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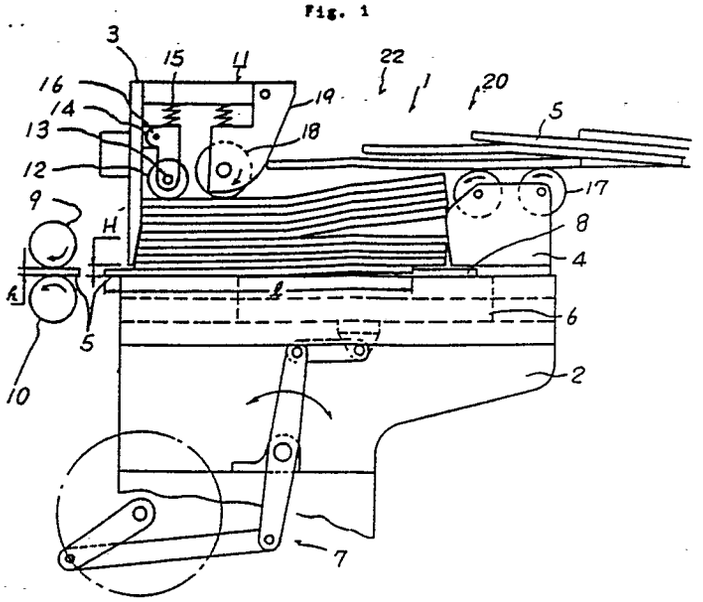
(54) Paper board feeding apparatus.

(57) A paper board feeding apparatus in which paper boards are stacked within a hopper and are sequentially delivered therefrom one by one through a gate disposed at the outlet of the hopper, is improved in that in order to reform warping of the paper boards, press means for always pressing the stacked paper boards downwards is disposed at the above within the hopper.

Fig. 1



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PAPER BOARD FEEDING APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to a paper feeding apparatus in a box making machine for making boxes of paper boards such as corrugated cardboard sheets or the like.

Description of the Prior Art:

A general construction of a heretofore known paper board feeding apparatus 1 is shown in Fig. 3. In this figure, paper boards 5 are stacked in a hopper formed of a table 2 and a front stopper 3 and a rear support 4 on the table 2. A slide bar 6 that is slidably buried in the table 2 is adapted to be reciprocated by a crank mechanism 7. A kicker 8 is fixedly secured to the slide bar 6, so that as a result of operation of the above-mentioned crank mechanism 7, a paper board 5 positioned at the lowermost level in the hopper is kicked out one by one through a gap clearance at the bottom of the front stopper 3 of the hopper in the direction of an arrow. In front of the front stopper 3 are provided a pair of upper and lower rolls 9 and 10, and a paper board 5 delivered from the hopper is pinched by the upper and lower rolls 9 and 10 and continuously sent to the subsequent processing station by rotation of the both rolls 9 and 10. The gap clearance at the bottom of the front stopper 3 is preset by a gap adjusting device provided separately, though not shown, so that it may become somewhat larger than the thickness of the paper board 5. However, depending upon the state of the paper board 5 such as, for example, a warped (upwardly warped or downwardly warped) state, a bent state, etc., the height from the upper surface of the table 2 of the front edge of the paper board 5 would differ, and so, it is necessary to adjust this gap clearance each time.

In the event that the gap clearance is not proper, the paper board 5 would strike against the lower portion of the front stopper 3 as shown in Fig. 4, or else there would occur the phenomenon that the paper board 5 at the lowermost level to be delivered and a paper board 5′ to be delivered next are simultaneously delivered together due to frictional resistance therebetween, hence stoppage of the machine or troubles in the subsequent processing station would occur, and therefore, there were disadvantages such as lowering of a productivity, loss of resources due to the loss of the paper boards 5, and the like.

With the heretofore known paper feeding apparatus shown in Fig. 3, in order to reliably deliver the paper board at the lowermost level in the hopper one by one, it is necessitated to reform the deformation of the paper board at the lowermost level and thereby keep the height from the upper surface of the table of the paper board always constant, and therefore, an operator himself spent the labor of preliminarily and manually reforming the deformed condition of the paper boards and then feeding them into a hopper. Even with such effort, a perfect condition could not be realized, and there occurred lowering of a productivity due to misfeeding of paper boards and loss of resources.

