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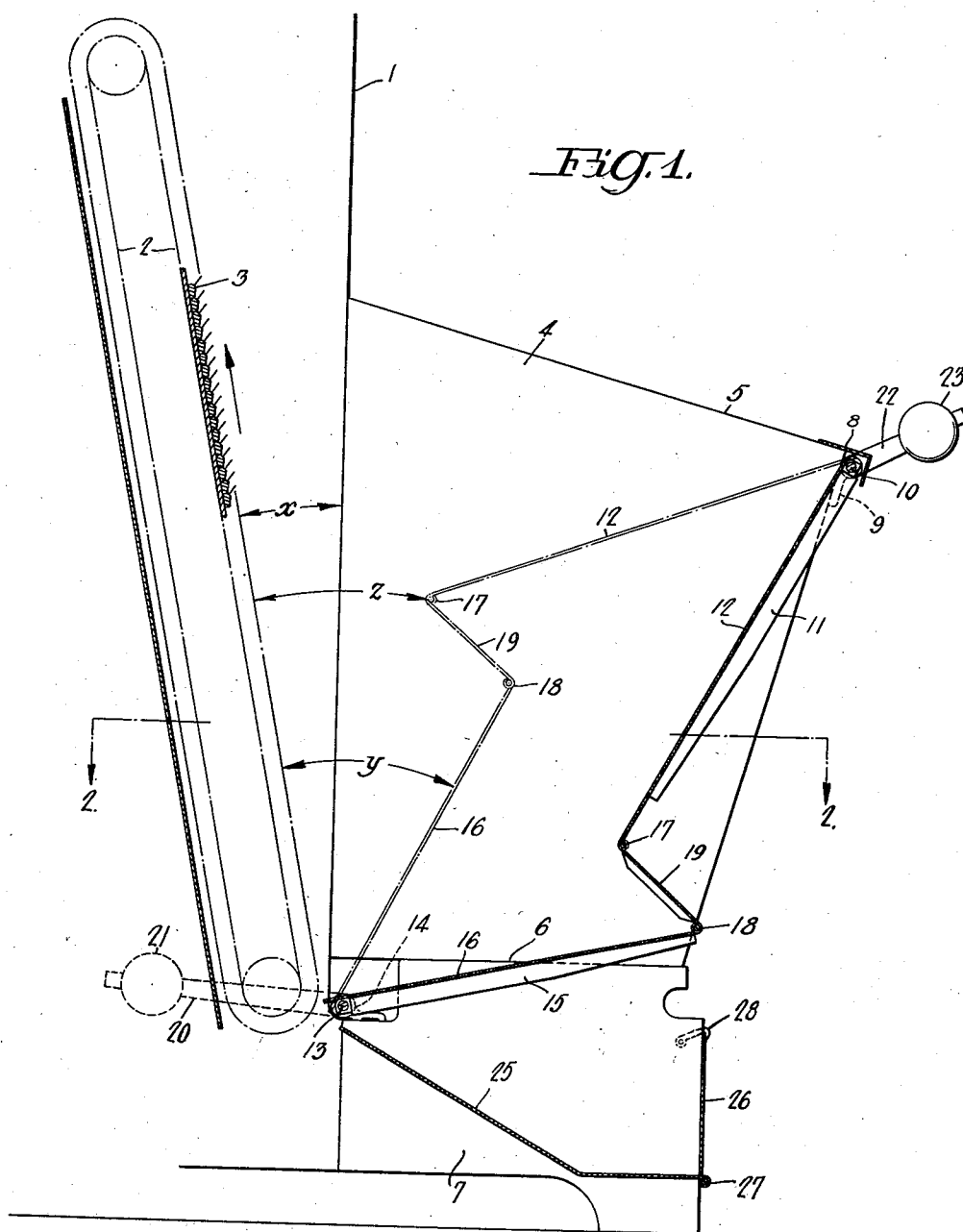
W. F. BOKUM

