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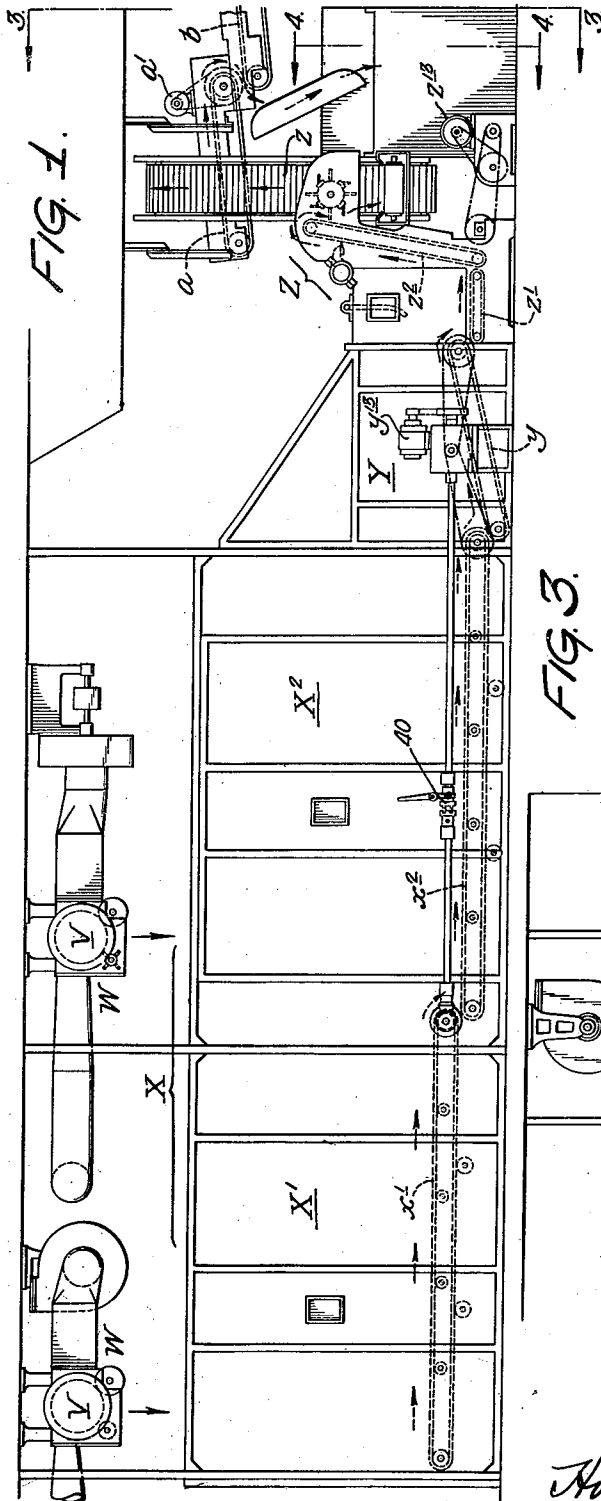
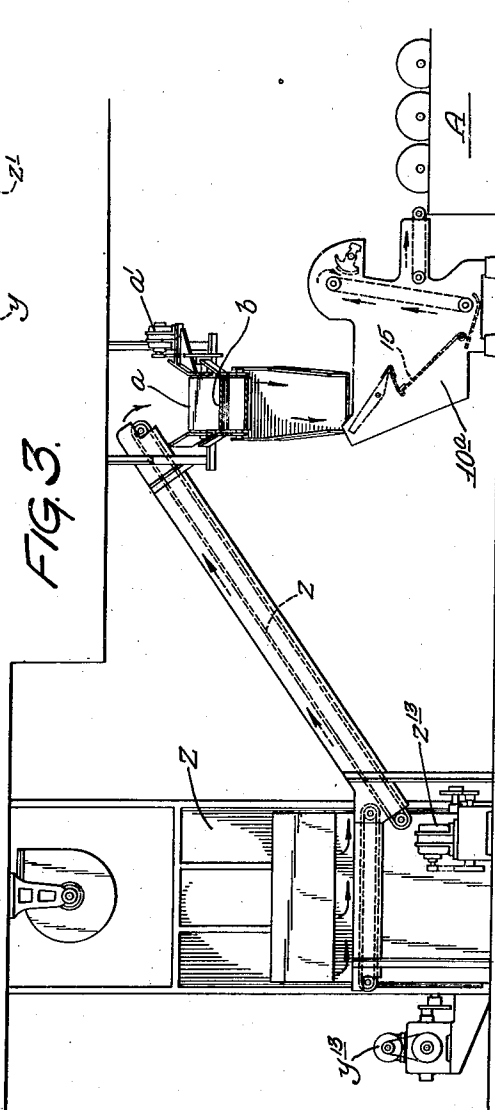
H. B. RIEHL

