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MECHANISM FOR FEEDING CARDBOARD AND LIKE BLANKS TO
CREASING, FOLDING, OR OTHER TREATMENT MACHINERY
Filed Jan. 28, 1942
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Fig. 3.

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This invention has reference to improvements in mechanism for feeding cardboard or like blanks to creasing, folding, or other treatment machinery, and has for its object to automatically feed the blanks successively one by one from the bottom of a pile to the aforesaid machinery irrespective of any normal warping, bending, or deformation which may obtain in one or other of the said blanks, the operation being effected positively and expeditiously and without detriment to the blank.

The present invention consists of improvements in mechanism for feeding cardboard or like blanks to creasing, folding, or other treatment machinery wherein the blanks are disposed in a feed pile from which it is desired to successively remove the lowermost blank and to positively feed same into the nip of the feed rolls or other mechanical feed device through or by which the blank is traversed to the mechanism for effecting the subsequent operation thereon, which generally speaking is the first of a series of operations such as creasing, folding, gumming, labelling, etc. The characteristic features of the present invention reside in means for effecting the transfer by traverse of the lowermost blank of the pile toward and through a gauge slot of a stop plate and into the nip of the feed rolls or other mechanical feed device by (a) effecting an instantaneous couple of a traversable suction cup member with a vacuum chamber, (b) temporarily maintaining the couple for a predetermined traverse of the cup member together with the lowermost board of the pile, and (c) the subsequent release of this couple to atmosphere when the mechanical feeding of the traversed blank commences.

The invention will now be described with reference to the accompanying drawings which illustrate so much of a feed mechanism as is necessary to an understanding of the present invention.

Fig. 1 is a part sectional side elevation.
Fig. 2 is a plan on line 2—2 of Fig. 1.
Fig. 3 is a perspective detail view to an enlarged scale illustrating the traversable suction cup member in the position it occupies when adjacent the nip of the feed rolls.
Fig. 4 is a perspective detail view illustrating the vacuum pump and associated mechanism by means of which the reciprocating motion of the piston and of the suction cup member are obtained.

In the illustrated embodiment of the invention which is intended to show its application to a feed mechanism for cardboard and like blanks of the kind which are utilised for the production of cardboard boxes, the pile of cardboard blanks in the form of a vertical stack is indicated by the series of dotted lines designated B. This stack is located on a frame having a stationary horizontal part 5 formed by a plurality of parallel rails and vertical stanchions 6 which approximately determine the disposition of the pile B relative to the feed mechanism. This feed mechanism comprises a horizontal traversable central section 7 which at its forward end incorporates a crossbar 1a which is located within undercut recesses 5a formed in the outer pair of rails 5 forming the outer part of the stationary section of the pile supporting frame. The section 7 of the traversable frame is mounted upon a plurality of anti-friction rollers 7b which are mounted on transverse spindles in the supporting framework of the machine.

The distance apart of the outer pair of rails 5 can be varied so as to accommodate boards of different width.

The traversable central section 7 is reciprocated by means of a lever 12 to the extremity of which the forward end of the section 7 is pivotally connected. This lever 12 is fulcrumed on the framework of the machine by means of a pin 8a in a bracket 9, the rocking motion of the lever 8 being effected through the engagement of a projecting roller 8b mounted on the lever 8 within a cam track 10a formed in the cam 10, the cam 10 being mounted on the shaft 12 which is continuously rotated through a worm wheel transmission 11 which is operated from the main drive of the machine (not shown). On the shaft 12 there is provided a crank 13 which is pivotally connected to the connecting rod 14 of the piston of a reciprocating vacuum pump mechanism, the cylinder of which is designated 15. Also mounted on the shaft 12 is a sprocket wheel 16 which through a chain 17 effects the rotation of the feed rolls 18 through a toothed wheel transmission 19 mounted on the spindles of the feed rolls.

To the cross bar 1a of the traversable central section 7 is connected a suction cup member 20 in the form of an open-topped box, the top surface whereof is constituted by a grid or grill.

The base of this cup member is connected by means of a pair of flexible pipes 21 to the side wall of the pump cylinder 15 which forms part of a reciprocating vacuum pump of known type within the cylinder of which is mounted a piston which creates within the cylinder by its outward stroke a partial vacuum. This vacuum is coupled to the suction cup member instantaneously when the piston uncovers a port in the wall of the cylinder which has connected thereto the flexible pipe connection 21 thereby applying a substantial positive suctional pull to the undersurface of the lowermost board of the feed pile which is resting on the supporting frame, thereby effecting a positive sealing engagement between the periphery of the suction cup member 20 and this lowermost board, the vacuum being of sufficient intensity to draw this board (even if par-
tially deformed) into firm and adherent contact with the periphery of the cup member 20. This vacuum couple continues in being while the piston moves further outwardly until the piston reaches a relief port 15a in the cylinder wall. Simultaneous with this continued motion of the piston, the suction cup member 20, together with the central traversable section 7 of the supporting frame is traversed forward through the transmission already described with the lowermost board firmly held in contact therewith until the forward edge of the board has passed through a gauge slot which is determined by the setting of a vertically adjustable stop plate 22 relative to the top face of the suction cup member 20, the board being passed through this slot into the nip of the feed rolls 18. On either side of the stop plate 22 there is provided a fixed guide plate 25 which at its lower end provides a leading surface for the blank into the nip of the feed rolls 18, and also serves to guard the fingers of the operator from contact with these rolls. At this moment the piston has reached the outward extremity of its stroke and has uncovered the relief port 15a and the pump circuit returns to atmospheric pressure in readiness for the reverse or inward stroke of the piston and of the suction cup member 20 and the associated part of the frame in readiness for the next feed or forward stroke, the stroke of the piston being mechanically synchronised through the transmission mechanism already described with the traverse of the central frame section 7 and the suction cup member 20.

