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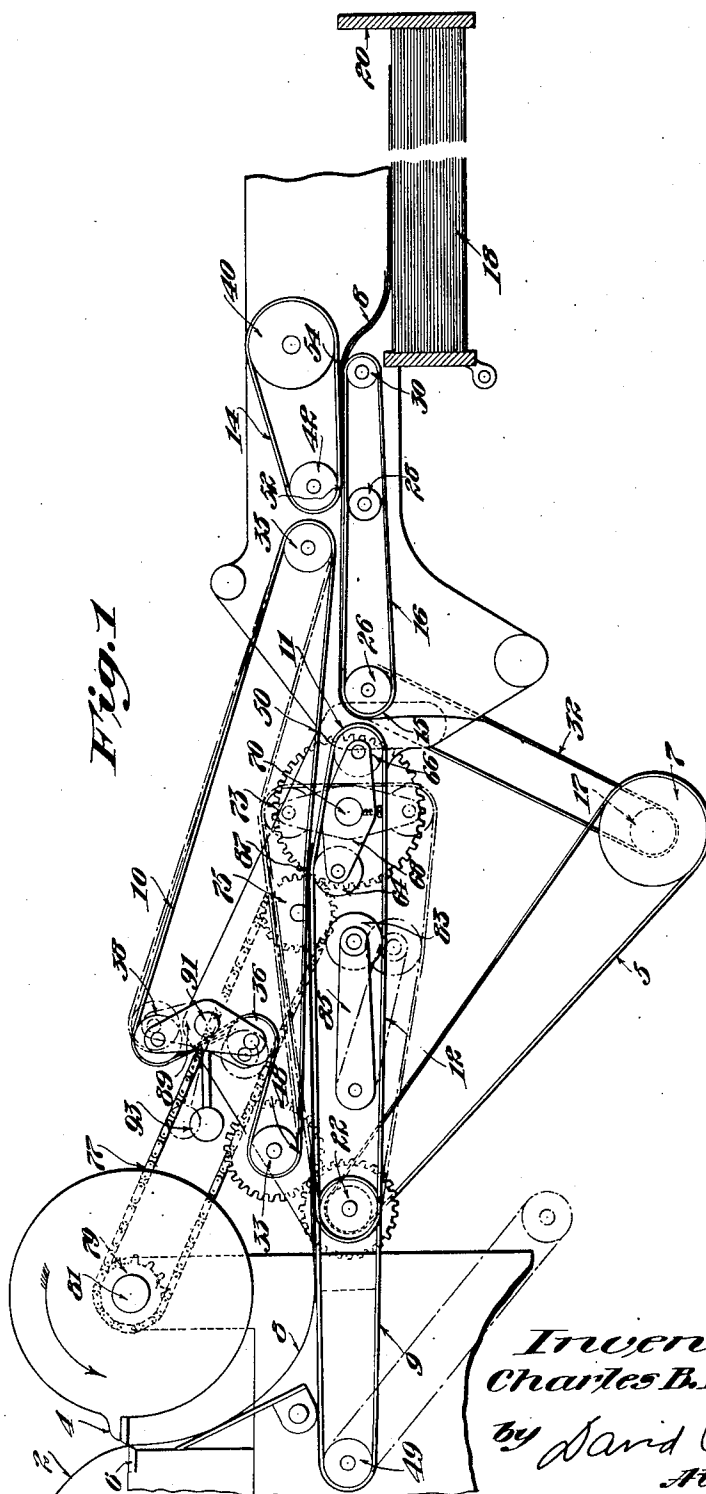
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C. B. MAXSON