2,360,583

SINGLE FEED FOR MULTIPLE CARDING MACHINES

Filed Oct. 16, 1942

3 Sheets-Sheet 1



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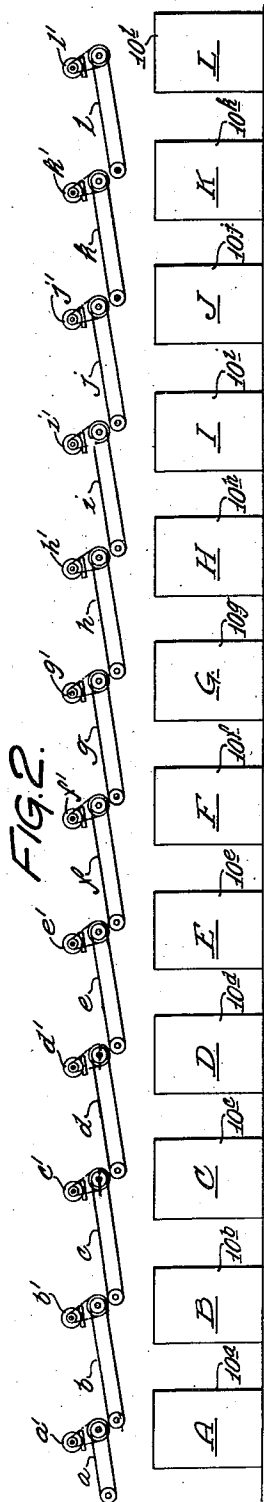
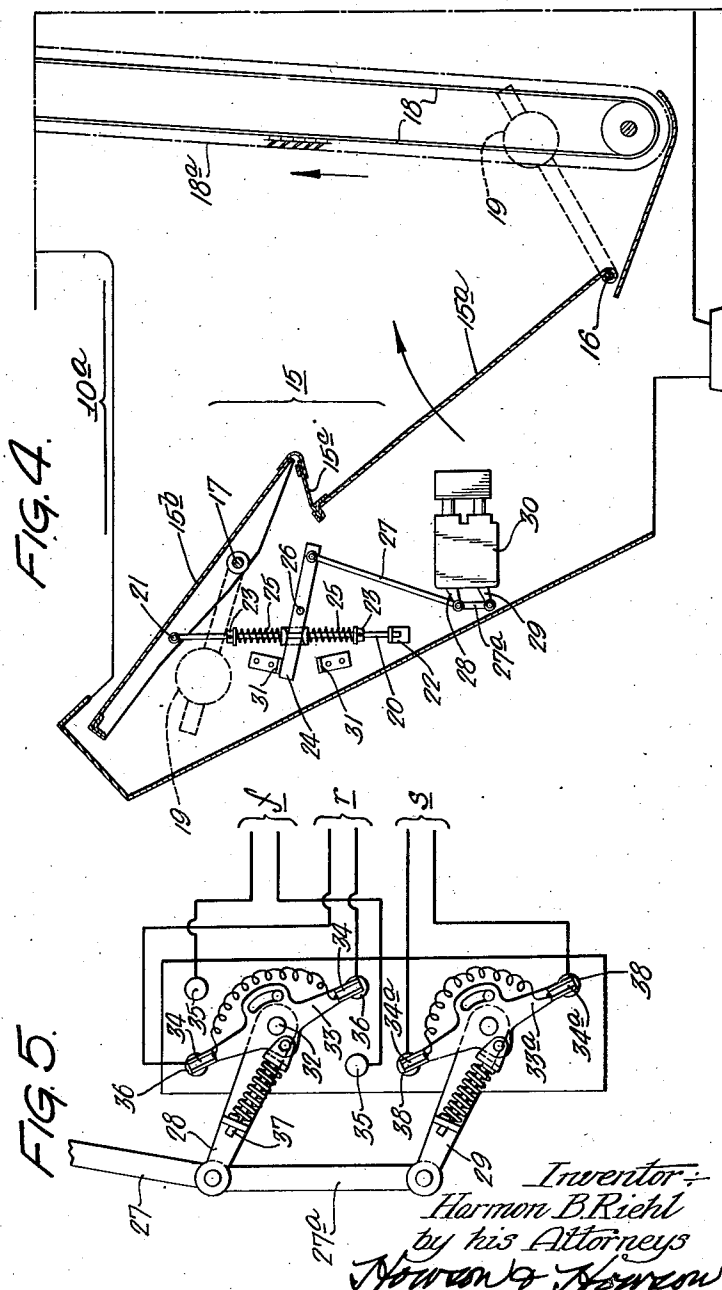
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SINGLE FEED FOR MULTIPLE CARDING MACHINES

