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FEEDING AND STACKING METHOD AND MACHINE

Filed May 13, 1921

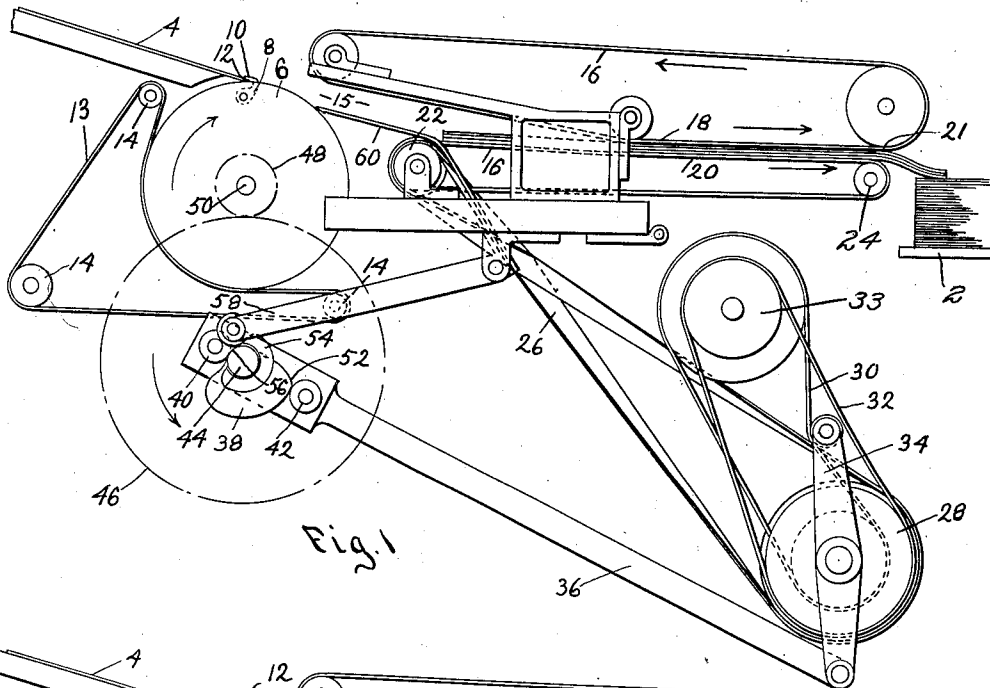


Fig. 1

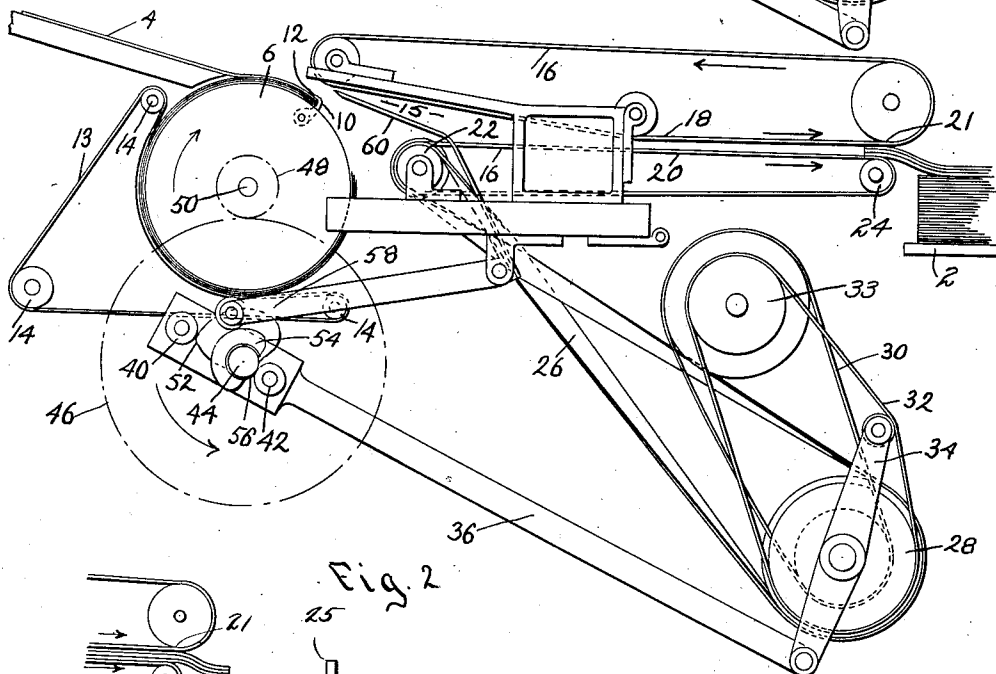


Fig. 2

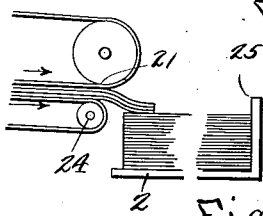


Fig. 3

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CHARLES B. MAXSON, OF WESTERLY, RHODE ISLAND.

