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SHEET FEEDING MECHANISM

Original Filed Nov. 29, 1939

2 Sheets-Sheet 1

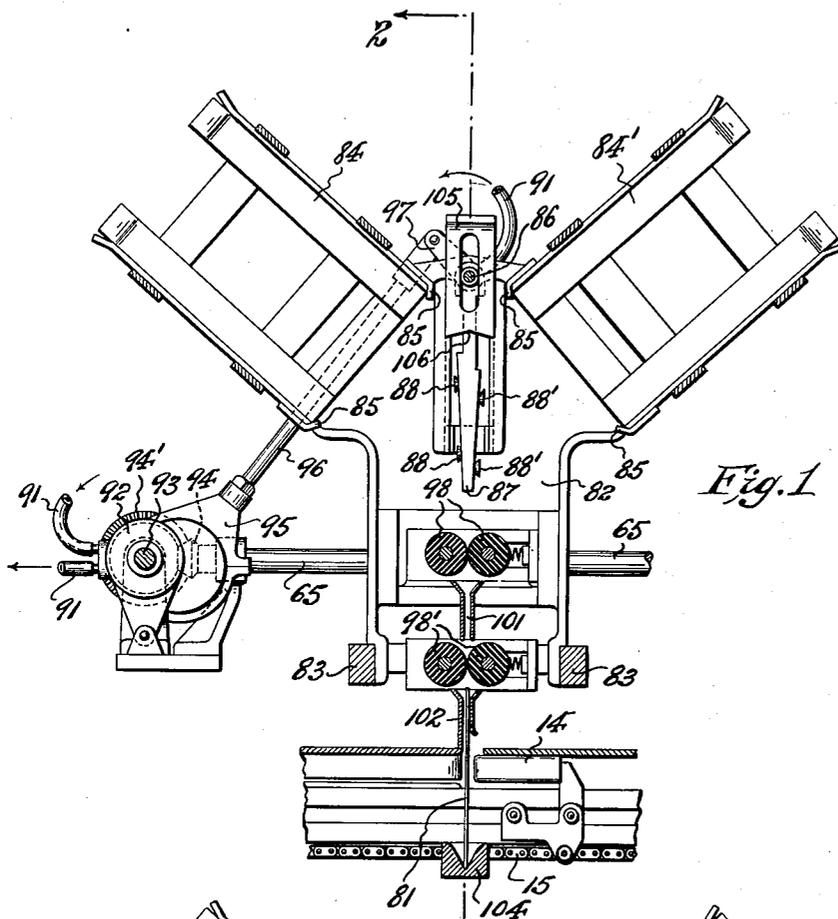


Fig. 1

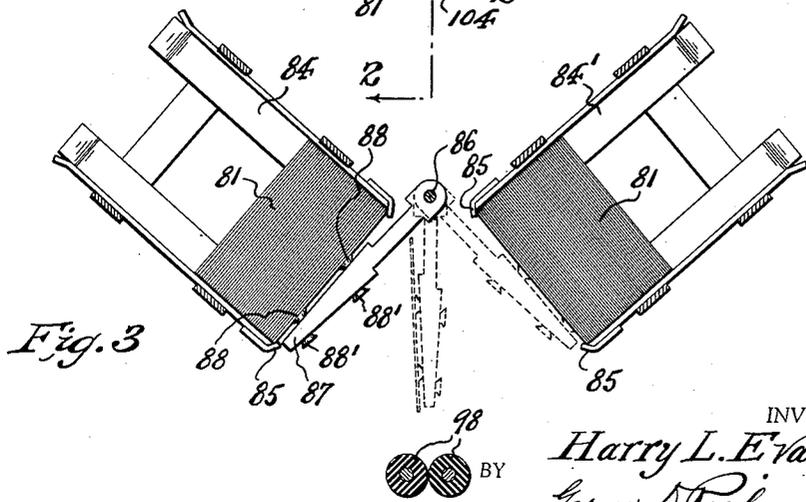


Fig. 3

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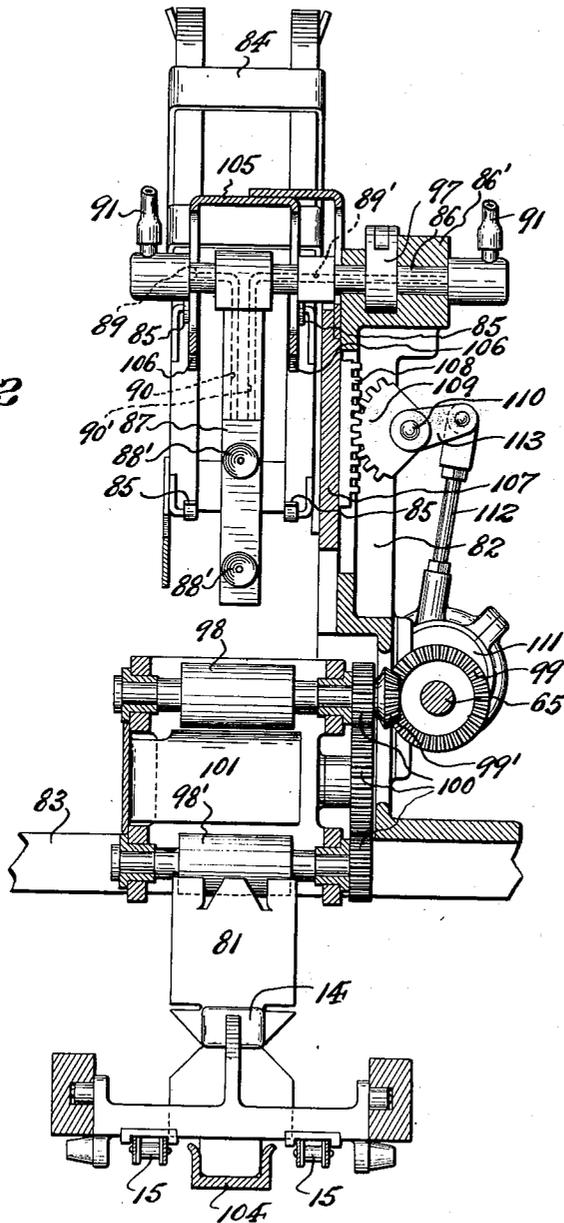
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2 Sheets-Sheet 2

Fig. 2



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# UNITED STATES PATENT OFFICE

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## SHEET FEEDING MECHANISM

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Original application November 29, 1939, Serial No. 306,600. Divided and this application January 21, 1942, Serial No. 427,533

9 Claims. (Cl. 271-9)

This invention relates to improvements in sheet feeding mechanism; and this application is a division of my co-pending application Serial No. 306,600, filed November 29, 1939.

This invention has for an object to provide a novel construction of mechanism for automatically feeding sheet material from a supply thereof to a place of use, or to engage or be engaged by other mechanism by which the same is to be treated or manipulated.

This invention has for a further object to provide a novel high speed means for successively removing individual sheets from a stacked supply thereof and delivering the same to other mechanisms adapted to operate thereon; as e. g. in the feeding of carton or box blanks, wrapper sheets, wrapper bands, labels or the like subject to manipulation by carton or box making mechanisms, packaging or wrapping machinery, or the like.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of sheet feeding mechanism according to this invention is shown in the accompanying drawings, in which:

Fig. 1 is a longitudinal vertical sectional view of the sheet feeding mechanism, Fig. 2 is a transverse vertical section through said sheet feeding mechanism, taken on line 2-2 in Fig. 1, but drawn on an enlarged scale; and Fig. 3 is a fragmentary view, similar to that of Fig. 1, but showing the operation of oscillatable sheet extractor means with which the feeding mechanism is provided.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

For the purposes of illustrating the use and operation of the sheet feeding mechanism of this invention, the same is shown as arranged to feed flat carton blanks to traveling carton former blocks, by which said blanks are adapted to be engaged and passed through means for folding the blanks into desired carton formations. It will be understood, however, that the novel sheet feeding mechanism is not intended to be limited to such specific use, but may be applied to any other uses, or incorporated in any other kind of machinery or apparatus wherein it is required or desired to successively feed any appropriate sheet material or blanks to a place of use, or to engage or be engaged by mechanism adapted to

treat or manipulate the same in a desired manner.