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3 Sheets-Sheet 2



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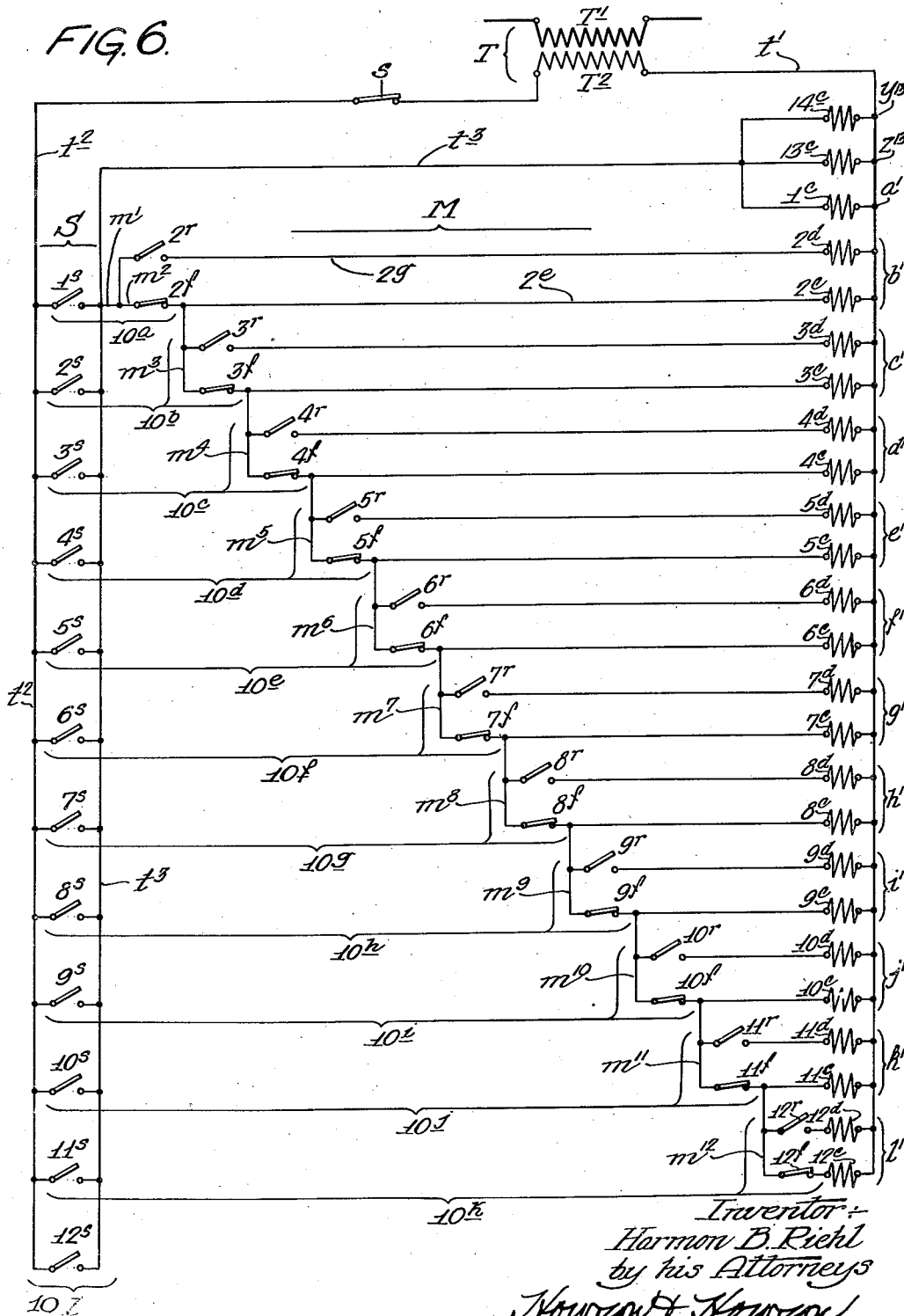
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SINGLE FEED FOR MULTIPLE CARDING MACHINES