SUMMARY OF THE INVENTION:

It is therefore one object of the present invention to provide a novel paper board feeding apparatus in which paper boards stacked in a hopper can be reliably delivered one by one from the paper board at the lowermost level through a gap clearance at the bottom of a front stopper without necessitating preliminarily and manually reforming the deformed condition of the paper boards.

According to one feature of the present invention, there is provided a paper board feeding apparatus of the type that a paper board at the lowermost level in a hopper is delivered one by one through a gap clearance at the bottom of a front stopper of the hopper, in which press means for reforming deformation of paper boards is disposed above a stack of the paper boards.

According to a more specific feature of the present invention, there is provided a paper board feeding apparatus of the type that paper boards are stacked in a hopper and the paper boards are delivered one by one from the bottom of the hopper to the subsequent processing station, which apparatus comprises conveyor means for conveying and feeding paper boards into the hopper and press means for pressing the paper boards conveyed into the hopper by the conveyor means within the hopper to stack them so as to maintain a constant height and thereby reforming warp of the paper boards.

Since the paper board feeding apparatus according to the present invention has the above-featured construction, the paper boards are subjected to reforming forces and the height of the stack of paper boards can be kept constant within the hopper by the action of the press means, and nearly in synchronism with the paper board at the lowermost level within the hopper being ejected one by one, an additional paper board is fed to the top of the hopper by the conveyor means. While the paper board at the lowermost level in the hopper is kept flat as pressed by the press means, the lowermost paper board could be delivered to the subsequent processing station by driving a kicker provided above a crank mechanism.

Owing to the above-mentioned construction and operation, in the paper board feeding apparatus according to the present invention, upon delivering paper boards from the hopper, they can be reliably delivered one by one, hence stoppage of a paper making machine or troubles in the subsequent processing station would never occur, and so, a lot of advantages such as enhancement of a productivity and prevention of loss of resources can be brought about.

The above-mentioned and other objects, features and advantages of the present invention will become more apparent by reference to the following description of preferred embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS:

In the accompanying drawings:

Fig. 1 is a side view of a paper board feeding apparatus according to a first preferred embodiment of the present invention;

Fig. 2 is a side view of a paper board feeding apparatus according to a second preferred embodiment of the present invention;

Fig. 3 is a side view of a paper board feeding apparatus in the prior art; and

Figs. 4 and 5, respectively, are side views showing disadvantageous phenomena which may possibly occur in the paper board feeding apparatus in the prior art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Now the present invention will be described in greater detail in connection to a first preferred embodiment thereof shown in Fig. 1 as well as a second preferred embodiment thereof shown in Fig. 2.

In the paper board feeding apparatus 1 shown in Fig. 1, paper board 5 are stacked within a hopper 22 which is formed of a table 2 and a front stopper 3 and a rear support 4 provided on the table 2, and a paper board 5 at the lowermost level of the stack is adapted to be kicked out by reciprocating motion of a kicker 8 projected from the upper surface of the table 2. This paper board 5 kicked out by the kicker 8 is pinched between a pair of upper and lower rolls 9 and 10 disposed in the subsequent location in the paper board feeding apparatus, and it is positively pulled out and delivered. The above-mentioned kicker 8 is fixedly secured to a slide bar 6 which is adapted to slide within the table 2, and so, the kicker 8 would reciprocate jointly with the slide bar 6. The slide bar 6 is made to reciprocate by a crank mechanism 7 under the slide bar. The above-described portion of the apparatus is similar to the paper board feeding apparatus in the prior art shown in Fig. 3.

