United States Patent

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[33] **Canada**
[31] **37,863**

[54] **SHEET HANDLING APPARATUS**
10 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **271/27**
[51] **Int. Cl.** **B65h 3/06**
[50] **Field of Search** 271/26, 30, 31, 27, 28

[56] **References Cited**

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ABSTRACT: Apparatus for feeding sheets or panels, singly, from a stack of such sheets or panels comprising of suction head, a pair of parallel drive rolls spaced apart in the direction of feed, the suction head having a pickup extension movable between the rolls to pick up a sheet or panel and bring it into contact with the drive rolls to be fed laterally of the stack to a machine or to some other site.

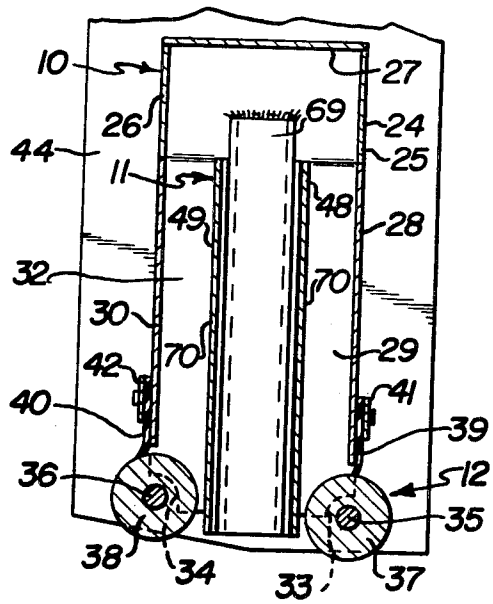
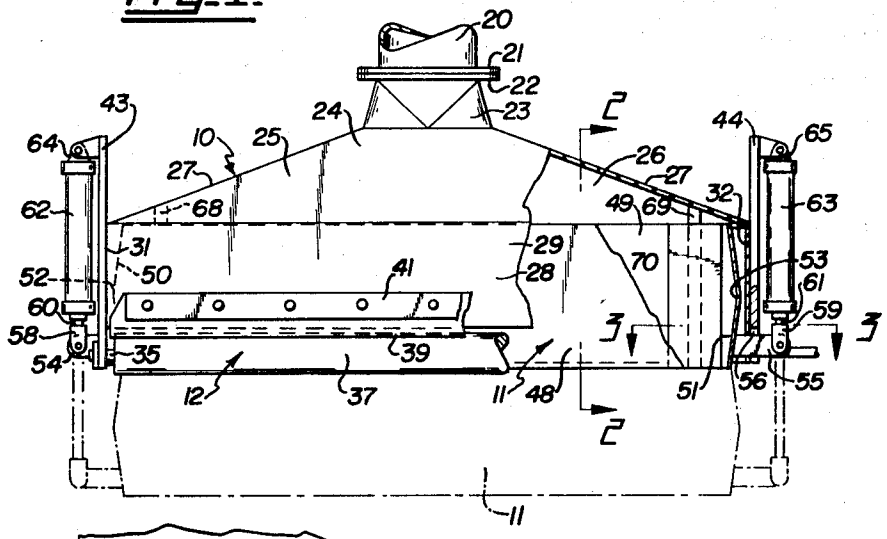


FIG. 1.



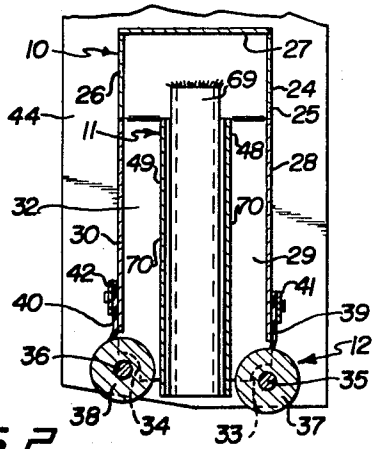


FIG. 2.

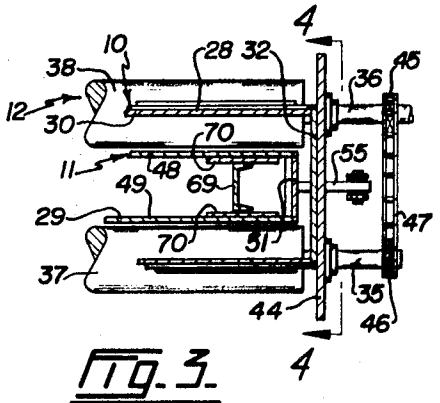


FIG. 3.

