Nov. 11, 1941. L. L. MATTHEWS 2,261,969

SHEET-FEEDING MACHINE

Filed April 4, 1940 2 Sheets-Sheet 1

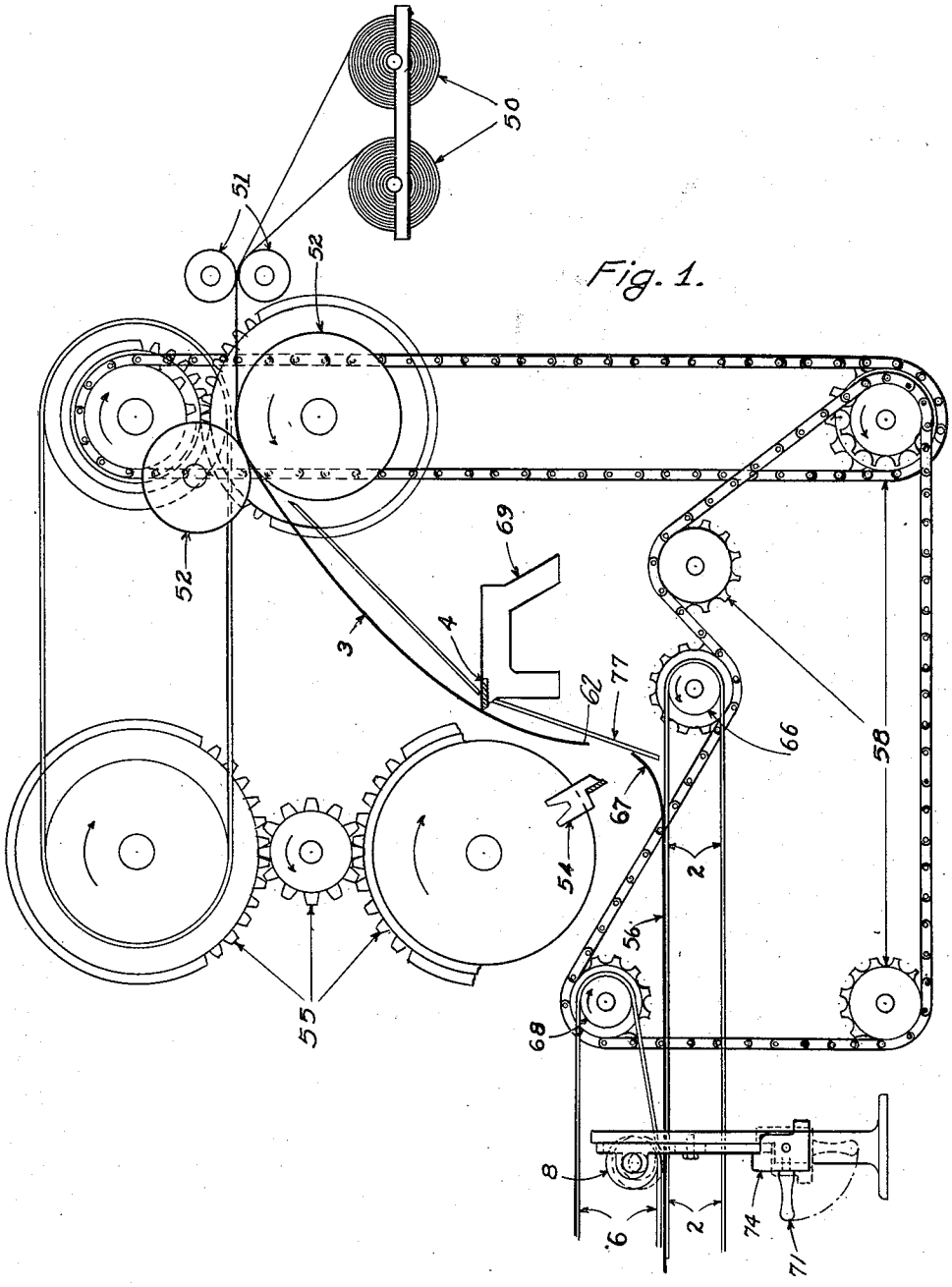


Fig. 1.