With regard to the other portion of the paper board feeding apparatus shown in Fig. 1, reference numeral 11 designates a pressing device which forms a principal part of a paper board feeding apparatus according to the present invention, reference numeral 12 designates a roller, numeral 13 designates a pivot axle, numeral 14 designates an arm, numeral 15 designates a spring (While a spring is shown in the illustrated embodiment, any resilient body such as an air cylinder could be employed in place of the spring, or else the roller itself could be made of elastic material.), and numeral 16 designates a fulcrum pin. In addition, there is disposed a paper board feeder 20 comprising a feed roller 17 having a separate driving device for feeding paper boards to the top of a hopper 22, a nip-in roller 18, a guide 19 and the like.

While a pressing device 11 having a roller 12 is illustrated in the first preferred embodiment shown in Fig. 1, it may be conceived that in place of the roller 12, any resilient means such as, for example, a leaf spring 21 is used for pressing a stack of paper boards as illustrated in the second preferred embodiment shown in Fig. 2. The remaining portion of the second embodiment is similar to the first preferred embodiment, and so, further description thereof will be omitted.

Essentially it is desirable that the paper boards 5 stacked within the hopper 22 are kicked out one by one from the paper board at the lowermost level by means of the kicker 8, and they are reliably delivered to the subsequent processing station through a gap clearance (H) between the bottom of the front stopper 3 and the top surface of the table 2.

In the illustrated embodiment having the above-described construction, since the direction of warping of the stacked paper boards 5 is kept fixed by pressing the top of the paper boards 5 stacked within the hopper 22 by means of the pressing device 11, the distance between the front stopper 3 and the rear support 4 can be set always at an optimum condition (normally at ℓ + 3 mm) with respect to a length (ℓ) of the paper board 5. In addition, since the paper board 5 at the lowermost level can be held in tight contact with the top surface of the table 2 by the pressing device 11 regardless of the magnitude of warping and the direction of warping of the paper boards 5, a height (h) from the top surface of the table 2 per single sheet of the paper boards 5 becomes uniform, and so, the bottom position of the front stopper 3 can be set at a fixed height (H).

From the above-mentioned reasons, the paper boards 5 kicked out by the kicker 8 would reliably pass through the gap clearance at the bottom of the front stopper 3 one by one.

It is to be noted that while the nip-in roller 18 is of non-driven type in the above-described embodiment, modification could be made thereto so as to be driven by the existing driving system.

As described in detail above, according to the present invention, when the paper boards are delivered from the interior of the hopper, they can be reliably delivered one by one, hence stoppage of a machine or troubles in the subsequent processing station would be eliminated, and therefore, the present invention brings about a lot of advantages such as improvements in a productivity and prevention of loss of resources.

Since many apparently widely different embodiments of the present invention can be made without departing from the spirit of the present invention, all matter contained in the above description and illustrated in the accompanying drawings shall be interpreted to be illustrative and not as a limitation to the scope of the invention.

Claims

1. A paper board feeding apparatus of the type that paper boards stacked on a table within a hopper are delivered sequentially from the paper board at the lowermost level one by one through a gate provided on the top surface of said table to the succeeding processing station; characterized in that said apparatus comprises press means disposed at the above within said hopper for always pressing downwards said stacked paper boards to reform warping of said paper boards.

2. A paper board feeding apparatus as claimed in Claim 1, characterized in that said press means includes a resilient body having its top end mounted to the hopper and tending always to extend downwards.

3. A paper board feeding apparatus as claimed in Claim 2, characterized in that said resilient body is a spring.

4. A paper board feeding apparatus as claimed in Claim 2, characterized in that said resilient body is an air cylinder.

5. A paper board feeding apparatus as claimed in Claim 2, 3 or 4, characterized in that said press means includes an intermediate member engaged with the bottom end of said resilient body and disposed in said hopper so as to be vertically movable.

6. A paper board feeding apparatus as claimed in Claim 5, characterized in that a roll which is rotatable in the direction of traveling of the paper boards is provided at the bottom of said intermediate member, and said roll comes into contact with the top of said stacked paper boards.

7. A paper board feeding apparatus as claimed in Claim 6, characterized in that the combination of said resilient body and said intermediate member is disposed two sets as spaced from each other in the direction of traveling of the paper boards.

8. A paper board feeding apparatus as claimed in Claim 7, characterized in that among said two sets of resilient bodies and intermediate members, the roll in the front side set is forcibly driven in the direction of making the paper board at the top level travel.