2,261,049

VOLUMINAL COMPENSATOR FOR THE HOPPERS OF WEIGHING FEEDERS

Filed Oct. 21, 1940

2 Sheets-Sheet 1



*Inventor:-
William F. Bokum
by his Attorneys
Hewson & Hewson*

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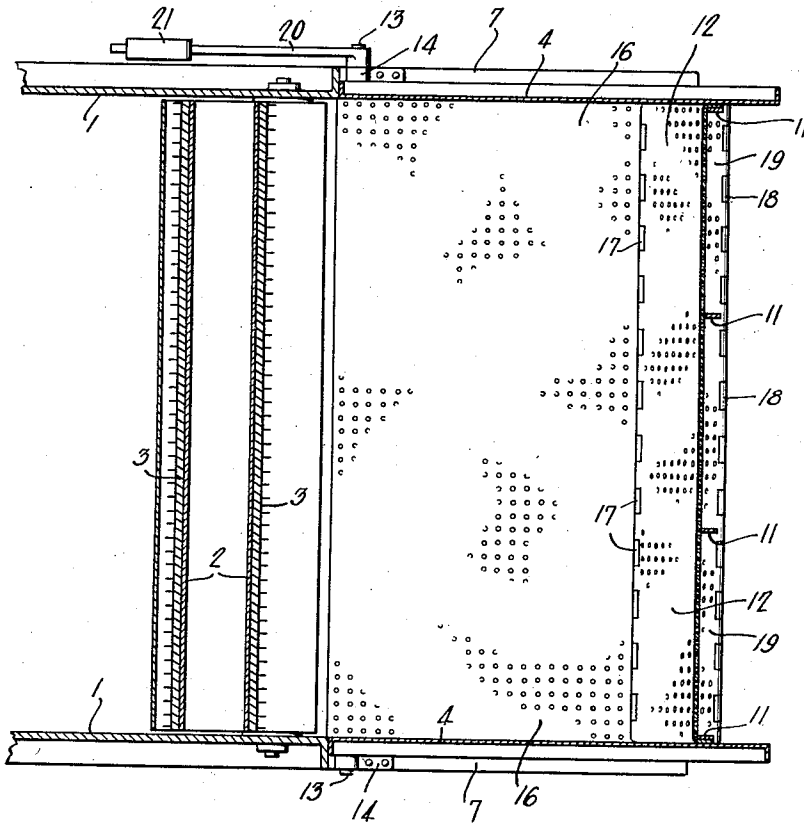
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2 Sheets-Sheet 2

Fig. 2.



*Inventor:-
William F. Bokum
by his Attorneys
Howson & Howson*

UNITED STATES PATENT OFFICE

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VOLUMINAL COMPENSATOR FOR THE
HOPPERS OF WEIGHING FEEDERS

William F. Bokum, Jenkintown, Pa., assignor to
Proctor & Schwartz, Incorporated, Philadel-
phia, Pa., a corporation of Pennsylvania

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7 Claims. (Cl. 221—128)

This invention relates to a voluminal compensator for constantly maintaining a substantially uniform pressure against a mass of fibrous stock contained in a hopper as the volume therein is being constantly depleted and periodically replenished.

The present invention more specifically relates to a device of the character noted as applied to the stock hopper of an automatic weighing feeder normally employed with a garnett or a carding machine to produce a fleece or web of uniform thickness and density, by which uniform slivers and rovings are furnished to the condensers, gills, drawing and doubling machines for ultimately producing yarns of uniform diameter throughout the lengths thereof.

Non-uniformity in yarn diameter is frequently generated in the stock feeder, as a result of the feeder delivering varying quantities of stock to the licker-in rolls of the carding or garnett machine at different times, thus starting the formation of a web or fleece of varying thickness and density, which is subsequently split into uneven slivers and worked into uneven rovings. This unevenness will frequently follow through the condensing, gilling, drawing and doubling operations and show up in the ultimate yarn as thin or thick spots, as the case may be, depending upon whether the licker-in rolls were starved or overfed at various times.

The object of the present invention is to provide an automatic compensator for the stock hopper of a weighing feeder, for example, a feeder of the type disclosed in my prior United States Letters Patent No. 1,660,249 dated February 21, 1928, to maintain the stock contained in the hopper, regardless of its volume, the rate of its withdrawal, or the amount of its periodic replenishment, at a substantially uniform pressure against the upwardly moving side of the spiked apron of the feeder, by which the stock is continuously withdrawn from the hopper and fed to the scale pan of the feeder.

When the scale pan contains a charge of stock of predetermined weight it trips, automatically, to discharge the weighed volume of stock in front of the consolidating board on the discharge apron of the feeder, by which a layer of stock of uniform thickness and density is constantly and continuously fed to the licker-in rolls of the garnett or carding machine.

In order to maintain a flow of stock to the licker-in rolls continuously, the scale pan must be mechanically operated, to dump its contents

onto the discharge apron of the feeder in front of the reciprocating consolidating board, at predetermined time intervals, regardless of whether or not the scale pan contains a full or tripping charge of stock.