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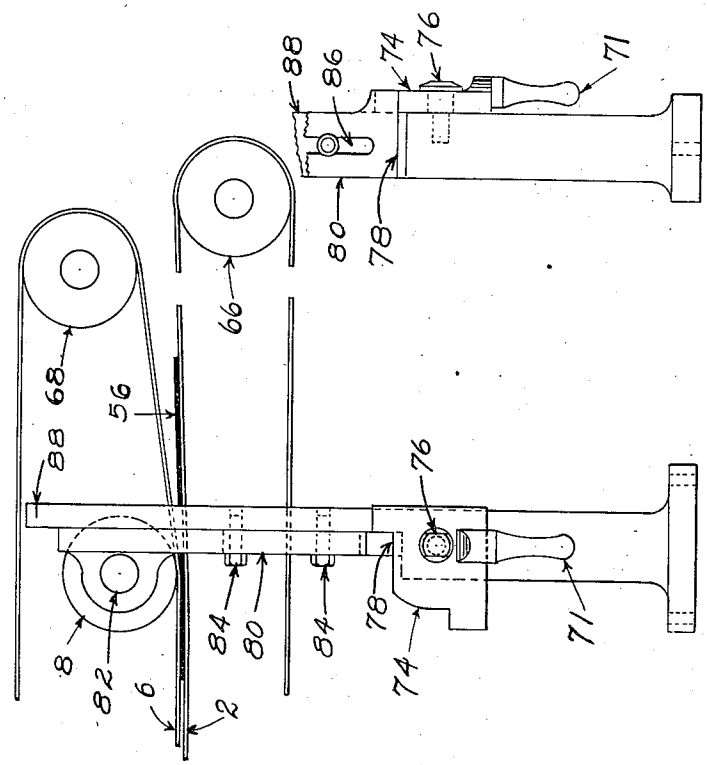


Fig. 4

Fig. 3.

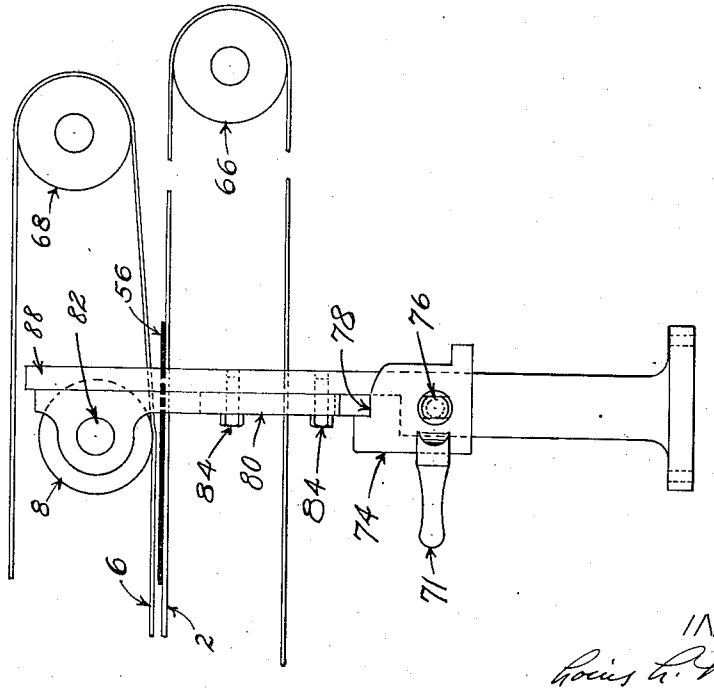


Fig. 2.

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SHEET-FEEDING MACHINE

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Application April 4, 1940, Serial No. 327,859

8 Claims. (Cl. 164—68)

The present invention relates to machines for feeding sheet material, such as paper and the like. The invention is particularly related to machines involving high speeds, like those used at paper mills for cutting webs from a roll or rolls into sheets, and feeding the sheets, by means of more or less horizontal conveyor tapes, into a lay-boy or other magazine, and more particularly still to machines of this character in which the cutting knife is rotary. The sheets are fed by high-speed tapes to low-speed tapes by which they become overlapped, and it is in this overlapped condition that they arrive in the lay-boy.

In one type of machine of the above-described character, the web of paper is led to the cutter at a downward incline, and the sheets, after they are cut from the web, continue to travel at the downward incline by their momentum, to tape conveyors. The head of each sheet is gripped between the tapes to feed the sheet forward into a lay-boy. When the sheets are long, this gripping is advantageous. When the sheets cut from the web are shorter than the length of the peripheral path of travel of the rotary-knife blade, however, this blade must obviously travel faster than the web stock, in order that it may return to the stock in sufficient season to make the next cut of a sheet of the same-size length. Because of the greater cutter speed, there is a tendency for the cutter, during its next revolution, to overtake the sheet cut during the previous revolution, causing the tail of the sheet to become hooked or "whipped" in front of the fast-traveling knife. The consequent buckling of the tail of the sheet results not only in damaging the sheet, by causing cracking or tearing, at the sharp part of the bend in the tail of the sheet, but also in interposing the tail as an obstruction to the travel of the head of the next-following sheets, thereby interfering with the smooth free travel of the latter, and causing the sheets to become jumbled into a waste mass.