FEEDING AND STACKING METHOD AND MACHINE.

Application filed May 13, 1921. Serial No. 469,205.

To all whom it may concern:

Be it known that I, CHARLES BENJAMIN MAXSON, a citizen of the United States, and a resident of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Feeding and Stacking Methods and Machines, of which the following is a specification.

The present invention relates to feeding and stacking methods and machines, and more particularly to methods of and machines for feeding and stacking sheet material, like paper.

Though by no means limited thereto, the invention is particularly adapted for use with high-speed printing presses. The printed sheets emerge from the press so rapidly that they buckle and fly about in a manner which precludes their being led directly into a magazine to be stacked. Their speed of travel must be considerably reduced before they are permitted to reach the magazine. It has therefore been customary hitherto to direct the sheets to a rapidly moving associator, which successively seizes the sheets and associates rapidly any desired number of them in superposed relation. The associated sheets are then deposited upon a fly which slowly transfers them to the magazine. During the slow transfer movement, fresh sheets are rapidly associated, which are then slowly stacked by the fly as before. But the speed of the press is naturally limited by the speed of operation of the inherently slowly acting fly and the stack produced in this manner is very far from uniform.

This invention has for its objects to speed up feeding and stacking methods and machines of the above-described character and to produce a more uniform stack.

According to a preferred embodiment of the present invention, the heads of the superposed, associated sheets are received by a carrier which at first moves very rapidly to remove the sheets quickly from the associator. Further association of fresh sheets is thereby not interfered with. The rate of speed of the carrier at this time is so high, however, that if the sheets were delivered into the magazine at this speed, it would be impossible to stack them therein. The carrier is accordingly slowed down, so that by the time the heads of the superposed sheets reach the magazine, they are moving

slowly enough to permit of their ready and uniform stacking.

With these and other objects in view, the invention consists of the improved method and machine hereinafter described, illustrated in the accompanying drawings and defined in the appended claims.

The invention is illustrated in the accompanying drawings, in which Fig. 1 is a diagrammatic view of a machine constructed according to a preferred embodiment of the present invention, illustrating the feeding operation at high speed; Fig. 2 is a similar view, showing the feed mechanism operating at low speed; and Fig. 3 is a view of a detail.

An important end sought to be attained by the present invention is to stack evenly and uniformly in a magazine or lay-boy 2 sheets 4 that are successively delivered to or past a predetermined point at a speed so high that, if the sheets were fed directly into the magazine, they would buckle and curl and fly about therein in a manner which would make stacking impossible. The method by which the sheets are produced before delivery to the high-speed point is no part of this invention. They may, for example, be successively cut from an unwinding roll of paper, as suggested in a copending application, Serial No. 469,203, filed May 13, 1921. For the purpose of the present description, however, it will be assumed that the sheets are delivered, ready cut, from a printing press provided with a rotary associator 6, and the above-referred-to predetermined point may be taken as any point upon the associator, as, for example, that point 8 upon the circumference thereof at which a gripper jaw 10 is located. As the sheets 4 are successively delivered to this predetermined point at relatively high speed, their forward ends or heads 12 are successively gripped by the jaw 10 and their forward movement becomes thus limited. The head of each sheet becoming thus affixed to the associator, further rotation of the latter will cause the sheet to become rolled thereabout, and by the time that the jaw 10 has revolved through a complete cycle and returned to its original, illustrated position, it will be in readiness to receive the head 12 of the next-delivered sheet 4. A plurality of sheets will thus become rolled about the associator in superposed relation. The drawings show a belt 13 pass-

ing over idler pulleys 14 as the retaining means for the superposed sheets, but any other expedient for retaining the sheets upon the associator may be adopted, as, for example, the use of two jaws 10, acting alternately to grip successive sheets in a well-known manner.