FEEDING AND STACKING METHOD AND MACHINE

Filed May 13, 1921

2 Sheets-Sheet 1



Inventor
Charles B. Maxson
by David Rines
Attorney

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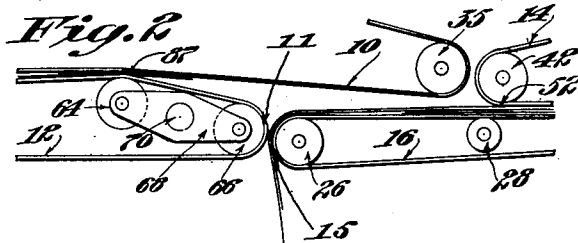
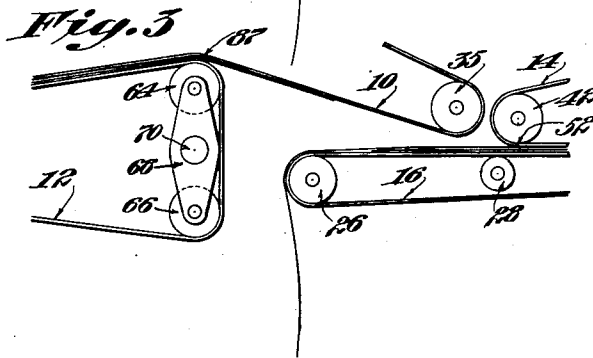
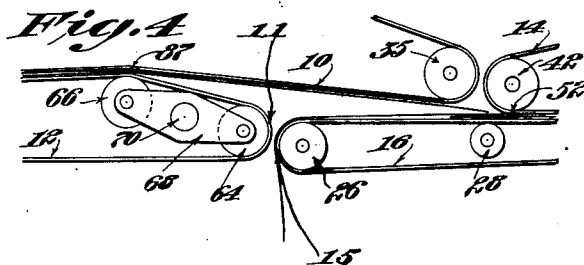
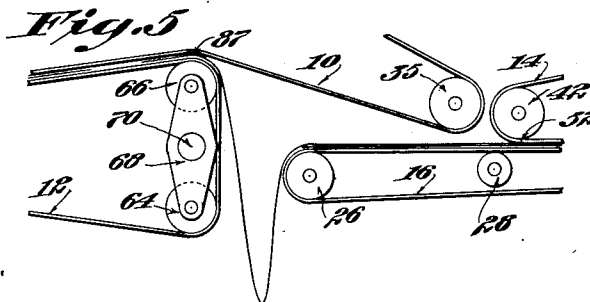
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FEEDING AND STACKING METHOD AND MACHINE

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2 Sheets-Sheet 2



Inventor
Charles B. Maxson
by David Rines
Attorney

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UNITED STATES PATENT OFFICE.

CHARLES B. MAXSON, OF WESTERLY, RHODE ISLAND.

FEEDING AND STACKING METHOD AND MACHINE.

Application filed May 13, 1921. Serial No. 469,204.

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.

This 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.

According to present practice, a large number of thicknesses or sheets of paper are simultaneously severed into bundles of sheets, the bundles then being fed forward as units into a magazine, where they become stacked. For some purposes, and for some kinds of paper, it is desirable to feed and stack the sheets singly. This result can, of course, be attained with present-day machines, a single sheet, and not a bundle of sheets, constituting the unit. To operate the machines at the low speed for which they are adapted, however, is very time consuming, and when it is attempted to increase the speed, the sheets commence to buckle up and fly about as they are delivered into the magazine, interfering with proper stacking. The consequence is that it is impracticable to stack sheets singly or in small bundles with the present-day methods.

According to the method disclosed in a co-pending application, Serial No. 370,829, filed April 2, 1920, the sheets are fed singly or in small unit bundles successively past a high-speed point at a very high speed,—a speed so high that, if they were fed at said speed into the magazine, they would buckle and fly about therein in such manner as to make stacking impossible. The sheets are, however, then successively fed past a low-speed point at a very much lower speed, the unit sheets or bundles of sheets becoming thus overlapped, and they are fed in overlapped relation at the same low speed into the magazine, where they become easily stacked. If the sheets are very long compared to the dimensions of the machine, their tails, after their heads have been slowed down by the slow-speed mechanism, must be moved out of the way of the heads of the next succeeding sheets that are ad-

vancing at high speed. This result is effected in the above-described application by bodily intermittently separating the high-speed mechanism from the low-speed mechanism to permit the tails to fall into the gap thus made. The particular apparatus there shown, however, though entirely practicable and operative, is such as to introduce considerable friction upon the sheets, with the consequent generation of static electricity, and the length of the sheets which it is possible to operate upon is, furthermore, comparatively limited.

It is the object of the present invention, therefore, to improve upon methods and machines of the above-described character, rendering them more efficient in operation, adapted for use with longer sheets and reducing the generation of static electricity to a minimum.

With this end in view, a feature of the invention contemplates transferring the head of the sheet from the high-speed mechanism to the low-speed mechanism with as little friction upon the sheet as possible. As a further feature, the rear portions of the sheet are successively gripped anew at spaced-apart points and positively forced into the gap intermittently opened up between the high-speed mechanism and the low-speed mechanism, thereby facilitating the handling of very long sheets.