In the illustrative case above referred to, carton blanks 81 of suitable form are deposited in and automatically fed from magazine racks in timed relation to successive movement of former blocks 14, as advanced by conveyer means, so as to be operatively engaged by said former blocks, and carried thereby through folding means (not shown) by which a blank 81 is folded around a former block 14 into a desired carton formation.

In an illustrative form thereof the sheet feeding mechanism comprises, an upstanding frame member 82 supported by transverse carrier bars 83, which form a part of the framework of the machine to which the sheet material is to be automatically fed, or said frame member 82 may be otherwise supported as may be most convenient with respect to the type of machinery to which the sheet material is desired to be fed.

Supported by said frame member 82, in spaced relation one to the other, are a pair of magazine racks 84-84', the same being angularly disposed in downwardly inclined convergent relation, so as to oppose their lower discharge ends respectively to opposite sides of an oscillatable carton blank extractor means which is operatively mounted therebetween. A supply of carton blanks 81 is deposited in each magazine rack subject to successive withdrawal therefrom. The lower discharge end of each magazine rack is provided with suitably arranged retainer fingers 85 for normally holding the carton blanks 81 against escape therefrom, but over which fingers a carton blank will readily spring so as to be released when operatively engaged and outwardly moved by the carton blank extractor means.

The carton blank extractor means comprises, a transverse rock-shaft 86 mounted in supporting bearing means 86' with which the upper end of the frame member 82 is provided, whereby said rock-shaft is disposed between and somewhat above the discharge ends of the magazine racks 84-84'. Fixed on said rock-shaft 86, to depend therefrom and to be oscillated thereby for back and forth swinging movement between the discharge ends of the magazine racks 84-84', is an extractor arm 87. Said extractor arm 87 is provided, on the face thereof which is opposed to the magazine rack 84, with carton blank gripper means, preferably in the form of resilient suction cups 88 adapted to operatively grip and withdraw the lowermost carton blank from said magazine rack 84 when brought into contact therewith; and, similarly, said extractor arm 87 is pro-

vided, on the face thereof which is opposed to the magazine rack 84', with like carton blank gripping suction cups 88', to grip and withdraw the lowermost carton blank from said magazine rack 84' when brought into contact therewith. Provided in one end portion of said rock-shaft 86 is a duct 89 which communicates with a duct 90 leading through said extractor arm into communication with the interiors of the suction cups 88; and, in like manner, the opposite end portion of said rock-shaft 86 is provided with a duct 89' which communicates with a duct 90' leading through said extractor arm into communication with the interiors of the suction cups 88' (see Fig. 2). The duct passages 89-90 and 89'-90' are respectively connected by flexible conduit means 91 and through automatic control valve means 92 with an exhaust pump (not shown), whereby suitably timed making and breaking of suction gripping effects exercised by the suction cups 88 and 88' are properly controlled. The control valve means 92 is actuated by a transverse transmission shaft 93, which is driven from a counter shaft 94 through intermeshing bevel gearing 94-94' (see Fig. 1). The means for oscillating the rock-shaft 86, and through it the extractor arm 87 comprises, an eccentric 95 driven by said transmission shaft 93. The connecting rod 96 of said eccentric is pivotally joined to a rocker arm 97 which is affixed to said rock-shaft 86.

Suitably mounted in connection with said frame member 82, to be disposed in spaced position below and in vertical alignment with the medial position of said extractor arm 87, are one or more carton blank feed roll sets, which, as shown, comprise an upper pair of opposed transverse feed rolls 98 and a lower pair of opposed transverse feed rolls 98'. One of the feed rolls of each set is yieldably thrust toward the other thereof by suitable means, so as to operatively grip a carton blank passing downwardly therebetween, and so as to feed such carton blank downwardly across the forward path of travel of the former blocks 14. Said feed roll sets are actuated from said counter shaft 95 by intermeshing bevel gears 99-99' interconnected between the latter and a shaft of one of the feed rolls. The feed rolls of said sets are actuated in mutually cooperating relation from the driven roll shaft by interconnecting gear 100 (see Fig. 2). It will be understood, that in other arrangements and uses of the sheet feeding mechanism, a single feed roll set may suffice, in which case, the lower feed roll set may be eliminated. It will also be understood that, in other cases, sheet material blanks may be directly discharged from the extractor arm to blank receiving means of other form, so that the feed roll sets may therefore be entirely eliminated.