After five or six or any other desired number of rapidly-delivered sheets become thus successively rapidly associated, the jaw 10 becomes automatically opened, in a manner well known, to release the heads of the sheets. An arm 60, referred to more specifically hereinafter, is at the same time lowered from the position of Fig. 2 to that of Fig. 1 to open a path 15 for the sheets to a carrier 16. The continued rotation of the associator, following the release of the sheets by the jaw 10, causes the heads of the sheets to shoot forward into the path 15 until they are seized by the carrier. The carrier, shown in the drawings as comprising two sets of tapes 18 and 20, moves forward at very high speed at the time that the heads of the sheets are gripped thereby, and accordingly the sheets are fed at high speed past the position occupied by the point 8 at the time that the sheets are seized by the carrier. The carrier continues operating at high speed until the tails of the sheets, as they become unwound from the associator, have been moved past the point 8 and out of the way of the sheets that are next delivered to the associator. While restrained by the tapes, the sheets can not buckle or fly or curl, but were they to enter the magazine at the same high speed, it would be impossible to stack them. The carrier is accordingly slowed down, so that the sheets, after they have left the associator, may be fed past a second predetermined point 21 into the magazine at a speed low enough to permit of their becoming stacked therein. The point 21 may, for example, be that at which the sheets leave the carrier, or a point to the left thereof. The movement of the sheets is stopped at a third predetermined point 25 in the magazine. Simultaneously with the feeding of the sheets at low speed, fresh sheets become superposed upon the associator, the process of association continuing steadily whether the carrier operates at high speed, or at low.

The preferred mechanism for driving the carrier, first at high speed and later at low, will now be described. The tape 20 is driven by a roll 22 over which, and over a roll 24, it is mounted. The roll 22 is connected by a belt 26 to a pulley 28. The pulley 28 is adapted to be driven by either of two belts 30 and 32, which are mounted over a constantly-rotated driving pulley 33 that is connected to any suitable source of power. The belts 30 and 32 have considerable slack to render them ineffective, but they are adapted to be-

come selectively tightened by a belt tightener 34. When the belt tightener occupies the position shown in Fig. 1, the belt 30 becomes tightened to drive the pulley 28 and, therefore, the tape 20, at high speed. This may be regarded as the normal action of the belt-tightener. When the belt-tightener occupies its opposite extreme position, shown in Fig. 2, the belt 32 becomes tightened to drive the tape 20 at low speed. The movement of the belt-tightener 34 from the position of Fig. 1 to that of Fig. 2 thus effects the slowing down of the carrier. Not only is the speed of the carrier changed by this arrangement, however, but the carrier becomes effectively braked as well, so that it commences to feed the sheets slowly at a time always when the sheets occupy the same relative position in the carrier. The preferred position, of course, is that in which the sheets are about to enter the magazine.

To time the operation of the belt tightener, it is shown pivoted to an arm 36 that is adapted to be moved longitudinally in one direction or the other by a cam 38 acting upon lugs 40 and 42 fixed to the arm. The cam 38 is mounted upon a shaft 44 that is driven by a gear 46 from a gear 48 meshing therewith mounted upon the accumulator shaft 50. The belt-tightener is thus, through the cam 38 operated in timed relation to, and controlled by, the associator. When the forward nose 52 of the cam 38 engages the lug 42, the belt-tightener acts upon the tape 30 to drive the carrier at high speed. When the nose 52 acts upon the lug 40, which happens after the sheets have been received by the carrier and have been fed temporarily thereby at high speed, the action of the belt-tightener is transferred to the tape 32 and the carrier is operated at low speed.

In order that the associated bundle of sheets may be transferred from the associator to the carrier while the latter is travelling at high speed, a cam 54 that is mounted upon the shaft 44 is provided with a dwell 56 in which the free end of an arm 58 is adapted to fall, as shown in Fig. 1, to permit the lowering of the arm 60. So long as the arm 60 is raised, Fig. 2, the path 15 to the carrier is closed. When the arm 60 becomes lowered, however, it permits the heads of the associated sheets to shoot forward to the rapidly moving carrier.

Modifications may be made by persons skilled in the art without departing from the spirit and scope of the present invention, as defined in the appended claims.

The invention having been thus described, what is claimed as new is:

1. The method of feeding sheet material that comprises associating a plurality of sheets, feeding the associated sheets at a speed so high that they would have a tendency to buckle and fly about, restraining the

sheets against said tendency while they are so fed, and feeding the associated sheets at relatively low speed.

2. The method of feeding sheet material which comprises successively rapidly associating a plurality of sheets at a predetermined point, feeding the associated sheets past the predetermined point at a speed so high that they would have a tendency to buckle and fly about, restraining the sheets against said tendency while they are so fed, and feeding the associated sheets at relatively low speed past a second predetermined point and simultaneously associating fresh sheets at the first-named point.

3. The method of feeding and stacking sheet material which comprises successively rapidly associating a plurality of sheets at a predetermined point, feeding the associated sheets past the predetermined point at a speed so high that they would have a tendency to buckle and fly about, restraining the sheets against said tendency while they are so fed, feeding the associated sheets at relatively low speed past a second predetermined point, and stopping the movement of the sheets at a third predetermined point.