A one-way valve 23 is incorporated in the head of the cylinder 15 to allow of the escape of the air therefrom on the inward stroke of the piston so that no pressure is created in the cylinder by this stroke. If it should be desired to stop the feed of the blanks due to any defect arising in the machinery, this can be readily accomplished by opening the one-way valve 23 by means of the lever 24 which may be set to control the opening motion of the valve 23 so that the other part of the machinery can continue to function through its connection to the main drive, but the feed of blanks from the pile will cease.

The vacuum or suction cup which obtains and is maintained between the forward undersurface of the lowermost blank and the periphery of the mouth of the suction cup member is sufficient to flatten or straighten out any normal deformation which may obtain in the blank so as to ensure the positive feeding of this blank through the gauge slot and will maintain the blank in the correct feed position until the blank has been directed into the nip of the feed rolls 18 and released thereinto.

By the aforesaid invention there is provided a simple but positive efficient means for feeding the lowermost blanks one at a time from the base of the pile, and of overcoming the difficult feeding which ordinarily arise in the feeding mechanism if any one of the blanks should be deformed in such a manner as would ordinarily obstruct its passage through the gauge slot in the stop plate.

It will be appreciated that more than one traversable suction cup member may be employed if desired and that a plurality of such members may be coupled to a common vacuum cylinder.

In the illustrated form of the invention the feeding mechanism hereinbefore described is constructed and mounted to form a separate removable unit by the provision of wheels 26 mounted on the lower end of the vertical stanchions 6, whereby this feeding mechanism can be transferred from one blank folding or creasing machine to another where this feeding mechanism is not built into or a part of the machine as a whole.

I claim:
1. A mechanism for feeding cardboard or like blanks to feeding machines, or other treatment machinery wherein the blanks are disposed in a feed pile from which it is desired to successively remove the lowermost blank and to positively feed same into the nip of the feed rolls, comprising a reciprocating traversable frame, a suction cup member connected to said frame, a flexible pipe coupling connected to said member, a reciprocating vacuum pump also connected to said flexible coupling whereby a timed instantaneous couple and a release to atmosphere is obtained within the suction cup member, and a continuously driven motion transmission mechanism for effecting the reciprocating motion of the said frame in synchronised relationship to the stroke of the piston of the pump, a pair of feed rolls rotated by said mechanism, and an adjustable stop plate which permits of the passage of the lowermost board of the pile into the nip of the said feed rolls.

2. Mechanism according to the preceding claim mounted on wheels to constitute an independent transferable unit whereby the feed mechanism can be associated with different creasing, folding, or other treatment machines.

3. A mechanism for feeding sheets successively from a stack comprising a suction cup, a reciprocating vacuum pump, mechanism for translating the suction cup in contact with the endmost sheet of the stack and operating the vacuum pump in synchronism, means actuated during each suction stroke of the vacuum pump, after a vacuum has been created therein, for connecting the vacuum pump substantially instantaneously with the suction cup, and means for releasing the vacuum in the cup at the end of the feeding operation.

4. A mechanism for feeding sheets successively from a stack comprising a suction cup, a vacuum pump including a cylinder and a piston reciprocable therein, and mechanism for translating the suction cup in contact with the endmost sheet of the stack and operating the vacuum pump in synchronism, the wall of said cylinder having an opening connected to said suction cup that is uncovered by the piston at an intermediate point in its suction stroke, and an opening connected to the atmosphere that is uncovered by the piston at a subsequent point in its suction stroke.

5. A mechanism for feeding sheets successively from a stack comprising a suction cup, a vacuum pump including a cylinder and a piston reciprocable therein, mechanism for translating the suction cup in contact with the endmost sheet of the stack and operating the vacuum pump in synchronism, the wall of said cylinder having an opening connected to said suction cup that is uncovered by the piston at an intermediate point in its suction stroke, and an opening connected to the atmosphere that is uncovered by the piston at a subsequent point in its suction stroke, and a one-way valve for releasing pressure from said cylinder during the return stroke of the piston.

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