Arranged between the sets of feed rolls 98 and 98' are suitably formed carton blank guides 101. Additionally, carton blank guide means 102 may be disposed below the lower feed rolls 98' immediately above the path of movement of the advancing former blocks 14.

Suitably supported below the path of movement of the advancing former blocks is a carton blank stop 104 adapted to determine the proper placement of a delivered carton blank across the path of former block movement, and ready for engagement by an advancing former block.

Means are provided for positively transferring a carton blank from the extractor arm 87 into the nip of the upper set of feed rolls 98, or into engagement with other types of blank receiving

or engaging means. This transfer means comprises a vertically reciprocable push-piece 105, the spaced arms of which are slotted to embrace the rock-shaft 86 so as to ride up and down across the same. The lower extremities of said arms are notched, as at 106, whereby the same may engage the upper extremity of a carton blank at spaced points across the width thereof. Said push-piece 105 is carried by a slide plate 107 vertically slidable in a guideway 108 with which the frame member 82 is provided. The means for reciprocating said slide plate 107 and the push piece 105 carried thereby comprises, a rack 109 affixed to the back of said slide plate. Operatively meshing with said rack 109 is an oscillatable quadrant gear 110 fixed on a rock-shaft 110 which is mounted on the frame member 82. The means for actuating the rock-shaft 110 comprises, an eccentric 111 driven by the counter shaft 95. The connecting rod 112 of said eccentric is pivotally coupled to a rocker arm 113 which is affixed to said rock-shaft 110.

In the operation of the carton blank feeding mechanism above described, the extractor arm 87, when swung to the left, as viewed in Fig. 3, engages the lowermost carton blank contained in the magazine rack 84 so as to grip the same by its suction cups 88. Timed to coincide with operative contact of said suction cups with the carton blank, the control valve means 92 functions to connect the suction cups operatively with exhaust pump means for suction effect, whereby said carton-blank is gripped, and as the extractor arm 87 thereupon swings from left to right, said carton blank is removed from the magazine rack 84 and carried to position above and aligned with the upper set of feed rolls 98. When the removed carton blank is thus positioned above said feed rolls, the push-piece 105, under its timed actuation, is caused to descend and engage the upper end of said carton blank, and, simultaneously, the control valve means 92 functions to shut off communication between said suction cups 88 and the exhaust pump means, so as to break the gripping suction effect of said cups and thus release the carton blank from the extractor arm 87. By its descending movement, the push-piece 105 exerts a downward thrust upon the released carton blank, to thereby assure both its positive removal from the extractor arm 87 as well as its propelled descent, whereby its lower end is carried into engagement by the nip of the upper set of feed rolls 98 or such other mechanism as may be provided to receive the same. Said feed rolls 98 operate to carry down the carton blank into engagement by the nip of the lower set of feed rolls 98', which, in turn, feed the carton blank on down, until the same comes to rest in operative position in front of an approaching former block 14, as determined by its stopped engagement with the stop 104. In the meantime, the extractor arm 87 continues its swinging movement from left to right until engaged with the lowermost carton blank contained in the magazine 84' (as shown in dotted outline in Fig. 3), so as to grip said carton blank by its suction cups 88', whereupon the swinging movement of the extractor arm 87 is reversed, and by operations corresponding to those above described, the said carton blank is carried into alignment with the feed rolls 98-98', to be fed downwardly thereby into position to be engaged by a succeeding former block advancing toward the same, while the previously delivered carton blank is carried on through forming or folding

means (not shown) by the preceding former block.