4. The method of feeding sheet material which comprises successively feeding a plurality of sheets forward at relatively high speed, successively limiting the forward movement of the sheets, whereby the sheets become superposed, feeding the superposed sheets at a speed so high that they would have a tendency to buckle and fly about, restraining the sheets against said tendency while they are so fed, and feeding the superposed sheets at relatively low speed.

5. The method of feeding and stacking sheet material which comprises successively feeding a plurality of sheets forward at relatively high speed, successively limiting the forward movement of the sheets, whereby the sheets become superposed, feeding the superposed sheets at relatively high speed to permit of another plurality of sheets becoming superposed, the speed of feed of the superposed sheets being so high that the sheets would have a tendency to buckle and fly about, restraining the sheets against said tendency while they are so fed, feeding the superposed sheets at relatively low speed into a magazine, and limiting the forward movement of the sheets in the magazine, whereby the sheets become stacked therein.

6. The method of feeding sheet material which comprises affixing an end of a sheet to an associator driven at relatively high speed, whereby the sheet becomes rolled around the associator, releasing said end of the sheet, seizing said end of the sheet and feeding the sheet at a speed so high that it would have a tendency to buckle and fly about, whereby the sheet becomes unrolled from the associator, restraining the sheet

against said tendency while it is so fed, and then feeding the sheet at relatively low speed.

7. The method of feeding sheet material which comprises successively feeding a plurality of sheets at relatively high speed to an associator that is driven at relatively high speed, successively affixing an end of each of the sheets to the associator, whereby the sheets become successively rolled around the associator in superposed relation, releasing said ends of the sheets, seizing said ends of the sheets and feeding the sheets in superposed relation at a speed so high that they would have a tendency to buckle and fly about, whereby said sheets become unrolled from the accumulator, restraining the sheets against said tendency while they are so fed, and then feeding the superposed sheets at relatively low speed.

8. A sheet-feeding machine having, in combination, an associator carrying a plurality of associated sheets at high speed, single means for feeding the associated sheets first at a speed so high that they would have a tendency to buckle and fly about and then at low speed, and means for restraining the sheets against the said tendency.

9. A sheet-feeding machine having, in combination, means for rapidly associating a plurality of sheets, means for feeding the associated sheets away from the associating means, means for actuating the feeding means first at relatively high speed and then at relatively low speed, the relatively high speed being such that the sheets would have a tendency to buckle and fly about, and means for restraining the sheets against the said tendency.

10. A sheet-feeding machine having, in combination, an associator, means for feeding sheet material thereto, a carrier for receiving the associated sheets from the associator and for thereafter feeding them, means for actuating the carrier first at relatively high speed and then at relatively low speed, the relatively high speed being such that the sheets would have a tendency to buckle and fly about, and means for restraining the sheets against the said tendency.

11. A sheet-feeding machine having, in combination, an associator, means for feeding sheet material thereto, and single means controlled by the associator for receiving the associated sheets from the associator and for feeding them first at relatively high speed and then at relatively low speed, the relatively high speed being such that the sheets would have a tendency to buckle and fly about, and means for restraining the sheets against the said tendency.

12. A sheet-feeding machine having, in combination, an associator, a carrier for receiving the associated sheets from the asso-

ciator, a source of power, a high-speed belt and a low-speed belt connecting the carrier to the source of power, and a belt tightener adapted to be actuated into engagement with either the high-speed belt or the low-speed belt, whereby a change-speed effect and a braking effect are obtained upon the carrier.

13. A sheet-feeding machine having, in combination, an associator, a carrier for receiving the associated sheets from the associator and for thereafter feeding them, a source of power for the carrier; a high-speed belt and a low-speed belt for connecting the carrier to the source of power, a belt tightener normally engaging the high-speed belt, and means controlled by the associator for actuating the belt-tightener away from the high-speed belt and into engagement with the low-speed belt after the carrier has received the associated sheets from the associator and fed them forward temporarily at high speed.

14. A sheet-feeding machine having, in combination, a carrier operable at different speeds, and common means for changing the speed of the carrier and braking it.

15. A sheet-feeding-and-stacking machine having, in combination, an associator, a carrier for receiving the associated sheets from the associator, a magazine to which the carrier is adapted to feed the sheets, means for actuating the carrier at relatively high speed when the sheets are received thereby from the associator, and means for lowering the speed of the carrier when the sheets are fed to the magazine, the speed-lowering means acting also to brake the carrier.

16. The method of delivering sheet material from a high-speed associator that comprises feeding the associated sheets away from the associator at a speed so high as not to cause interference with the further association of sheets by the associator, whereby the sheets are caused to have a tendency to buckle and fly about, restraining the sheets against the said tendency while they are so fed, and then feeding said associated sheets at relatively low speed.

In testimony whereof, I have hereunto subscribed my name this second day of May, 1921.

CHARLES B. MAXSON.