To the attainment of the above and other objects, as will be made clear to persons skilled in the art as the description proceeds, the invention consists of the improved method and machine hereinafter described, illustrated in the drawings and defined in the appended claims.

A preferred machine constructed in accordance with the present invention is diagrammatically illustrated in the accompanying drawings, in which Fig. 1 is a diagrammatic view, in elevation, of the machine; and Figs. 2 to 5 inclusive are diagrammatic views showing successive steps in the operation of feeding the sheets.

The invention is illustrated in its preferred form in Fig. 1. A layer 2 of material, like paper, is delivered by a mechanism (not shown) to a rotating cutter 4 which cooperates with a cutter block 6 to sever the paper into sheets 8 of predetermined length. The cutter and the cutter block may be dispensed with if the sheets which it is desired to treat have been pre-

viously cut. The sheets are deposited upon tapes 9 by which they are advanced to high-speed tapes 10 and 12 which successively grip their forward ends or heads. One only of each of the tapes 9, 10 and 12 is shown, others being directly behind and would be visible in plan. It will be understood that the term "tape" is employed in the specification and the claims in a generic sense and includes within its scope other feeding mechanisms, like belts, cylinders, aprons and the like. The tapes 9 are driven at a little higher speed than the speed of delivery thereto of the sheets, permitting the successively delivered sheets to become spaced before they arrive at the tapes 10 and 12. The speed of the high-speed tapes is so great that if the sheets were permitted to enter a magazine 18 directly, they would buckle and curl and fly about therein in a manner that would make stacking impossible. The tapes 10 and 12 resist this buckling or curling tendency so long as the sheets are retained between them. In order that the sheets may be slowed down before they are fed into the magazine, the high-speed tapes deliver them to low-speed tapes 14 and 16. One only of each is shown and others are located behind these.

Upon the sheets being received by the low-speed tapes from the high-speed tapes, their speed of advance becomes naturally reduced. Before the low-speed tapes can complete feeding the sheet forward to the magazine, therefore, the high-speed tapes will have advanced another sheet to the low-speed tapes. To prevent the head of the second sheet from colliding with the prior-fed sheet, the tail of the latter is moved transversely to the direction of feed, out of the way. As in the above-described application, this result is attained by separating the delivery end 11 of the tape 12 from the receiving end 15 of the tape 16, permitting the tail of the sheet whose head has been gripped by the low-speed tapes to move into the gap thus formed between the tapes 12 and 16. The head of the next succeeding sheet is then advanced at high speed over the submerged tail of the prior-fed sheet. As the new sheet continues to travel at higher speed than the old until its head becomes gripped by the low-speed tapes, it will become superposed over the prior-fed sheet, in lapping relation thereto, but at a distance behind the value of which is dependent upon the relative speeds of the high-speed and the low-speed tapes. The tail of this succeeding sheet will be moved out of the way, as before, and a third sheet will be advanced to the low-speed tapes, which will become superposed over the second sheet. In similar fashion a fourth sheet will become superposed over the third sheet, a fifth over the fourth, and so on.

While the high-speed tapes feed the sheets

singly, therefore, the low-speed tapes feed a plurality of sheets in successively lapped relation, one behind the other, in which fashion they arrive into the magazine. There, a stop 20 acts successively upon the heads of the sheets to limit their further movement, so that the sheets become stacked or piled in the magazine evenly.

In this manner, the sheets may be advanced to, and stacked evenly in, the magazine, at low speed, without buckling or curling or other defects incident to high speed, though the sheets are in reality advanced singly by the high-speed tapes at quite a high speed. The high-speed advance, for example, may be as high as 850 feet per minute, or higher, while the speed of advance of any single sheet in the magazine itself may be as low as 75 feet per minute. The high speed, indeed, need be limited only by the speed at which the cutter will operate safely. The significance of this will become apparent when it is reflected that the average speed employed with present-day methods,—which speed, of course, is uniform throughout,—is in the neighborhood of only 150 feet per minute.

The high-speed tapes 12 are mounted over actuating rolls 22, 64 and 66. The roll 22 is driven from any suitable source of power, as by a belt 5 mounted over a pulley 7. The rolls 64 and 66 will be further discussed hereinafter. The high-speed tapes 9 are mounted over the roll 22, at one side of the tapes 12, and over an idler roll 49. The low-speed tapes 16 are mounted over a roll 26 and idler rolls 28 and 30. The roll 26 is driven in any suitable manner, as by a belt 32 mounted over a pulley 17 concentric with the pulley 7, but of smaller diameter than the latter. The high-speed tapes 10 are mounted over a roll 33 geared to the roll 22 and over idler rolls 35, 36 and 38. The low-speed tapes 14 are similarly mounted over idler rolls 40 and 42.