9. A paper board feeding apparatus as claimed in Claim 1 to 8, characterized in that said apparatus comprises conveyor means for conveying said paper boards into the hopper, above the inlet of said hopper.

Fig. 1

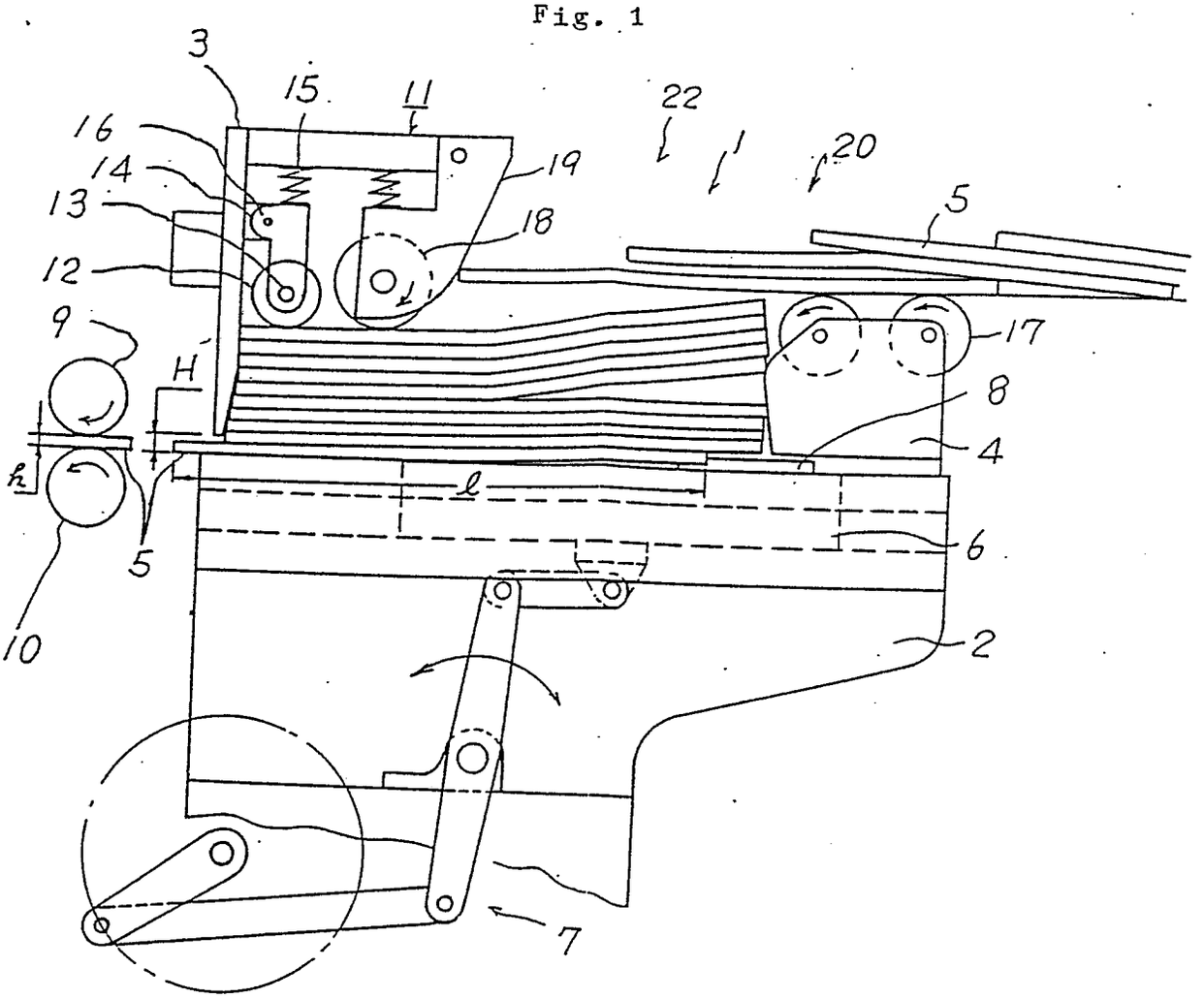

Fig. 2