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3 Sheets-Sheet 3

FIG. 6.



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UNITED STATES PATENT OFFICE

2,360,583

SINGLE FEED FOR MULTIPLE CARDING
MACHINES

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Application October 16, 1942, Serial No. 462,312

11 Claims. (Cl. 214—16)

This invention relates to apparatus for auto-
matically feeding a battery of Garnett, carding
or other fibrous stock working machines, which
heretofore have been individually fed, manually.

The outstanding effects of the present inven-
tion are the saving of man power, the produc-
tion of cleaner and more uniform webs from
the Garnett or carding machines, a reduction in
the loss of moisture from the stock, and others
which will be apparent from the following speci-
fication taken with the accompanying drawings,
of which:

Fig. 1 is a side elevation of the primary feeding
apparatus and a portion of the secondary feeding
apparatus, constructed and operated in accord-
ance with the present invention, including the
first fibre working unit of a battery thereof;

Fig. 2 is a diagrammatic side elevation of the
secondary feeding apparatus cooperating with
the battery of fibre working units;

Fig. 3 is a transverse sectional elevation taken
on the line 3—3, Fig. 1;

Fig. 4 is an enlarged sectional elevation taken
on the line 4—4, Fig. 1;

Fig. 5 is a diagrammatic view illustrating one
of the electric control devices provided at each
of the fibre working units of the battery; and

Fig. 6 is an electrical diagram showing the
intercooperation of the elements of the second-
ary feeding apparatus and the various units of
the battery of fibre working machines.

As shown in Fig. 2, a battery of carding or
Garnett machines, commonly called carding en-
gines, of any desired number are installed in
laterally spaced parallel relation to each other,
with the receiving hoppers of the automatic
weighing feeders of the individual machines lined
up in a single row.

In the present instance, there are twelve card-
ing or Garnett machines in the battery, indicated
at A to L respectively (Fig. 2). Each machine
is provided with an automatic weighing feeder
of the type shown in the present assignee's prior
United States Patent No. 1,660,249 dated Feb-
ruary 21, 1928, modified in accordance with the
assignee's later United States Patent No.
2,261,049 dated October 28, 1941.

Each of the weighing feeders includes a re-
ceiving hopper, from which fibrous stock is au-
tomatically withdrawn and automatically fed, in
uniform weighed batches, to the lick-in rolls
of the garnett or carding machine.

Heretofore the receiving hoppers of the auto-
matic feeders have been replenished manually,
by a crew of men, for example, one man for

each three or four machines. Such manual
feeding has been unsatisfactory for a number of
reasons.