The apparatus thus far described, like the apparatus of the above-identified application, is adapted to feed long sheets of material successively past a predetermined point at a speed so high as to make it impracticable to feed them at said speed directly into the magazine, and to successively feed the sheets at a relatively low speed past a second predetermined point into the magazine. The first-named predetermined point may, for example, be the point 48 at which the high-speed tapes 10 and 12 commence to feed, the point 50 at which these tapes separate, or any intermediate point. For convenience, this point may be referred to as a high-speed point. The second predetermined point, which may be designated a low-speed point, may, for example, be the point 52 at which the low-speed tapes 14 and 16 commence their feeding, the point 54

at which these tapes separate, or any intermediate point.

After the head of the sheet has been gripped by the low-speed tapes, the tapes 12 separate from the tapes 16, as above mentioned, to permit the tail of the sheet to move out of the way of the next advancing sheet, into the space or gap formed between the tapes 12 and 16. When the sheets are very long, it may happen that the delivery ends 11 of the high-speed tapes 12 may return to their original position near the receiving ends 15 of the low-speed tapes 16 before the tail of the sheet has completely escaped from the high-speed tapes. This condition of affairs is illustrated in Fig. 4. The present invention is particularly adapted for use with very long sheets.

The rolls 64 and 66 are, to that end, mounted at the ends of arms 68 that are pivoted upon a shaft 70 half way between these ends. The arms 68 are continuously rotated, as indicated in Figs. 2 to 5, by a gear 73 keyed to the shaft 70 and meshing with a gear 75. The gear 75 is connected by a gear chain 77 to a gear 79 upon the shaft 81 of the rotary cutter 4. The arms 68 are thus positively driven from the same source of power that actuates the cutter 4.

As the arms 68 are actuated from the full-line to the broken-line position of Fig. 1, the above-mentioned space or gap will be opened up between the tapes 12 and 16 to permit an intermediate portion of a sheet to fall or buckle in between. An idler roll 83 upon a freely pivoted arm 85 will take up the slack in the tapes 12, thus maintaining the tapes taut and permitting the roll 22 that is fixed in position, and the movable rolls 64 and 66, to drive the tapes 12 effectively in all positions of the arms 68.

As the arms 68 continue their rotation, they will be restored to the full-line position, but with the positions of the rolls 64 and 66 reversed, the roll 64 occupying the position originally occupied by the roll 66 and the latter now occupying the position formerly occupied by the former. (Compare Fig. 4 with Fig. 2 and Fig. 5 with Fig. 3.) The roll 66 will now cause the tapes 10 and 12 to take a new grip upon a rear portion of the sheet, at the point 87. The arms 68 continuing to rotate, the roll 64 will now separate from the tapes 16, and into the new gap thus formed between the tapes 12 and 16, the portion of the sheet gripped at 87 will be positively forced. The sheet may be so long that its tail extends for a considerable distance beyond the point 87, in which event, the roll 64 will act again upon the sheet in the same manner. The rolls 64 and 66 will thus act alternately upon rear portions of the sheet, causing an increasingly larger portion of the sheet to buckle in the gap between the tapes 12 and 16, until the

tail of the sheet has escaped the influence of the high-speed tapes and has dropped completely away therefrom. The next sheet will then be similarly acted upon by the high-speed tapes after its head has been gripped by the low-speed tapes in overlapping relation to the prior sheet.

The rotation of the arms 68 causes the tapes 12 and 10 to assume successively various positions two of which are shown in full lines and broken lines. The consequent slack in the tapes 12 are taken up by the roll 83, as has already been explained. In order to take up the slack in the tapes 10, the rolls 36 and 38 are mounted at the ends of arms 89 that are intermediately freely pivotally mounted at 91. When the tapes 10 are forced into the broken-line position, the arms 89 are rocked clockwise, and as the tapes 10 are restored toward their full-line position, a counterweight 93 rocks the arms 89 in the opposite direction, to maintain the tapes 10 taut.