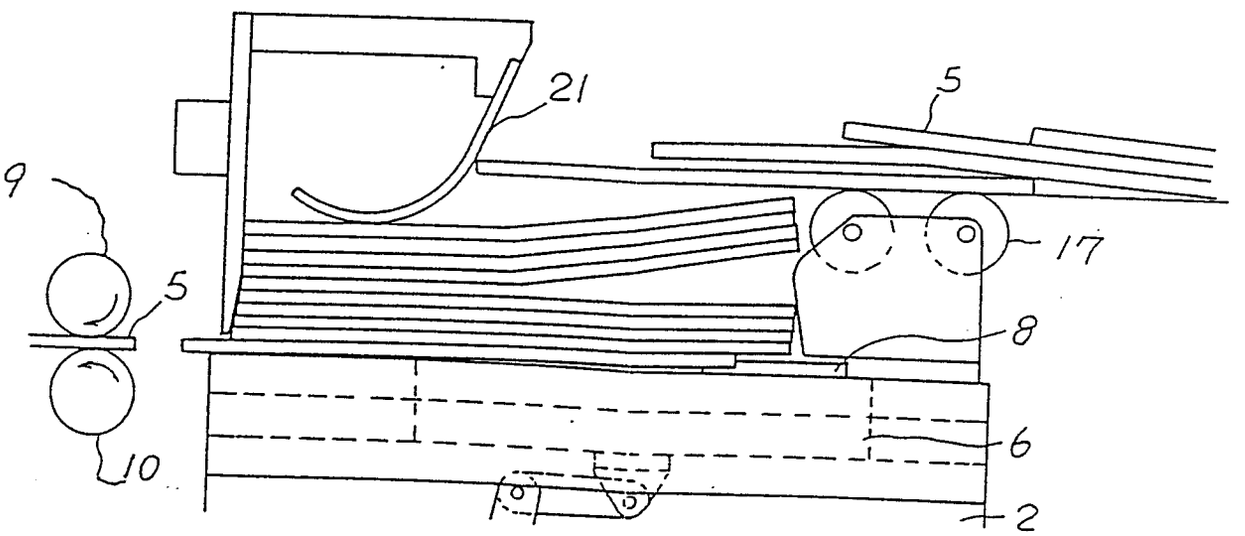

Fig. 3

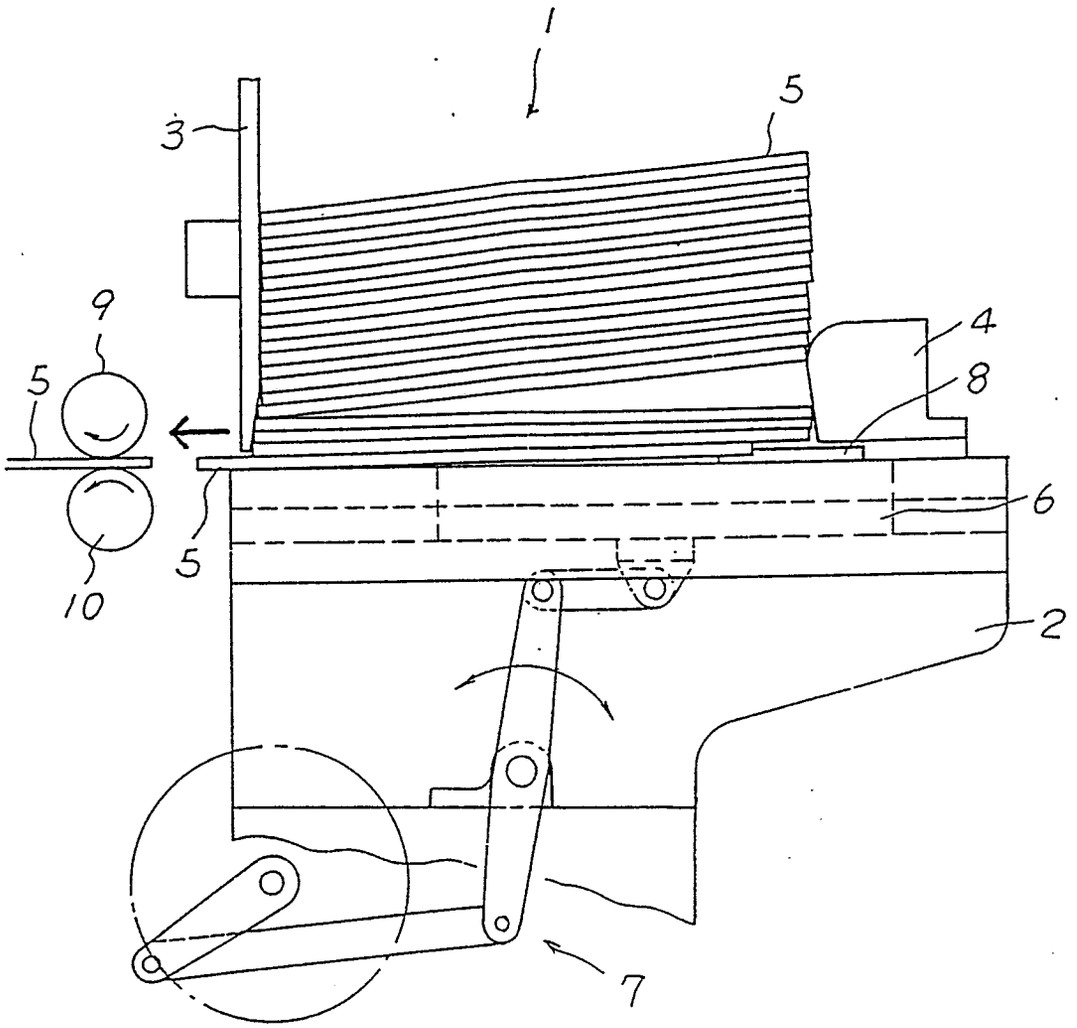

Fig. 4

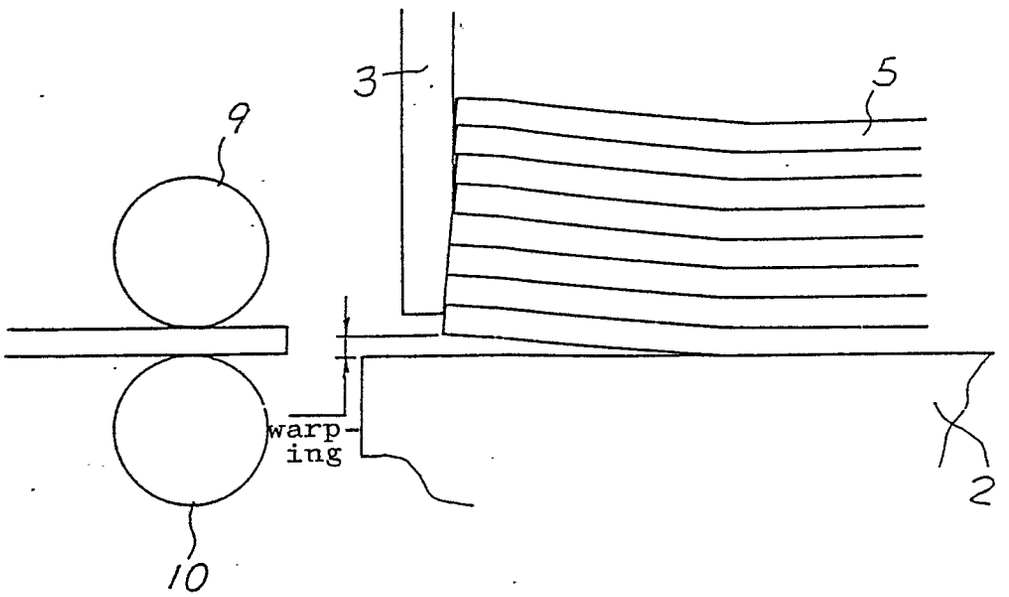

Fig. 5