In order to gain leisure time, the attendants
have been inclined to overload the hoppers and
to cram the hoppers so full that the bulk of
stock in each hopper is unevenly distributed
against the ascending face of the spike apron of
the feeder which withdraws the fibres from the
receiving hoppers thereof. This condition causes
variations in the web as it forms on the swift
or cylinder of the carding engine, and conse-
quently results in variations in the carded slivers
leaving the machines.

Another disadvantage attending manual feed-
ing is the opposite extreme, i. e. the attendants
will frequently overlook the fact that the stock
in a hopper is rapidly becoming depleted and in
need of replenishing. This causes thin starved
spots to be formed in the fleece or web on the
carding cylinder. Then, when the inadequacy
is discovered, the attendant will cram the hop-
per full to excess. This causes thick spots in
the web. Consequently the ensuing sliver is thick
in some spots and thin in others.

Furthermore, undue packing of the stock in
the feeder receiving hoppers does not permit of
the loose dirt and fines falling out of the stock
through the foraminous floor and/or back of the
hopper, thus the web and ensuing sliver contain
undesirable quantities of foreign matter which
must be subsequently removed therefrom.

According to the present invention, the receiv-
ing hoppers 10a to 10l of the automatic feeders
attending the carding engines A to L inclusive
are fed by a series of longitudinally aligned con-
veyers a to l inclusive, arranged with the adja-
cent ends of successive conveyers in overlapping
relation, for respectively delivering stock in a
loose fluffy condition to the hoppers 10a to 10l
inclusive. Each hopper is provided with auto-
matic means whereby the bulk of stock therein
is maintained within predetermined limits, thus
the stock is distributed uniformly across the faces
of the ascending runs of the spike aprons and
the density of the stock is maintained uniform,
thus the web and the sliver coming from each
carding engine is of uniform texture.

Furthermore, the fluffing of the stock in the
hoppers frees the fibres of a high percentage of
foreign matter, which results in cleaner webs and
slivers than has been possible heretofore.

The conveyers a to l are aligned one with the
other in end over end overlapping relation di-
rectly above the row of feeder hoppers 10a to 10l

inclusive, and the composite conveyer, made up of the several individual conveyers or sections a to l , is fed by a cross conveyer z from a master feeder Z .

The master feeder Z is fed from a master hopper or bin X^2 , forming one compartment of a service bin X , which also includes a second compartment X^1 , through an intermediate delivery house or bin-head Y .

The bin compartments X^1 and X^2 of the service bin X are each adapted to hold a sufficient quantity of stock to serve the whole battery of carding engines for one full working period, i. e. for a full day's run or a full night's run.

The compartments X^1 and X^2 of the service bin X are each provided with a movable floor, in the form of endless belt conveyers x^1 and x^2 respectively, whereby the stock assembled in compartment X^1 may be bodily transferred to compartment X^2 , when empty, and whereby the stock from compartment X^2 may be steadily delivered to the bin-head Y .

The bin-head Y is provided with an inclined conveyer y which is adapted to deliver stock onto the movable floor conveyer z^1 of the master feeder Z .

The master feeder Z is provided with a spike apron z^2 which raises the stock and delivers it to the cross conveyer z for delivery to the first end section a of the composite conveyer $a-l$ aforesaid.

The master feeder Z is preferably provided with compensating means in accordance with the disclosure of the assignee's expending application Serial No. 427,668 filed in the names of William F. Bokum and John W. Weber under date of January 21, 1942, which insures uniformity of the stock delivered to the series of conveyers a to l inclusive by the cross conveyer z .

The conveyer sections b to l are respectively driven by reversible electric motors, or their equivalents b^1 to l^1 respectively. The forward motions of the motors b^1 to l^1 are controlled by relay switches which include operating coils $2c$ to $11c$ respectively, while the reverse motions of these motors are controlled by relay switches including operating coils $2d$ to $11d$ respectively.

The conveyer a will never be required to reverse, hence the motor a^1 which drives this conveyer may be of the mono-directional type, the reasons for which will become obvious as the description of the apparatus as a whole progresses.