Owing to the above-described oscillatory movement of the high-speed tapes 10 and 12, the sheet that is fed therebetween will be advanced forward to the low-speed tapes 14 and 16, but with an oscillatory movement transverse to the direction of feed. As the head of the sheet first emerges from between the tapes 10 and 12, Fig. 2, it first moves upward with the tapes 10, towards the position of Fig. 3. The tapes 10 and 12 are adapted to contact but part way, as shown, the delivery ends of the tapes 10 extending beyond the tapes 12, so as to overlap the receiving ends 15 of the tapes 16, for a purpose which will shortly appear. The sheet is therefore first fed by the tapes 10 and 12, and later by the tapes 10 alone. During the upward oscillatory movement of the tapes 10 and 12, the delivery ends 11 of the tapes 12 separate from the receiving ends 15 of the tapes 16, as above described. The head of the sheet is meantime carried forward beyond the delivery ends 11 of the tapes 12 by the tapes 10, which are continuously driven by the roll 33. The overlapping portions of the tapes 12 then move bodily downward towards the receiving tapes 16, but still advancing to feed the sheet forward. Owing to their downward movement, the action of the air upon the surface of the sheet causes the overlapping portions of the tapes 10 to grip the head of the sheet along its upper surface, causing the sheet to hug or cling close to the tapes. While so gripped, the head of the sheet is fed forward in its plane, and at the same time, it is moved transversely downward. During first, the upward and forward movement of the head of the sheet between the tapes 10 and 12, Figs. 1, 2 and 3, and, later, the downward and forward advance of the head of the sheet by the tapes 10 alone, Fig. 4,

these tapes and the sheet advance together, without any substantial rubbing of one over the other. There can therefore be very little, if any, generation of static electricity during the advance.

As the sheet is fed further forward, it remains above the plane of feed of the low-speed tapes 14 and 16 until the arms 68 again assume a substantially horizontal position. The rolls 64 and 66, and the delivery ends 11 of the high-speed tapes 12 that are controlled thereby, move from a position above the plane of feed of the low-speed tapes 14 and 16, across and beyond said plane, during their cycle of movement. The overlapping ends of the tapes 10 can not follow the rolls 64 and 66 below the plane of the tapes 16. They will therefore release the head of the sheet. Owing to the lapped arrangement of the tapes 10 and 16, the head of the sheet, when it leaves the tapes 10, will come upon the overlapped portions of the tapes 16. The overlapping portions of the tapes 10, in effect, lay the sheet upon the overlapped portions of the tapes 16. There is thus as little rubbing action of the sheet upon the tapes 16 as upon the tapes 10 and as little static electricity is therefore generated from that source. The roll 35 at the delivery ends of the tapes 10 is situated very close to the roll 28 and the roll 42 of the low-speed tapes 14 so that the sheet may be deposited or laid upon the tapes 16 very close to the bite 52 between the low-speed tapes, thereby further reducing the opportunity for friction of the sheet upon the tapes 16.

The sheets are thus first fed by the high-speed tapes 10 and 12, and the head of the sheet is then advanced by the overlapping ends of the tapes 10 alone, without substantial friction. The head of the sheet is not allowed to drop from the delivery ends of the tapes 10 when they occupy their uppermost positions, to the receiving ends of the tapes 16, and is not allowed to slide thereover, but it is carried bodily downward by the tapes 10 and is deposited thereby upon the overlapped ends of the tapes 16, very close to the point 52. The transfer from the one set of tapes to the other is effected with as little friction upon the sheet as it is possible to have, for until the one sheet is laid upon the other, they are maintained out of contact. The low-speed tapes 14 and 16 then grip the head of the sheet at 52 to feed it forward into the magazine, and the delivery ends of the high-speed tapes 12 become intermittently separated from the receiving ends of the low-speed tapes, to permit rear portions of the sheet to fall or buckle into the gap thus formed. The continuously rotating arms 68 act upon spaced-apart points of the sheet to positively force the rear portions of the sheet out of the way of the next

advancing sheet. In this manner, very long sheets may be fed in overlapped relation into the magazine at very low speed, though the speed of advance of each individual sheet is very high. Upon their arrival in the magazine, the sheets may be evened or trued according to the method illustrated in a co-pending application, Serial No. 469,203 filed May 13, 1921.

The present invention, obviously, is as applicable to the feeding and stacking of bundles of sheets as to single sheets. Although, for concreteness, therefore, the term "sheet" is employed in the claims, it is to be understood that the term is intended to embrace within its scope not only a single sheet, but a unit which may be constituted of a single sheet or of a bundle of sheets. The invention furthermore, is not restricted to the chief features hereinbefore pointed out, but embraces other features of novelty as well, as is indicated in the appended claims.

