently rotated to actuate the feeding rolls 26 and 27 at the end of each cycle of operation of a counter. This mechanism is not further described herein as, with minor changes, it is substantially the same as is disclosed in Letters Patent No. 1,613,182 to Charles B. Maxson, dated January 4, 1927. The shafts 129 and 131 correspond, respectively, to the shafts 122 and 44 of the said Letters Patent. The mechanism shown at the right of Fig. 2 corresponds to the mechanism shown at the right of Fig. 17 of Letters Patent No. 1,611,476, granted December 21, 1926 to the said Maxson, a sprocket chain 95 (Figs. 2 and 3) corresponding to the sprocket chain 58 of the said Letters Patent No. 1,611,476. See, particularly, Fig. 3 of the present drawings and Fig. 4 of the drawings of the said Letters Patent No. 1,611,476.

As before explained, the shafts 129 and 131 are rotated not continuously, but intermittently, after a full ream or other desired number of sheets have been delivered into the lay-boy 4. The shaft 44, however, is rotated continuously. According to the disclosed embodiment of the invention, this is effected by a pawl 46 (see more particularly Fig. 19) that is pivotally mounted at 52 upon a collar 54 that is pinned to the shaft 63 at 55 (Fig. 13). The pawl 46, therefore, rotates continuously with the shaft 63, and as the rotation of the latter is timed with the revolutions of the knife 16, the pawl 46 makes one revolution corresponding to each revolution of the knife 16. The number of revolutions of the pawl 46, therefore, is a measure of the number of sheets cut by the knife 16, and that would, under normal conditions, be delivered into the lay-boy 4. The pawl 46 normally engages a lug 48 that is provided upon the hub or collar 50 (see more particularly Figs. 13 and 19) of a sprocket wheel 65 that is loosely mounted upon the shaft 63 so as to rotate thereabout. In thus rotating in a circular path with the shaft 63, therefore, the pawl 46 normally carries the collar 50 and the sprocket wheel 65 with it about the axis of the shaft 63. A sprocket chain 64 (Figs. 2 and 3) is mounted over the sprocket wheel 65 and also over a sprocket wheel 67 upon the shaft 44. The shaft 44 is thus rotated in timed relation to the rotation of the knife shaft 17. The rotation of the shaft 44 is, therefore, timed to the rotation of the rotary knife 16 and is, therefore, a measure of the number of sheets that are cut by the knife 16 and that would normally be stacked in the lay-boy, as has already been mentioned. By connecting the shaft 44 to a counting disk 97, then, it is possible to count the number of sheets cut by the knife 16. The details of the counter may be found described in the said Letters Patent No. 1,611,476. The counter may be adjusted, as described in the said Letters Patent No. 1,611,476, by means of a handle 176 (Fig. 2) to count by fives (five rolls 2 being illustrated) or by any other desired multiplier.

It will now be explained how the count is corrected for the defective sheets removed by the switch 43. As before explained, when the switch 43 is actuated, it is maintained open for a pre-

determined time interval by the interior cam walls 61. The same mechanism for effecting this result is utilized also to correct the count of the counter.

When the roll 55 enters the cam opening 57, as before explained, the pivoting rod 45 is tilted therewith. An arm 69 that is fixed to the opposite end of the pivoting rod 45 is, therefore, tilted also, and its end 71 is thus brought against a wall 73 of a collar or disc 72. The collar or disc 72 is loosely mounted upon a reduced hub 85 of the collar 54, so as to be free to rotate about the hub 85. The collar or disc 72 binds frictionally against the hub 85, and is normally, therefore, rotated with the collar 50. When the end 71 of the arm 69 engages the wall 73, however, the collar or disc 72 is prevented from rotating further.