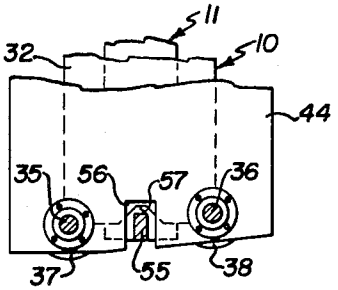


FIG. 4

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SHEET HANDLING APPARATUS

BACKGROUND OF THE INVENTION

The invention is concerned with apparatus for feeding flat articles laterally from a stack to a machine or to some other site. It is particularly, but not necessarily exclusively, concerned with apparatus for feeding veneers or wood panels to machines such as dryers and glue spreaders.

There have been several proposals for apparatus of this kind but none has obtained universal acceptance and still the most common method of feeding panels and veneers to the several different treatment machines is by hand.

Many of the prior proposals have involved the use of suction heads and have either lifted sheets from stacks of sheets to an elevated position at which they are held while a conveying mechanism is moved below the sheet and the sheets are then lowered onto the conveyor to be fed laterally of the stack or, they have had complex and large conveying mechanisms and suction heads where the suction heads have lifted the sheets to an elevated position from which they are directly conveyed.

Perhaps the most similar in principle to this invention of the prior proposals is that described in O. G. Jeddeloh's U.S. S. Pat. No. 3,050,175 issued Aug. 21, 1962. Reference to that patent will show that the proposal comprises a large space consuming and complex apparatus. Essentially, that apparatus comprises a plurality of suction caps adapted to be moved downwardly and upwardly by a rack and pinion-type drive to lift the uppermost panel of a number of stacked panels into contact with a perforated endless conveyor belt. Between the upper and lower runs of the conveyor belt a pair of suction tanks is located and they have downwardly opening slots to hold the panels in engagement with the belt through the perforations in the belt once the panels have been raised by the suction caps and released from them by engagement with the belt.

In practice, the Jeddeloh arrangement has not worked effectively because of the difficulties in accurately controlling the complex drive and feeding mechanism required of it and because the perforated belt tends to clog and the panels to fall from it. The present invention seeks to provide a simple and effective means for feeding flat articles singly, from a stack of such articles.

BRIEF SUMMARY OF THE INVENTION

This invention provides apparatus for laterally feeding flat articles, singly, from a stack of such articles comprising a suction head and an extension within said suction head cutting the lower edges of the extension defining a pickup opening, at least one drive roll located adjacent to said suction head, said extension being movable between a lower position adjacent a stack of articles and an upper position above the lowermost part of the drive roll, thus to pick up an article in the lower position and in the upper position, to maintain the article in driving engagement with the drive roll.

Preferably there are two rolls located adjacent the suction head at least one, but preferably both, of which are driven.

With an arrangement having two rolls, the extension is adapted to be moved upwardly and downwardly between the two rolls.

From another aspect of this invention, there is provided apparatus for laterally feeding flat articles, singly, from a stack of such articles comprising a suction head and a pair of rolls at least one of which is driven, a pickup opening in the suction head and means for controlling the application of suction generated by the head to the uppermost one of the articles in the stack of articles, to raise the article into driving engagement with the drive rolls. Preferably the means for applying the suction and raising the article comprises an extension housed within the suction head and movable downwardly towards the uppermost one of the stack of articles to pickup that article and movable upwardly to raise the article into engagement with the drive rolls.

DESCRIPTION OF THE FIGURES OF THE DRAWING

FIG. 1 is a front view of one embodiment of the invention
FIG. 2 is a section on the line 2—2 of FIG. 1,
FIG. 3 is a section on the line 3—3 of FIG. 1, and
FIG. 4 is a section on the line 4—4 of FIG. 3.

DESCRIPTION OF A PREFERRED EMBODIMENT

The apparatus basically comprises a suction head **10**, an extension **11** and drive rolls **12** the extension being movable downwardly between the drive rolls to pick up an article from a stack of articles below the apparatus and upwardly to raise the uppermost one of the articles in the stack of articles into engagement with the drive rolls.

Referring specifically to FIG. 1, the suction head is connected to the lower end **20** of a circular section conduit extending from the low-pressure side of a high-displacement fan which is of known kind and for that reason is not illustrated in the drawings.

The connection is made by annular radial flanges **21** and **22** formed respectively on the lower end of the conduit **20** and the upper end of the section **23** of the suction head and by bolts passed through those flanges.

The section **23** varies in cross section from circular at the flange **22** to rectangular at its lower edge where it is secured, as for example by welding, to the upper rectangular edge of section **24**.