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

1. The method of feeding sheet material in a fluid, such as air, that comprises gripping a sheet along one surface and along a portion of the other surface with tapes, whereby a second portion of the said other surface is exposed to the action of the fluid during the gripping action, and advancing the tapes to feed the sheet and simultaneously moving the tapes transversely, the speed and the direction of transverse movement of the tapes being such that the fluid acting on the said second portion shall press the sheet against one of the tapes, whereby the sheet is moved transversely while it is fed.

2. The method of feeding sheet material in a fluid, such as air, that comprises successively gripping a plurality of sheets, each along one surface, with a tape, and maintaining pressure on a portion of the other surface, whereby a second portion of the said other surface is exposed to the action of the fluid during the gripping action, and advancing the tape at relatively high speed to feed the sheets, each in its plane, successively past a high-speed point, successively moving the tape transversely in a direction towards each sheet during the advance of the tape at a speed sufficiently large so that the fluid acting on the said second portion shall press the sheet against the tape, causing the sheets to hug the tape, whereby the sheets are successively moved transversely by the tape at relatively large speed while they are successively advanced in their planes by the tape, successively retracing the transverse movement of the tape to release the sheets, and subsequently feeding the sheets at relatively low speed, whereby the sheets are fed past a low-speed point in lapped relation.

3. The method of feeding sheet material that comprises gripping a sheet along its surface, feeding the sheet, while so gripped, at relatively high speed in its plane, simultaneously moving the head of the sheet, while it is fed, transversely to its plane, lapping the head of each sheet over the tail of the prior-fed sheet, and subsequently feeding the sheet at relatively low speed.

4. The method of feeding sheet material which comprises successively gripping a plurality of sheets along their surfaces, successively feeding them forward at relatively high speed while so gripped past a high-speed point, moving the gripped sheets transversely while they are so fed, successively feeding the sheets at relatively low speed past a low-speed point, and lapping the head of each sheet over the tail of the prior-fed sheet, whereby they are fed past the low-speed point in lapped relation.

5. The method of feeding sheet material which comprises feeding a sheet at relatively high speed past a high-speed point, feeding the sheet at relatively low speed past a low-speed point, and successively acting upon spaced-apart portions of the sheet to buckle the sheet out of the way between the two points while the sheet is fed positively at low speed.

6. The method of feeding-sheet material which comprises successively feeding a plurality of sheets at relatively high speed past a high-speed point, successively feeding the sheets at relatively low speed past a low-speed point, successively lapping the head of each sheet over the tail of the prior-fed sheet, and successively buckling parts of the sheets out of the way between the two points, whereby the sheets are fed past the low-speed point in lapped relation.

7. A machine for feeding sheets of material in a fluid, such as air, having, in combination, a tape for gripping a sheet of material along one surface, means for gripping the sheet along a portion of the other surface, whereby a second portion of the said other surface is exposed to the action of the fluid during the gripping action, means for advancing the tape to feed the sheet, and means for moving the tape during its advance transversely to the direction of its advance in a direction towards the sheet at a speed sufficiently large so that the fluid acting on the said second portion shall press the sheet against the tape, causing the sheet to hug the tape, whereby the sheet is moved transversely by the tape at relatively high speed while it is fed.

8. A machine for feeding sheets of material in a fluid, such as air, having, in combination, a tape for successively gripping a plurality of sheets, each along one surface, each sheet being held against the tape by pressure along a portion of its other surface

means for advancing the tape at relatively high speed to feed the sheets, each in its plane, successively past a high-speed point, means for successively moving the tape transversely to the direction of its advance in a direction towards each sheet during the advance of the tape at a speed sufficiently large so that the fluid acting on the other surface of each sheet shall press the sheet against the tape, causing the sheets to hug the tape, whereby the sheets are successively moved transversely by the tape at relatively high speed while they are advanced in their planes by the tape, means for successively retracing the transverse movement of the tape to release the sheets, the construction and arrangement being such that the head of each sheet shall be lapped over the tail of the prior-fed sheet and means for subsequently feeding the sheets at relatively low speed, whereby the sheets are fed past a low-speed point in lapped relation.

9. A machine of the class described having, in combination, two lapping tapes the tapes each having upper and lower reaches, the lower reach of one of the tapes and the upper reach of the other tape being adapted individually to feed material, and means for moving one of the tapes towards the other tape to lay the material fed by the one tape upon the other tape.