If the spiked apron is feeding the proper amount of stock to the scale pan, the pan will fill and dump automatically within the time cycle of mechanical trippings. But, if the spiked apron does not feed the stock rapidly enough for the scale pan to fill and dump automatically, the mechanical trip becomes effective before the pan is fully charged. This causes starving of the licker-in rolls, at times.

Failure of the spiked apron to supply sufficient quantities of stock to the scale pan within the time cycle periods of the mechanical trippings, is due to the spiked apron failing to pick up the proper amount of stock in the hopper; and this failure is due to the weight of the volume of stock in the hopper being insufficient to press the stock against the spiked apron with sufficient force to cause the spikes to bite into the stock and carry away the required amount thereof.

Under the principles of the present invention, the spiked apron is assured of picking up a full load of stock, by reason of the stock being at all times pressed against the ascending face of the apron with sufficient force to cause the spikes to bite into and grip the stock regardless of the volume of stock contained in the hopper.

The construction and operation of the device forming the subject matter of the present invention will be fully disclosed hereinafter, reference being had to the accompanying drawings of which:

Fig. 1 is a longitudinal sectional elevation of the hopper and sufficient of a weighing feeder to illustrate the principles of the present invention; and

Fig. 2 is a sectional plan view taken on the line 2—2, Fig. 1.

As shown in Fig. 1, a side frame of a weighing feeder of the type disclosed in the above mentioned prior patent is illustrated at 1. Operably mounted between the two relatively spaced parallel side frames 1 of the weighing feeder is the usual spiked apron 2, with the one run 3 of said apron moving upwardly in a plane disposed at an angle α to the vertical rear edge of the side frame 1.

Secured to the rear edges of the side frames 1, 1, are the side plates 4, 4 of the hopper 5. The lower edges 6 of the hopper side plates 4, 4 are secured to rear extensions 7 of the side

frames 1. The upper rear corners of the hopper side plates 4, 4 are connected by a horizontal angle plate 8.

Pivotally mounted in bearings 9, 9, carried by the rear flanged edges of the side plates 4, 4 respectively, is a cross shaft 10. Intermediate the bearings 9, 9, the cross shaft 10 is preferably squared, with arms 11, 11 secured thereto and spaced apart therealong. Secured to the squared portion of the cross shaft 10 and to the arms 11 is a perforated movable rear wall plate 12 of the hopper.

Pivotally mounted adjacent the lower end of the ascending run 3 of the spiked apron 2 is a shaft 13, which, like the cross shaft 10, extends completely across the hopper 5. The opposite ends of the shaft 13 are pivotally mounted in bearings 14, 14 which are secured to the frame extensions 7, 7. Intermediate the bearings 14, 14 the cross shaft 13 is preferably squared and has secured thereto a plurality of arms 15 to which, and the squared portion of the shaft 13, is secured a perforated movable bottom plate 16 of the hopper 5.

Pivotally connected at 17 and 18 to the outer normally free swinging ends of the perforated back plate 12 and perforated bottom plate 16 of the hopper 5 is an intermediate perforated plate 19. The perforated plates 12, 19 and 16 constitute a complete articulated element which serves as the bottom and rear wall closures for the hopper 5.

Secured to one end of the shaft 13 is an arm 20, on which is adjustably mounted a weight 21; and secured to one end of the shaft 10 is an arm 22 on which is adjustably mounted a weight 23. Normally the weights 21 and 23 will swing the bottom plate section 16, the rear plate section 12, and the intermediate connecting plate section 19 of the articulated closure element from their full line positions shown in Fig. 1 to their broken line positions shown in Fig. 1, when the hopper is empty, or when the volume of stock contained in the hopper is depleted to a material extent.

When the relatively movable sections of the articulated closure element 12—19—16 are in their broken line positions, the bottom plate section 16 is arranged at a rather sharp angle y with respect to the ascending face 3 of the apron 2, whereby any stock lying between the downwardly converging surfaces formed by the plate 16 and apron run 3, will tend by gravity and its own weight to slide down the steeply inclined surface of the plate section 16 and thereby be pressed firmly against the ascending run 3 of the spiked apron.