It is therefore an object of the present invention to provide a machine of the above-described character that shall combine the above-described gripping feature for long sheets with an adjustment that shall avoid gripping the heads of short sheets. Other objects will be explained hereinafter and will be particularly pointed out in the appended claims.

The invention will now be more fully described in connection with the accompanying drawings, in which Fig. 1 is a diagrammatic side elevation of a machine embodying the invention in preferred form; Fig. 2 is a fragmentary side elevation, upon a larger scale, showing the parts in the full-line position of Fig. 1, part of the tapes 2 being broken away; Fig. 3 is a view similar to Fig. 2, but with the parts in the dotted-line position of Fig. 1; and Fig. 4 is a fragmentary view corresponding to Fig. 3, but in end elevation.

A web 3 is illustrated as led from a roll or rolls 50 of paper between feed rolls 51 and 52 and over a stationary bed knife or cutter 4, mounted upon a cutter unit 69. The term "web," "paper," "sheet," or its equivalent, will be employed to denote either a single layer or a plurality of superposed layers of the paper or other material. A rotary cutter 54, operated by mechanism 55, cooperates with the cutter 4 to cut the traveling web into sheets 56. The invention is equally applicable to use with previously cut sheets. Owing to the feeding action of the rolls 51 and 52, aided by gravity, the sheets 56 travel, at a downward incline, toward high-speed conveyor tapes or belts 2, that are mounted over a roll 66 and other rolls (not shown). The mounting of the tapes 2 over these rolls is such as to cause the belts 2 to become tensioned, so as to occupy a normal position, illustrated in Figs. 2 and 3, as hereinafter more fully explained.

During such travel, the heads of the sheets may engage a stationary inclined guide board 71, disposed between the cutter 4 and the tapes 2, or a line of sloping or inclinedly disposed tapes (not shown), described in a copending application, Serial No. 326,975, filed March 30, 1940. The belts or tapes 2 are disposed approximately horizontal, substantially parallel to the bed knife 4, at a level below the level at which the web is fed between the rolls 51 and 52. A cooperating belt or tape conveyor 6 cooperates with the conveyor 2 by engaging corresponding conveyor belts or tapes to feed the sheets received from the cutters further, ultimately into a lay-boy (not shown). The cooperating conveyor 6 is mounted and tensioned independently of the rolls of the conveyor 2 under a roll 8 and around a roll 68. The lower portion of the roll 8, when the roll occupies its normal position, illustrated in Fig. 3, normally engages the conveyor 2 at a predetermined point, hereinafter more fully referred to. The tapes 2 and 6 are actuated by mechanism 58, acting upon the rolls 66 and 68, desirably at a speed approximately ten per cent faster than the speed of the web 3, as determined by the feed rolls 52. The mechanism 58 may be in the form of a link chain engaging sprocket wheels upon the shafts that it turns. The roll 8 is shown positioned to the left of the rolls 66 and 68, and the roll 68 is shown raised slightly above the tapes 2 to provide a space in which the tapes 2 and 6 may bite the heads 62 of the oncoming sheets.

The rotary cutter 54 is operated by mechanism 55 at a peripheral speed that may be either less or greater than the speed of the web. In the former case, the sheets cut from the web will be of greater length than the length of the periph-

eral path of travel of the rotary cutter 54; in the latter case, the sheets will be shorter. Owing to the greater speed of travel of the knife 54 in the latter case, it has a tendency to engage the tail end 67 of a newly cut sheet, and force it into a loop before it reaches the roll 68 of the tapes 6, with undesirable consequences, as before described. Under such circumstances, it may be desirable that the head of the sheet be not gripped between the roll 8 and the tapes 2.

To this end, the roll 8 may be provided with a latch 74, or similar cam or other arrangement, permitting it to be raised above the tapes 2. The latch may be actuated by means of a handle 71; when the handle 71 occupies the position illustrated in Figs. 3 and 4, corresponding to the dotted-line position of Fig. 1, the roll 8 may be lowered; and when occupying the position illustrated in Fig. 2, corresponding to the full-line position of Fig. 1, raised. The handle 71 may be actuated from the position of Fig. 2 to that of Figs. 3 and 4 and back again merely by turning it about a pivot 76; the end of the handle 71 then describes the dot-and-dash curved path illustrated in Fig. 1. The latch 74 is shown as a cam that is rigid with the handle 71 so as to turn therewith. Upon the cam 74 rests by gravity the lower end 78 of a vertically disposed bar 80 at the upper end of which is mounted a spindle 82 about which the roll 8 is journaled. The bar 80 is free to move vertically by gravity, being guided in its vertical movement by pins 84 extending freely in a vertically disposed slot 86 of the bar 80 and fixed in a frame portion 88 of the machine. When the handle 71 is actuated from the position of Fig. 2 to that of Figs. 3 and 4, therefore, the cam 74 assumes a position such that the bar 80 descends by gravity on to a low part of the cam 74, as illustrated in Figs. 3 and 4, carrying the roll 8 with it. When the handle 71 is returned to the position of Fig. 2, the high part of the cam 74 raises the bar 80, raising also the roll 8.