10. A sheet-feeding machine having, in combination, two tapes for feeding a sheet of material, two tapes for receiving the sheet from the first-named tapes, one of the first-named tapes lapping one of the second-named tapes, and means for relatively moving the lapping tapes towards each other, whereby said one of the first-named tapes is adapted to lay the sheet upon said one of the second-named tapes.

11. A machine of the class described having, in combination, a roll, an intermediately pivoted arm that extends farther from the pivot in one direction than in a direction at right angles to the said one direction, a tape mounted over the roll and the ends of the arm, and means for rotating the arm and the roll to drive the tape.

12. A machine of the class described having, in combination, a roll fixed in position, an arm pivoted half way between its ends, the arm extending farther from the pivot in one direction than in a direction at right angles to the said one direction, a roll pivotally mounted at each end of the arm, a tape mounted over the rolls, means for rotating the arm and the fixed roll to drive the tape, and means for maintaining the tape taut.

13. The method of feeding sheet material that comprises successively gripping a plurality of sheets each along one of the surfaces of the sheet, maintaining at least a portion of the other surface of each sheet ungripped during the gripping action, feed-

ing the sheets while so gripped at relatively high speed successively past a high-speed point, moving the gripped sheets transversely while they are so fed, successively releasing the sheets along the said first-named surfaces, and successively gripping the heads of the sheets before their tails are released and feeding the sheets so newly gripped at relatively low speed past a low-speed point, whereby the sheets are fed past the low-speed point in lapped relation.

14. A machine of the class described having, in combination, a roll fixed in position, an arm pivoted half way between its ends, a roll pivotally mounted at each end of the arm, a tape mounted over the rolls, means for rotating the arm and the fixed roll to drive the tape, two additional rolls, a second intermediately pivoted arm, a roll pivotally mounted at each end of the second arm, a tape mounted over the last-named rolls and said additional rolls, means for rotating one of said additional rolls to drive the second-named tape, the tapes contacting part way to feed material between them and the rotation of the first-named arm causing an oscillatory movement of the contacting parts, and means for maintaining the tapes taut.

15. A sheet-feeding machine having, in combination, a rotatable arm, a high-speed tape mounted over the free end of the arm adapted to feed a sheet of material at relatively high speed, and means adapted to receive the sheet from the high-speed tape and to feed it at relatively low speed.

16. A sheet-feeding machine having, in combination, a rotatable arm, a high-speed tape mounted over the free end thereof adapted to feed a sheet of material at relatively high speed, and a low-speed tape adapted to receive the sheet from the high-speed tape and to feed it at relatively low speed.

17. A sheet-feeding machine having, in combination, a rotatable arm, a high-speed tape mounted over the end thereof adapted to feed a sheet of material at relatively high speed, a low-speed tape situated near the arm adapted to receive the sheet from the high-speed tape and to feed the sheet at relatively low speed, and means for rotating the arm, whereby said end of the high-speed tape is caused to separate from the low-speed tape and permit the sheet to pass in between them.

18. A sheet-feeding machine having, in combination, a rotatable arm, a high-speed tape mounted over the end thereof, a second high-speed tape cooperating with the first-named tape to feed a sheet of material, the second high-speed tape extending beyond the arm, and a low-speed tape adapted to receive the sheet from the high-speed tapes and to feed the sheet at a relatively low speed, one end of the low-speed tape being situated

near the arm so as to be overlapped by the second high-speed tape, the second high-speed tape being adapted to lay the head of the sheet upon the low-speed tape and the arm being adapted to separate from said end of the low-speed tape to permit another portion of the sheet to pass in between the arm and the low-speed tape.

19. A sheet-feeding machine having, in combination, means acting at a high-speed point to feed a sheet of material at relatively high speed past the point, means acting at a low-speed point to feed the sheet at a relatively low speed past the low-speed point and means for moving the high-speed point in a closed path, whereby the points become periodically separated to permit the sheet to pass in between them.

20. A sheet-feeding machine having, in combination, two tapes for feeding a sheet of material between them, two tapes adapted to receive the sheet from the two first-named tapes and feed it further, the delivery end of one of the two first-named tapes lapping the receiving end of one of the two second-named tapes and the delivery end of the other of the two first-named tapes being situated near said receiving end, and means for removing said second-named delivery end to permit a portion of the sheet to pass in between said second-named delivery end and said receiving end.

21. A sheet-feeding machine having, in combination, a high-speed tape for feeding a sheet of material at relatively high speed, a low-speed tape one end of which is situated near one end of the high-speed tape adapted to receive the sheet from the latter and to feed the sheet at a relatively low speed, and means for moving said end of the high-speed tape from a position to one side of the plane of the low-speed tape across and beyond said plane, thereby separating said ends and permitting the sheet to pass in between them.