The collar or disc 72 has also a gate 70 that normally is to one side of the lug 48, as shown in Figs. 5, 9 and 19. Under normal conditions, therefore, the pawl engages the lug 48, as before described, and the collar 50, with its sprocket wheel 65, and the collar or disc 72 rotate together with the collar 54 as a unit. When the end 71 of the arm 69 engages the wall 73, however, and the collar or disc 72 is stopped rotating, as before described, the further rotation of the collar 50 by the pawl 46 will soon carry the lug 48 to a position where the gate 70 overlies or covers the lug 48, as shown in Figs. 6 and 10. Upon reaching the wall 78 of the gate 70, the pawl 46, as shown in Fig. 10, will ride up the wall 78 and out of engagement with the lug 48, whereupon the shaft 44 will cease rotating and the counter will stop counting. The lug 48 will thus be left behind the gate 70, in the position of Fig. 10. So long as the gate 70 continues to overlie the lug 48, the continuously rotating pawl 46 can not engage the lug 48, but rides idly over the gate 70, as illustrated in Figs. 6 and 10. The sprocket wheel 65 is therefore stopped rotating further, the rotation of the shaft 44 is correspondingly stopped and the counter is not further actuated. In this manner, the operation of the counter becomes interrupted during the switching out of a defective sheet, so that the number of sheets delivered into the lay-boy 4 and the indicators of the counter are caused to tally.

When the switch 43 resumes its normal position, the sheets will again be led from the cutter 16 to the tapes 18 and 20 and, by them, to the lay-boy 4. The count should, therefore, again be resumed. This is effected by the arm 69 resuming its normal position, together with the switch 43. This is because both the switch 43 and the arm 69 are fixed to the same pivoting rod 45. The wall 73 becoming thus released from the restraining influence of the end 71 of the arm 69, the frictional binding of the collar 72 against the hub 85 will cause the collar 72 to resume its rotation about the axis of the shaft 63 together with the collar 54. The gate 70 will accordingly be moved away from the positions of Figs. 6 and 10 and into the positions of Figs. 5 and 9.

Upon the gate 70 becoming displaced from the position of Figs. 6 and 10 into that of Figs. 5 and 9, the pawl 46, during its next journey around with the shaft 63, will again become pressed into engagement with the lug 48 by a spring 76. The pawl 46 continuing its rotation, will now again carry the sprocket 65 with it, and the latter will, through the sprocket chain 64 and the sprocket wheel 67, again cause rotation of the shaft 44 and actuation of the counter controlled thereby.

The gate 70 is shown provided with a wall 75 similar to the wall 73, and the wall 73 is formed upon a gate 77 similar to the gate 70. The end 71 of the arm 69 may engage either the wall 73 or the wall 75, whichever happens to be nearer at the time that the switch 43 is actuated, and the other gate 70 or 77, as the case may be, will then be moved behind the lug 48 to disengage the pawl 46 therefrom.

In this manner, though the knife operates continuously, the sprocket wheel 65 is rotated only when the sheets enter the lay-boy 4, so as to maintain the count accurate.

The description of many portions of the machine an understanding of which is not essential to an understanding of the present invention has purposely been omitted, and many parts of the machine have purposely not been illustrated, in order not to distract attention from the features of essential novelty. Fuller explanation of such portions of the machine will be found in the Letters Patent above referred to. It will be understood that the features of novelty may be embodied in other machines, and in machines of other types, and that modifications may be made by persons skilled in the art without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a counter for counting the sheets, a switch, means normally maintaining the switch out of the path, means for rendering the maintaining means ineffective, a cam thereupon normally operative to maintain the switch in the path, means for operating the cam in synchronism with the feeding of the sheets to permit the switch-actuating means to actuate the switch into the path just prior to the arrival of a sheet and to actuate the switch out of the path prior to the arrival of the next-following sheet, means for actuating the counter, and means for rendering the counter-actuating means ineffective during the period when the switch is in the path.

2. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a switch, means normally maintaining the switch out of the path, means under the control of an operator for actuating the switch into the path, a cam thereupon normally operative to maintain the switch in the path for a predetermined time interval, and means for operating the cam in synchronism with the feeding of the sheets for actuating the switch out of the path at the end of the predetermined time interval.

3. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, an intermediately pivoted member having a switch on one side of the pivot and a cam-engaging member on the other side of the pivot, means normally maintaining the member in a pivotal position such that the switch is maintained out of the path, means for pivotally actuating the member to cause the switch to enter into the path, means for rendering the maintaining means ineffective, a cam engaged by the cam-engaging member and normally operative to maintain the switch in the path, and means for rotating the cam in synchronism with the feeding of the sheets, the cam having a portion adapted to be engaged by the cam-engaging member at a predetermined point in the rotation

of the cam to permit the pivotally actuating means to actuate the member to cause the switch to enter the path just prior to the arrival of a sheet, and the cam having a portion for actuating the member at a predetermined point in the rotation of the cam to cause the switch to move out of the path prior to the arrival of the next-following sheet.