When in the low position, the roll 8 engages the bottom tapes 2, so as to provide a definite drive between the top and the bottom tapes 6 and 2. The tapes 2 and 6 are thus caused normally to occupy a normal position at the said point predetermined by the lower position of the roll 8, at which point the tapes 2 and 6 normally engage, so as to be enabled to grip the heads 62 of the sheets 56 between the roll 8 and the conveyor 2 as the sheets are received by the tapes from the cutters 4 and 54. This is desirable to carry along heavy, long sheets of stock. In this low position, however, the effect is injurious on short sheets because the heads of the short sheets become positively locked against even slight slippage between the tapes 2 and 6. Such slippage would be desirable for the reason that the knife for a brief period engages the tails of the short sheets to push the sheets ahead more rapidly than the tapes 2 and 6 that grip the heads of the sheets can carry them away. When cutting short sheets, therefore, the roll 8 may be adjusted to the high position, in which no positive bite occurs between the top and bottom tapes 6 and 2. This gives a slight amount of freedom to the short-sheet paper without letting it get out of the control of the tapes 2 and 6. The heads 62 of the smaller-length sheets become thus enabled to pass freely at the said point predetermined by the roll 8, without becoming gripped between the conveyors 2 and 6 or the roll 8 at that point.

The lower tapes 2 are maintained by tension, as hereinabove described, in substantially the said normal position, illustrated in Figs. 2 and 3, irrespective of the position of adjustment of the roll 8, and irrespective of the position occupied by the tapes 6. The upper tapes 6, however, occupy their said normal position only when the roll 8 is adjusted to its lower position, as illustrated in Fig. 3. When the roll 8 becomes adjusted to its upper position, to separate the roll 8 from the conveyor 2, the lower reaches of the upper tapes 6 follow the roll 8 upward, so as to become disposed above their normal position, as illustrated in Fig. 2, permitting separation of the tapes 2 and 6 at the above-described position, predetermined by the roll 8.

By this simple adjustment of the roll 8 by a small definite amount, from the position illustrated in Fig. 3 to that of Fig. 2, to provide an open mouth at the said point predetermined by the roll 8, therefore, it becomes possible to adapt the same machine for operation either upon long-size sheets or short-size sheets, at will, merely by releasing the bite of the tapes on the short sheets. So releasing the bite enables the heads of the short sheets to slip in between the tapes 2 and 6 at the point predetermined by the position of the roll 8, thus enabling the tails 67 of the short sheets to travel out of the path of whipping action of the rotary cutter 54, preventing the cracking of the tails 67 that would take place if the heads 62 of the short sheets were firmly gripped at the said predetermined point.

Modifications will occur to persons skilled in the art, and all such are considered to fall within the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. A machine of the character described having, in combination, cooperating cutters for cutting a traveling web into sheets, cooperating conveyors for receiving the sheets from the cutters and for thereafter feeding the sheets, the conveyors each normally occupying a normal position at a predetermined point at which the conveyors normally grip the heads of the sheets as the sheets are received from the cutters, means whereby one of the conveyors may be disposed out of its normal position at the point to separate it from the other conveyor at the point, and means for maintaining the other conveyor in substantially its normal position at the point irrespective of the position occupied by the said one conveyor, whereby the heads of the sheets become enabled to pass freely without becoming gripped between the conveyors at the point.

2. A machine of the character described having, in combination, cooperating cutters one of which is rotary for cutting a traveling web into sheets, cooperating conveyors for receiving the sheets from the cutters and for thereafter feeding the sheets, the conveyors each normally occupying a normal position at a predetermined point at which the conveyors normally grip the heads of the sheets as the sheets are received from the cutters, means for actuating the rotary cutter at a peripheral speed greater than the speed of travel of the web to produce sheets cut from the web having a smaller length than the length of the peripheral path of travel of the rotary cutter, means whereby one of the conveyors may be disposed out of its normal position at the point to separate it from the other conveyor at the point, and means for maintaining the other conveyor in substantially its normal

position at the point irrespective of the position occupied by the said one conveyor, whereby the heads of the said smaller-length sheets become enabled to pass freely without becoming gripped between the conveyors at the point.