22. A sheet-feeding machine having, in combination, two means each adapted to act at a high-speed point to feed a sheet of material at relatively high speed past the point, means acting at a low-speed point to feed the sheet at a relatively low speed past the low-speed point, means for separating the two points to permit the sheet to pass in between them, and means whereby the two first-named means are adapted to act alternately at the high-speed point after each point-separating operation.

23. A sheet-feeding machine having, in combination, a high-speed tape adapted to feed a sheet of material at relatively high speed, a low-speed tape adapted to receive the head of the sheet from the high-speed tape and to feed the sheet at a relatively low speed, means for separating adjacent ends of the tapes to permit another portion

of the sheet to pass in between them, and means whereby said end of the high-speed tape is adapted to force a third portion of the sheet in between the tapes, whereby long sheets may be fed by the low-speed tape in lapped relation.

24. A sheet-feeding machine having, in combination, a roll fixed in position, an arm pivoted half way between its ends, a roll pivotally mounted at each end of the arm, a high-speed tape mounted over the rolls, means for rotating the arm and the fixed roll to drive the tape, a second high-speed tape cooperating with the first-named tape to feed a sheet of material, the second high-speed tape extending beyond the arm, a low-speed tape one end of which is situated near the arm so as to be lapped by the second high-speed tape, and a second low-speed tape one end of which is situated near the extending end of the high-speed tape, the second high-speed tape being adapted to lay the head of the sheet upon the first-named low-speed tape near the second-named low-speed tape, the low-speed tapes being thereupon adapted to feed the sheet at a relatively low speed, the arm being adapted to separate from said end of the first-named low-speed tape to permit another portion of the sheet to pass in between the arm and said end of the first-named low-speed tape, the rolls upon the arm being adapted to act alternately to cause the high-speed tapes to feed successive sheets to the low-speed tapes in lapped relation.

25. The method of feeding sheet material which comprises feeding a sheet a substantial distance in lapping relation to a prior-fed sheet, maintaining the sheets out of contact with each other during the feeding movement throughout the said substantial distance, and laying a portion of the first-named sheet upon the prior-fed sheet a substantial distance forward of the rear end of the prior-fed sheet at the end of the said feeding movement of the said portion of the first-named sheet.

26. A machine of the class described having, in combination, two tapes each having upper and lower reaches, the lower reach of one of the tapes and the upper reach of the other tape being adapted individually to feed material, means for actuating the tapes, and means for relatively moving the upper reach of the said other tape and the lower reach of the said one tape towards each other transversely to the direction of feed to lay

the material from the said one tape upon the said other tape.

27. A machine of the class described having, in combination, a tape for gripping a sheet of material along a surface, the sheet being held against the tape by pressure along a portion of its other surface, means for advancing the tape to feed the sheet, a tape for receiving the sheet from the first-named tape, means for actuating the receiving tape to feed the sheet further, and means for moving the first-named tape transversely to the direction of its advance towards the sheet and the receiving tape, whereby the first-named tape is adapted to lay the sheet upon the receiving tape.

28. A machine of the class described having, in combination, a tape for gripping a sheet of material along a surface, the sheet being held against the tape by pressure along a portion of its other surface, means for advancing the tape to feed the sheet, a tape for receiving the sheet from the first-named tape and for feeding the sheet further, the tapes being disposed on opposite sides of the sheet, and means for moving the first-named tape transversely to the direction of its advance towards the sheet and the receiving tape, whereby the first-named tape is adapted to lay the sheet upon the receiving tape.

29. The method of feeding sheet material that comprises feeding the heads of a plurality of sheets successively past a high-speed point, acting upon spaced-apart portions of each sheet rearward of the head to buckle the said portions of the sheet out of the path of travel of the head of the next-following sheet, and positively feeding the sheets at relatively low speed past a low-speed point, whereby the sheets are fed past the low-speed point in lapped relation.

30. A sheet-feeding machine having, in combination, means for feeding the heads of a plurality of sheets successively past a high-speed point, means for acting upon spaced-apart portions of each sheet rearward of the head to buckle the said portions of the sheet out of the path of travel of the head of the next-following sheet, and means for positively feeding the sheets at relatively low speed past a low-speed point, whereby the sheets are fed past the low-speed point in lapped relation.

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

CHARLES B. MAXSON.