Current to the relay switch coils $2c$ to $12c$ (Fig. 6) for affording forward motion of the motors b^1 to l^1 is furnished through switches $2f$ to $12f$ respectively of a main circuit M , and current to the coils $2d$ to $12d$ for reversing the motors b^1 to l^1 is furnished through switches $2r$ to $12r$ of said circuit.

Current to one side of the relay switch coil $1c$ for controlling the flow of current to the motor a^1 which drives the first conveyer section a associated with the carding engine A , and current to one side of the relay switch coils $13c$ and $14c$ which respectively control the flow of current to a motor z^{13} for the master feeder Z and y^{13} for the bin-head Y and service bin X , is supplied by a conductor t^3 . Current to the opposite side of each of the above noted relay switch coils is supplied by a conductor t^1 from one side of the secondary winding T^2 of a transformer T , or equivalent source.

The conductor t^3 forms one side of a complementary parallel stop circuit S including stop switches $1s$ to $12s$ inclusive, one for each of the

carding engines A to L inclusive. The second side of the complementary circuit S is formed by a conductor t^2 connected to the second side of the secondary winding T^2 of the transformer T . The circuit S is controllable by a manual switch s and by each of the automatic stop switches $1s$ to $12s$ inclusive.

As shown in Figs. 4 and 5, there is one of the stop switches $1s$ to $11s$ of the complementary circuit S , one of the forward switches $2f$ to $12f$, and one of the reverse switches $2r$ to $12r$, controlled by each of the weighing feeder hoppers $10a$ to $10k$ of the units A to K inclusive, and one of the stop switches $12s$ solely controlled by the hopper $10l$ of the feeder associated with the unit L .

As shown in Figs. 4 and 5, the forward switch and the reverse switch in each hopper are so connected mechanically that when the one is closed the other is open and vice versa. When the forward switch of a hopper is closed, the stop switch for the hopper is open in the case of the hoppers $10a$ to $10k$ inclusive, and in the case of the hopper $10l$, the stop switch $12s$ is open when the hopper is full and closed when the stock in that hopper requires replenishing.

As shown in Fig. 4, each hopper $10a$ to $10l$ is provided with an articulated movable back 15 , comprising a lower part $15a$ pivoted at 16 to the frame of the hopper, and an upper part $15b$ pivoted at 17 to said frame, with the upper edge of the lower part and the lower edge of the upper part flexibly connected by an intermediate part $15c$ of said back.

The movable back 15 of each hopper is counterbalanced to move the lower part $15a$ toward the ascending face $18a$ of the spike apron 18 , by a weight 19 , or its equivalent to press the stock in the hopper firmly against the spike apron. As the bulk of stock in the hopper diminishes the lower part $15a$ of the movable back 15 moves in the direction indicated by the arrow in Fig. 4, and as the bulk is replenished the back $15a$ moves in the opposite direction.

The top part $15b$, being connected to the lower part $15a$ receives a corresponding oscillating motion as the hopper empties and fills, and vice versa.

Idle oscillatory motion of the movable back 15 is permitted within prescribed limits at the opposite ends of which the forward and reverse and stop switches are operated in accordance with conditions existing in the hopper.

As shown in Fig. 5, a forward switch $2f$ to $12f$ as the case may be, an associated reverse switch $2r$ to $12r$ as the case may be, and a stop switch $1s$ to $11s$ as the case may be, are simultaneously controlled by the movable back of each hopper $10a$ to $10l$, as the case may be, by a rod 20 pivoted at one end to the movable back 15 , at 21 , with its opposite end slidably mounted in a bracket 22 on the frame of the hopper.

The rod 20 is provided with spaced collars 23 , 23 between which and the opposite sides of a lever 24 are springs 25 , 25 . The lever 24 is pivoted at 26 to the frame of the hopper and is connected at one end, by links 27 and $27a$, to a pair of switch levers 28 and 29 of a switch box 30 , in which said forward, reverse and stop switches are housed. The opposite end of the lever 24 is operable between stops 31 , 31 .

The forward and reverse and stop switches may be of the mercury tube type if desired, but preferably the forward and reverse are included in a double pole toggle switch. The stop switch is preferably of the single pole toggle type.