Section **24** is of downwardly increasing rectangular cross section being made up of opposed front and rear walls **25** and **26** of trapezoidal outline and inclined top walls **27** interconnecting the nonparallel side edges of the walls **25** and **26**.

The suction head terminates in a constant rectangular cross section lower part **28** secured by its upper edges to the lower edges of the section **24**. Section **28** comprises parallel front and rear walls **29** and **30** of which the rear wall **30** is, for a reason described hereinafter, slightly longer than wall **29** measured from its upper to its lower edges, and sidewalls **31** and **32**.

The sidewalls **31** and **32** of the section **28** extend below the front and rear walls of that section and are notched as at **33** and **34** (See FIG. 2) at their lowermost corners to accommodate the shafts **35** and **36** of the drive roll indicated generally at **12** in FIG. 1 and identified individually by numerals **37** and **38**.

Secured close to and overlapping the lower edges of front and rear walls **29** and **30** respectively are sealing strips **39** and **40** of felt or other material, which have rubbing contact with the drive rolls **37** and **38** effectively to seal the gap between the edges of walls **29** and **30** and the drive rolls, against excessive air leakage. The sealing strips are pinned to the walls **29** and **30** by metal clamping strips **41** and **42** and by pins passing through the clamping strips, sealing strips and walls.

The shafts **35** and **36** of the drive rolls are journalled in appropriate bearings set in frame members **43** and **44** which form part of the supporting frame of the apparatus (the supporting framework is not shown in its entirety since it may take any convenient form and is not a part of the inventive character of the feeder mechanism.) The shafts extend through the frame member **44** and carry sprockets **45** and **46** by which they are driven through a chain **47** connected to an electric motor (not shown).

Movable within the lower section **28** of the suction head is an extension **11** which comprises front and rear walls **48** and **49** and sidewalls **50** and **51** each of which sidewalls is constituted by inclined sections meeting at central ridges **52** and **53** respectively, the spacing between the sidewalls at the ridges being only a little less than that between the sidewalls **31** and **32** of the section **28** of the suction head, thus to prevent undue air leakage between the walls to the fan conduit **20**.

Secured close to the lower edges of each of sidewalls **50** and **51** respectively are horizontal and outwardly projecting arms

54 and 55. The arms pass through appropriate slots, one of which can be seen in FIG. 4 and is numbered 56, formed in the lower edges of sidewalls 31 and 32 and through registering slots 57 (again to be seen in FIG. 4) in the frame members 43. At the side of the frame members remote from the extension, the arms are each received in corresponding ones of U-shaped connector elements 58 and 59 by which they are connected to the piston rods 60 and 61 respectively of pneumatic piston and cylinder units 62 and 63. The cylinders of units 62 and 63 are each secured by pins passing through end lugs 64 and 65 on the respective cylinders and through brackets 66 and 67 mounted on the frame members 44 and 43 respectively.

It will be appreciated that by actuating the piston sand cylinder units in unison the extension 11 may be removed between its full line position in FIG. 1 to the chain-dot line position in that Figure.

To guide the extension in its movement, a pair of channel section members 68 and 69 are secured, as for example by welding, to each of the top walls 27 of the section 24 of the suction head so as to be vertically dependent from those walls. To each flange of the two channel sections are secured wear-resistant guide plates 70 which serve to guide and support the extension in its movement. It will be appreciated that in a minor modification of the apparatus, the guide plates could be secured to the extension rather than to the channel flanges.

The ridged sidewalls of the extension will allow a limited degree of tilting of the extension within the suction head while at the same time not allowing too great an air leakage past the sides of the extension to the suction fan.

Generally, the apparatus of this invention will be used in conjunction with an elevator table upon which the stack of articles to be fed is supported, the stack being movable upwardly by the table to be maintained within the range of the suction head extension. The table may be of the known scissor-type which comprises a base, a supporting platform and a scissor linkage connecting the base and platform with a piston and cylinder to move the linkage thus to raise the platform.

Conveniently the apparatus of this invention includes a probe adapted to sense the height of the uppermost one of the panels in the stack on the table and connecting to an electrical switch to control a solenoid valve to operate the piston and cylinder elevator mechanism of the table. It is considered desirable to maintain the uppermost one of the articles in the stack of articles at a considerable distance from the raised portion of the extension so that the tendency of the second uppermost one of the stack to adhere to the one to be raised and fed i.e. to the uppermost one, is overcome during the relatively long distance over which the uppermost one is lifted.