3. A machine of the character described having, in combination, a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets, a conveyor adapted to occupy a normal position, a cooperating conveyor cooperating with the first-named conveyor to receive the sheets from the cutters and thereafter to feed the sheets, the cooperating conveyor having a roll normally in engagement with the first-named conveyor to permit the conveyors normally to grip the heads of the sheets between the roll and the first-named conveyor as the sheets are received from the cutters, means for separating the roll from the first-named conveyor, and means for maintaining the first-named conveyor in substantially its normal position irrespective of the position of the roll, whereby the heads of the sheets become enabled to pass freely between the conveyors without becoming gripped by the roll.

4. A machine of the character described having, in combination, a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets, a belt conveyor adapted to occupy a normal position, a cooperating belt conveyor cooperating with the first-named conveyor to receive the sheets from the cutters and thereafter to feed the sheets, the cooperating conveyor being mounted over rolls one of which is normally disposed in engagement with the first-named conveyor at a predetermined point to permit the conveyors normally to grip the heads of the sheets between the said one roll and the first-named conveyor as the sheets are received from the cutters, means for separating the said one roll from the first-named conveyor, and means for maintaining the first-named conveyor in substantially its normal position irrespective of the position of the said one roll, whereby the heads of the sheets become enabled to pass freely between the conveyors without becoming gripped by the said one roll at the predetermined point.

5. A machine of the character described having, in combination, a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets of predetermined length substantially equal to or greater than the length of the peripheral path of travel of the rotary cutter, cooperating conveyors for receiving the sheets from the cutters and for thereafter feeding the sheets, the conveyors each normally having a normal position at a predetermined point at which the conveyors normally grip the heads of the sheets as the sheets are received from the cutters, means whereby one of the conveyors may be disposed out of its normal position to separate it from the other conveyor at the point, and means for maintaining the other conveyor in substantially its normal position irrespective of the position occupied by the said one conveyor, whereby the heads of sheets of length smaller than the said predetermined length and cut by the cutters from the web when the rotary cutter is actuated at a peripheral speed greater than the speed of travel of the web become enabled to pass freely without becoming gripped between the conveyors at the point.

6. A machine of the character described having, in combination, a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets, a conveyor adapted to occupy a normal position, a cooperating conveyor cooperating with the first-named conveyor to receive the sheets from the cutters and thereafter to feed the sheets, the cooperating conveyor having a roll normally in engagement with the first-named conveyor to permit the conveyors normally to grip the heads of the sheets between the roll and the first-named conveyor as the sheets are received from the cutters, means for actuating the rotary cutter at a peripheral speed greater than the speed of travel of the web in order to produce sheets cut from the web having a smaller length than the length of the peripheral path of travel of the rotary cutter, means for separating the roll from the first-named conveyor, and means for maintaining the first-named conveyor in substantially its normal positon irrespective of the position of the roll, whereby the heads of the sheets become enabled to pass freely between the conveyors without becoming gripped by the roll.

7. A machine of the character described having, in combination, a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets, a belt conveyor, roll means over which the conveyor is mounted and tensioned, a cooperating belt conveyor adapted to engage the first-named conveyor to feed between the conveyors the sheets cut by the cutters, roll means independent of the first-named roll means and over which the cooperating conveyor is mounted and tensioned independently of the mounting and tensioning of the first-named conveyor, the second-named roll means comprising a roll normally disposed in engagement with the first-named conveyor at a predetermined point to permit the conveyors normally to grip the heads of the sheets between the roll and the first-named conveyor as the sheets are received from the cutters, and means for separating the roll from the first-named conveyor to permit the heads of the sheets to pass freely between the conveyors without becoming gripped by the roll at the predetermined point.

8. In a machine having a stationary cutter and a cooperating rotary cutter for cutting a traveling web into sheets of predetermined length substantially equal to or greater than the length of the peripheral path of travel of the rotary cutter and cooperating conveyors normally engaging at a predetermined point to grip the heads of the sheets at the predetermined point as the sheets are received from the cutters to feed the sheets, a method enabling the machine to feed sheets of length smaller than the said predetermined length and cut by the cutters from the web when the rotary cutter is actuated at a peripheral speed greater than the speed of travel of the web, the said method comprising separating the conveyors at the predetermined point to permit the heads of the said smaller-length sheets to pass freely between them at the predetermined point.

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