Since one of the objects of this invention is to provide a high speed mechanism, it will be obvious that the above described carton blank or like sheet feeding means is highly advantageous by reason of the fact that there is no lost motion in the operation of the extractor arm 87, by its novel oscillatory disposition between two opposed carton blank supplies, operates to supply carton blanks alternately from said supplies in very rapid succession, without pause for recovery motions and consequently with neither waste of motion or time.

It will be understood that many changes and modifications could be made in the detailed construction of the novel sheet feeding mechanism of this invention, and that many apparently widely different embodiments of the features of this invention could be made without departing from the scope thereof as defined by the following claims. It is therefore intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

**I claim:**

1. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, convergingly inclined opposed magazines to contain supplies of blanks, a single pivoted extractor arm, means for continuously swinging said extractor arm back and forth between the discharge ends of said magazines to alternately withdraw blanks therefrom, and a single blank receiving and advancing means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom.

2. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm, means for continuously swinging said extractor arm back and forth between the discharge ends of said magazines to alternately withdraw blanks therefrom, a single blank receiving and advancing means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom, and perpendicularly reciprocated means also aligned with the medial position of said oscillated extractor arm for transferring blanks from the latter to said receiving and advancing means.

3. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between said discharge ends of said magazines to alternately withdraw blanks therefrom, and opposed driven delivery roll means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom and deliver the same to the place of use.

4. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously

oscillating said extractor means between said discharge ends of said magazines to alternately withdraw blanks therefrom, opposed driven delivery roll means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom and deliver the same to the place of use, and a perpendicular reciprocated push means also aligned with the medial position of said oscillated extractor arm and above said delivery roll means for disengaging blanks from said extractor arm and thrusting the same toward said delivery roll means for engagement by the nip thereof.

5. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between the discharge ends of said magazines to alternately withdraw blanks therefrom, said extractor arm having suction devices on its opposite faces to engage and grip the blanks to be withdrawn from said magazines, said extractor arm having air exhaust passages leading from said suction devices, timed valve means for controlling the opening and closing of said passages, and a single blank receiving and advancing means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom.

6. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between the discharge ends of said magazines to alternately withdraw blanks therefrom, said extractor arm having suction devices on its opposite faces to engage and grip the blanks to be withdrawn from said magazines, said extractor arm having air exhaust passages leading from said suction devices, timed valve means for controlling the opening and closing of said passages, and perpendicularly reciprocated means also aligned with the medial position of said oscillated extractor arm for removing blanks therefrom.

7. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between the discharge ends of said magazines to alternately withdraw blanks therefrom, said extractor arm having suction devices on its opposite faces to engage and grip the blanks to be withdrawn from said magazines, said extractor arm having air exhaust passages leading from said suction devices, timed valve means for controlling the opening and closing of said passage, a single blank receiving and advancing means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom, and perpendicularly reciprocated means also aligned with the medial position of said oscillated extractor arm for transferring blanks from the latter to said receiving and advancing means.

8. In sheet feeding mechanism, means to suc-

cessively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between the discharge ends of said magazines to alternately withdraw blanks therefrom, said extractor arm having suction devices on its opposite faces to engage and grip the blanks to be withdrawn from said magazines, said extractor arm having air exhaust passages leading from said suction devices, timed valve means for controlling the opening and closing of said passages, and opposed driven delivery roll means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom and deliver the same to the place of use.

9. In sheet feeding mechanism, means to successively feed sheet blanks to a place of use comprising, opposed convergingly inclined magazines to contain supplies of blanks, a single pivoted

extractor arm dependent between the discharge ends of said magazines, means for continuously oscillating said extractor arm between the discharge ends of said magazines to alternately withdraw blanks therefrom, said extractor arm having suction devices on its opposite faces to engage and grip the blanks to be withdrawn from said magazines, said extractor arm having air exhaust passages leading from said suction devices, timed valve means for controlling the opening and closing of said passages, opposed driven delivery roll means below and intermediate said magazines and aligned with the medial position of said oscillated extractor arm to receive blanks therefrom and deliver the same to the place of use, and a perpendicularly reciprocated push means also aligned with the medial position of said oscillated extractor arm for disengaging blanks from the latter and thrusting the same toward said delivery roll means for engagement by the nip thereof.

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