When the one terminal section 16 of the articulated closure element 12—19—16 is in its deeply inclined position above noted, the second terminal section 12 of said element assumes an acute angle with respect to the horizontal, and lies on a comparatively slightly inclined plane descending from the rear upper edge 8 of the hopper downwardly toward the ascending run 3 of the apron 2, with the hinge edge 17 of the plate 12 spaced from the ascending run 3 of the apron 2 and providing a mouth z for the passage of stock into the tapering pocket formed by the ascending run 3 of the apron 2 and the steeply inclined bottom plate 16 of the hopper defining the angle y .

With the plates 12, 16 and 19 in their broken line positions of Fig. 1, replenishing stock placed on the perforated plate 12 will slide down

said plate and through the mouth z into the tapering pocket formed between the ascending run 3 of the apron and the bottom plate 16 of the hopper.

The weight of the replenishing material falling on and against the terminal plate sections 12 and 16 of the articulated closure element 12—19—16, counteracts the influence of the weights 21 and 23 and causes the plate sections 12 and 16 to swing about the axes of the shaft 10 and 13 respectively and move said plates from their broken line positions of Fig. 1 toward their full line positions in said figure, to an extent depending upon the amount of replenishing stock placed on the plate 12.

However, the weights 21 and 23, even during the replenishing of the stock, tend to rock the plates 12 and 16 back into their broken line positions and, in so doing, cause these plates to exert a substantially uniform pressure constantly against the body of stock lying between the articulated wall formed by the plates 12—19—16 and the ascending inclined run 3 of the spiked apron.

It will be observed that, when the plates of the articulated wall are in their full lined positions assumed when the hopper 5 is substantially full, the plates 12 and 16 tend to lift the stock, while the relative angles of the plates tend to cause the stock to slide toward and be pressed against the ascending run 3 of the apron 2. The weight of the stock within the hopper at such times tends to counterbalance or offset the effects of the weights 21 and 23, but the weight of the stock alone, when the hopper is substantially full, is sufficient to press the stock against the spiked apron with sufficient force to cause the spikes to bite into the stock, resulting in the apron being fully loaded across its full width between the side frames 1, 1 of the feeder.

As the stock is gradually removed from the hopper 5 by the apron 2 and its volume thereby decreased, the weights 21 and 23 become more and more effective to compensate for the weight of the stock removed, said compensation being effected by the swinging of the plates 12 and 16 toward the ascending run 3 of the apron 2. As the volume of stock becomes more and more depleted, the angle between the inclined plate 16 and the inclined plane of the ascending run 3 of the apron decreases. Any stock then lying on the plate 12 slides down said plate and through the mouth z into the tapering pocket y , where the action of the weight 21 and the force of gravity acting on the weight of the stock in the pocket y becomes maximum and presses the stock in the pocket against the ascending run 3 of the spiked conveyer with a force substantially equal to that exerted by the weight of the stock itself when the hopper was substantially full and the effects of the weights 21 and 23 practically nullified by the counterbalancing effect of the weight of the volume of stock in the full hopper.

From the above it will be clear that with the arrangement herein described and shown in the accompanying drawings, the stock is pressed against the ascending run of the spiked apron constantly and continuously under a substantially uniform pressure at all times, whether the hopper is full, partially full, or practically empty, and also during such times as the volume of stock within the hopper is being replenished.

With the arrangement as disclosed, the spiked apron at all times picks up a full load of stock from the hopper and in so doing delivers suffi-

cient stock to the scale pan to bring the contents thereof up to the predetermined tripping weight at which the pan is automatically dumped. Fully loading the spiked apron at all times causes tripping of the scale pan within a period of time less than the time intervals in the cycle of operations of the mechanical tripper for the scale pan, thus assuring that each time the scale pan is dumped it deposits a predetermined amount of stock on the discharge apron of the feeder.

It will be understood that each time the scale pan is dumped, the spiked apron is stopped while the consolidating board operating over the discharge apron of the feeder pushes the deposited load received from the scale pan forwardly on the discharge apron and then returns to a normal position ready to receive the next load from the scale pan; and that, when the consolidating board re-assumes its normal position, the scale pan is reset and the spiked apron started for the beginning of a new cycle. Thus, with the discharge apron moving at a predetermined linear speed, and with the scale pan dropping full predetermined loads of stock at regular intervals onto the discharge apron, and with the consolidating board moving said periodic deposits one by one into contact with each other on the discharge apron successively, the discharge apron delivers to the lick-in rolls of the garnett or carding machine a substantially uniform layer of stock continuously.