4. A machine of the class described having, in combination, means for feeding sheet material in a predetermined path, a cutter for cutting the material into sheets, a switch normally disposed out of the path, means under the control of an operator for actuating the switch into the path in advance of any sheet to deflect the said sheet out of the path and for maintaining the switch in the path at will in order to deflect any desired number of successively following sheets out of the path, and means controlled by the cutter for preventing the actuation of the switch out of the path until after the lapse of a time interval and for actuating the switch out of the path prior to the arrival of the next-following sheet.

5. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a counter for counting the sheets, a switch normally disposed out of the path, means for actuating the switch into the path to deflect a sheet out of its path, means for actuating the counter, and means operated in synchronism with the feeding of the sheets for controlling the operation of the switch-actuating means and the counter-actuating means.

6. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a counter for counting the sheets, a switch normally disposed out of the path, means for actuating the switch into the path to deflect a sheet out of its path, means for actuating the counter, a cam, and means for actuating the cam in synchronism with the feeding of the sheets to control the switch-actuating means and the counter-actuating means.

7. A machine of the class described having, in combination, means for operating upon sheets of material, a counter for counting the sheets, a shaft operated from the operating means, means normally connected with the shaft for actuating the counter, and means for disconnecting the normally connected means to stop the further actuation of the counter.

8. A machine of the class described having, in combination, a cutter for cutting sheet material, means for feeding the cut sheets, a counter for counting the sheets, a shaft driven from the cutter, a member operated from the shaft for actuating the counter, and means for disconnecting the member from the shaft to stop the further actuation of the counter.

9. A machine of the class described having, in combination, means for feeding sheet material, a switch normally disposed out of the path of travel of the sheet material, normally ineffective means for actuating the switch into the path to deflect the sheet material out of the path, means under the control of an operator for rendering the switch-actuating means effective and for maintaining the switch-actuating means effective, and means operated in synchronism with the feeding means for actuating the switch out of the path upon the switch-actuating means becoming again ineffective.

10. A machine of the class described having, in combination, a cutter, means for feeding sheet material to the cutter along a path that is unobstructed to the view of an operator stationed thereat and from the cutter along a second path, means for actuating the cutter to cut the material into sheets, a switch normally disposed out of the second path, means under the control of the said operator when stationed at the first-named path for actuating the switch into the path in advance of any sheet and for maintaining the switch in the path at will in order to deflect any desired number of successively following sheets out of the path, and means controlled by the cutter-actuating means for actuating the switch out of the second path prior to the arrival of the next following sheet.

11. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a switch, means for actuating the switch into the path at predetermined times only, means for normally rendering the actuating means ineffective and thereby to maintain the switch normally out of the path, means under the control of an operator for rendering the said normally rendering means ineffective at any time, whereby the actuating means becomes thereupon effective at the next following said predetermined time to actuate the switch into the path in advance of a predetermined sheet to deflect the said predetermined sheet out of the path, and means for thereafter actuating the switch out of the path of travel of the next following sheet.

12. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a switch, means tending to actuate the switch into the path, means operated in synchronism with the feeding of the sheets for rendering the tending means effective at predetermined times only, means for normally rendering the synchronously operated means ineffective and thereby to maintain the switch normally out of the path, means under the control of an operator for rendering the said normally rendering means ineffective at any time, whereby the actuating means becomes thereupon effective at the next following said predetermined time to actuate the switch into the path in advance of a predetermined sheet to deflect the said predetermined sheet out of the path, and means for thereafter actuating the switch out of the path of travel of the next following sheet.

13. A machine of the class described having, in combination, means for feeding sheets of material in a predetermined path, a switch member having a switch and a cam-engaging member, means normally maintaining the switch member in a position such that the switch is maintained out of the path, means for actuating the switch member to cause the switch to enter into the path, means for rendering the maintaining means ineffective, a cam engaged by the cam-engaging member and normally operative to maintain the switch in the path, and means for operating the cam in synchronism with the feeding of the sheets, the cam having a portion adapted to be engaged by the cam-engaging member at a predetermined point in the operation of the cam to permit the actuating means to actuate the switch member to cause the switch to enter the path just prior to the arrival of a sheet, and the cam having a portion for actuating the switch member at a predetermined point in the operation of the cam to cause the switch to move out of the path prior to the arrival of the next-following sheet.

LOUIS LANDAFF MATTHEWS.