It will be appreciated that the use of the apparatus with different types of equipment will require different feeding characteristics of the apparatus and for this reason this invention includes the provision of rolls having different coefficients of friction. When feeding some machines it is necessary that the panels or sheets to be fed are presented square to the machine and thus it becomes necessary to allow the panels to remove relatively to the rolls. To do this the rolls are made of a material such as polished or plated steel having a sufficiently high coefficient friction to drive or feed the panels or sheets but a sufficiently low coefficient of friction to allow the panels to move relatively to the rolls. With other machines it is desirable that the feed be very positive and that there be no slippage between the panel and the rolls or very little slippage. In the first circumstances it is convenient to form the rolls of polished or plated steel and in the second set of circumstances to have the outer surfaces of the roll of rubber or other such material.

As can be seen in FIG. 2, the rearmost roll 34 considered in the direction of feeding of the panel, is somewhat lower than the forward roll. This is because the pickup is generally effected close to the leading edge of the panel or sheet to be fed and it will be appreciated that there will be a tendency for the trailing end of the panel to fall away and break contact between the panel and the rearward roll 38. By lowering that roll 38 this tendency is reduced.

It is convenient to allow both manual and automatic control of the piston and cylinder units 62 and 63 so that the panels can be fed one at a time under manual control at selected intervals or alternatively, can be fed automatically by any convenient time cycle control which can be set to feed the panels at a desired frequency.

As a modification of the embodiment illustrated it may be possible to have but a single drive roll and to have the lower edge of the front or rear wall of the section 28 of the suction head under which no roll is located, smooth, so that panels could be effectively fed. Alternatively, but a single one of the drive rolls could be driven and the other would merely idle as the panel or sheet moved across it.

Without deviating from the scope of the invention, the apparatus could be modified by the provision of a valve in the conduit 20 for closing that conduit as desired and for releasing the suction at the pickup opening in this way to control the pickup rate or to release a panel or veneer. The valve is conveniently operated by a pneumatic piston and cylinder unit controlled either manually or automatically by an appropriate solenoid valve arrangement. This valve would be particularly in an arrangement having more than one suction head feeding panels from separate stacks to a single machine such as a dryer. In such a case the stacks can be uneven height and the valve provides an additional control.

We claim:

1. Apparatus for laterally feeding flat articles, singly, from a stack of such articles, comprising a suction head and an extension within said suction head, the lower edges of the extension defining a pickup opening, at least one drive roll located adjacent said suction head, said extension being movable between a lower position adjacent a stack of articles and an upper position above the lowermost part of the drive roll, thus to pick up an article in the lower position and in the uppermost position to maintain the article in driving engagement with the drive roll.

2. Apparatus for laterally feeding flat articles, singly, from a stack of such articles comprising a suction head and a pair of rolls at least one of which is driven, a pickup opening in the suction head and means for controlling the application of suction generated by the head to the uppermost one of the articles in the stack of articles to raise the article into driving engagement with the drive roll and to maintain it in driving engagement with the rolls, and in which the means for applying the suction and raising the article comprises an extension housed within the suction head and movable downwardly towards the uppermost one of the articles in a stack of articles to pick up one article and movable upwardly to raise the article into engagement with the drive rolls.

3. Apparatus as claimed in claim 2 in which both said rolls are driven.

4. Apparatus as claimed in claim 1 in which sealing means is provided between the suction head and the roll.

5. Apparatus as claimed in claim 4 wherein said sealing means comprises resilient sealing strips secured to the suction head and having sliding contact with the roll.

6. Apparatus as claimed in claim 1 in which the roll has a coefficient friction while sufficient to cause article brought into contact therewith to be fed, is sufficiently low as to allow easy, relative sliding movement between the articles and the roll.

7. Apparatus as claimed in claim 2 in which the rolls have a coefficient friction while sufficient to cause articles brought into contact therewith to be fed is sufficiently low as to allow relative sliding movement between the articles and the rolls.

8. Apparatus for feeding articles, singly, from a stack of such articles comprising a suction head, an extension within the suction head defining an elongated pickup opening at its lower end, a pair of drive rolls spaced apart in the feeding direction and adjacent to suction head, said extension being movable upwardly and downwardly between the drive rolls between a lowermost position close to the stack of articles and an uppermost position slightly above the lowest part of the drive rolls.

9. Apparatus as claimed in claim 2 in which the rearmost roll, in the direction of feeding, is slightly lower than the forward roll.

10. Apparatus as claimed in claim 8 in which the rearward roll, in the direction of feeding, is slightly lower than the forward roll.

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