The plates 12, 16 and 19 are primarily perforated to reduce their weight and are preferably made of a light weight metal in order to permit the use of weights 21 and 23 of minimum size. The perforations in these plates, however, serve a further useful and desirable purpose, by permitting dust, dirt, and fine particles of broken fibres to pass out of the bulk of stock contained in the hopper, thus effecting a cleaning of the bulk.

In order to collect the refuse falling through the perforations in the plates 12, 19, 16, the device is provided with an imperforate bottom 25 extending between the frame extensions 7, 7 and preferably disposed at an incline downwardly and rearwardly from a point adjacent the shaft 13. The plate 25 and the frame extensions 7, 7 form a receptacle for receiving the refuse. The refuse container is preferably provided with a discharge gate 26, hinged to the bottom plate 25 along its lower edge and maintained in place by hooks or other suitable devices 28 carried by the frame extensions 7, 7 and engaging the gate 26 along its upper edge.

I claim:

1. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing stock contained in the hopper against said spike-bearing wall, said articulated wall comprising one terminal section pivotally mounted adjacent said spike-bearing wall, a second terminal section pivotally mounted remotely with respect to said spike-bearing wall, and an intermediate section pivotally connected along opposite parallel edges thereof to corresponding edges of said terminal sections spaced respectively from the pivots thereof.

2. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing stock contained in the hopper against said spike-

bearing wall, said articulated wall comprising one terminal section pivotally mounted adjacent said spike-bearing wall, a second terminal section pivotally mounted remotely with respect to said spike-bearing wall, and an intermediate section pivotally connected along opposite parallel edges thereof to corresponding edges of said terminal sections spaced respectively from the pivots thereof, and means for swinging said connected terminal sections toward said spike-bearing wall.

3. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing stock contained in the hopper against said spike-bearing wall, said articulated wall comprising one terminal section pivotally mounted at one lower corner of said hopper adjacent said spike-bearing wall, a second terminal section pivotally mounted in the upper diagonally opposite corner of the hopper, and an intermediate section pivotally connected along parallel opposite edges thereof to corresponding edges respectively of said terminal sections spaced from the pivots of said terminal sections.

4. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing stock contained in the hopper against said spike-bearing wall, said articulated wall comprising one terminal section pivotally mounted at one lower corner of said hopper adjacent said spike-bearing wall, a second terminal section pivotally mounted in the upper diagonally opposite corner of the hopper, and an intermediate section pivotally connected along parallel opposite edges thereof to corresponding edges respectively of said terminal sections spaced from the pivots of said terminal sections, motivating means constantly urging the first said terminal section to assume an acute angular position with respect to said spike-bearing wall to form a tapering pocket with said spike-bearing wall and said first terminal section in downwardly converging relation to each other.

5. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing stock contained in the hopper against said spike-bearing wall, said articulated wall comprising one terminal section pivotally mounted at one lower corner of said hopper adjacent said spike-bearing wall, a second terminal section pivotally mounted in the upper diagonally opposite corner of the hopper, and an intermediate section pivotally connected along parallel opposite edges thereof to corresponding edges respectively of said terminal sections spaced from the pivots of said terminal sections, motivating means constantly urging the first said terminal section to assume an acute angular position with respect to said spike-bearing wall to form a tapering pocket with said spike-bearing wall and said first terminal section in downwardly converging relation to each other, and the second terminal section to assume an acute angular position with respect to the horizontal, with said spaced edge thereof overhanging said pocket to guide stock into said pocket.

6. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing wall adapted to remove stock from the hopper, and an articulated sectional wall for pressing

stock contained in the hopper against said spike-bearing wall, said articulated wall comprising two terminal sections and an intermediate section having opposite parallel edges pivotally connected to corresponding edges respectively of said terminal sections, a pivot shaft for one terminal section mounted in one lower corner of the hopper adjacent said spike-bearing wall, a pivot shaft for the second terminal section located in an upper diagonally opposite corner of said hopper, and a weighted arm on at least one of said pivot shafts for rocking said terminal sections toward said spike-bearing wall.

7. A fibrous stock feeding device comprising a stock hopper including a movable spike-bearing

5 wall adapted to remove stock from the hopper, and an opposite wall adapted to press the stock against said spike-bearing surface, said opposite wall comprising at least two sections with one end of one section pivoted at a lower corner of the hopper adjacent said spike-bearing wall and one end of the second section pivoted at the upper diagonally opposite corner of the hopper, with the outer ends of the two sections disposed in adjacent relation to each other, and means for maintaining adjacent relationship between said outer ends of said sections during simultaneous swinging movement of said sections about their respective pivots.

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