As shown in Fig. 5, the lever 28 is pivoted on a rod 32 on which is also pivoted a dielectric lever 33 carrying electrically connected contacts 34, 34 which, in one position of the lever 33 connect the terminals 35, 35 of the forward switch and in another position connect the terminals 36, 36 of the reverse switch, a spring biased toggle link 37 having one end pivoted to the contact lever 33 and its opposite end slidable in a lug on the operating lever 28, serving to hold the contact lever 33 resiliently in either of its circuit closing positions to which this lever might be moved.

The stop switch is of similar construction except that the electrically connected contacts 34a, 34a on the dielectric lever 33a make contact with but one set of terminals 38, 38 of the stop switch, at the same time as the contacts 34, 34, on the dielectric lever 33 are in engagement with the terminals 36, 36 of the associated reverse switch.

As shown in Fig. 6, current is supplied to the conductor t^1 and t^2 from the opposite sides of the secondary winding T^2 of the transformer T , and from the conductor t^2 to the conductor t^3 of the stop circuit S , through each of the stop switches 1s to 12s inclusive.

The conductor t^3 , forming one side of the stop circuit S is connected to one side of the main circuit M through a single conductor m^1 . One side of the forward switch 2f and one side of the reverse switch 2r are connected by a single conductor m^2 to which is also connected the conductor m^1 from the stop circuit S . The second sides of the switches 2f and 2r are connected to the second sides of the relay switch coils 2c and 2d respectively by conductors 2e and 2g.

The switches 1s, 2r and 2f are controlled by the movable back 15 in the hopper 10a associated with the first carding engine A. The switches 2s, 3r and 3f are controlled by the movable back 15 in the hopper 10b associated with the second carding engine B and so on to the hopper 10k associated with the carding engine K, the movable back 15 of which controls the switches 11s, 12r and 12f. The movable back 15 of the hopper 10l associated with the last carding engine L of the battery thereof, controls only the stop switch 12s.

One side of the switches 3r and 3f are connected by a conductor m^3 to the conductor 2e behind the switch 2f, i. e. to the second side of said forward switch, so that if the switch 2f is opened no current can flow to any of the switches beyond the open forward switch. The other switches 4r—4f, 5r—5f, 6r—6f and so on are similarly connected together and to the second side of the preceding forward switch by conductors m^4 , m^5 , m^6 and so on down to the switches 12r—12f which are connected to the second side of the forward switch 11f by a conductor m^{12} .

In operation, assuming that the battery of carding engines are being started up for the first time, with all hoppers 10a to 10l empty, the movable backs 15 of these hoppers have closed the reverse switches 2r to 12r inclusive and the stop switches 1s to 12s inclusive, and opened the forward switches 2f to 12f inclusive.

The manual switch s is then closed. This starts the motors y^{13} , z^{13} and a^1 . Stock is then advanced from the compartment X^2 of the service bin X through the bin head Y to the master feeder Z , and from the master feeder Z to the cross conveyor z .

The conveyor z delivers the stock to the first conveyor a of the plurality a to l inclusive, which

collectively form a single path for the stock which is common to the entrances of all of the hoppers 10a and 10l. The conveyers a to l are adapted collectively to advance the stock in steady progression past the entrances of the hoppers 10a to 10l, as formed by the open tops of these hoppers.

As a result of the hopper 10a of the carding unit A being empty, the movable back 15 thereof has closed the switch 2r and opened the switch 2f therein which controls the action of the conveyor b , thus the conveyor b is caused to move in reverse, so that, as the stock is delivered to the receiving end of the conveyor b , from conveyor a , the forward motion of a and the reverse movement of b , combined, diverts the stock from the aforesaid single path and drops it into the hopper 10a of the carding unit A.

It will be observed from Fig. 6, that when the reverse switch 2r is closed the stop switch 1s, in the hopper 10a, is also closed, and the forward switch 2f is open. The opening of switch 2f cuts off the flow of current to the relay coils 3c, 3d to 12c, 12d so that all the conveyers c , d , e etc. following the reversed conveyor b , in this instance, are stopped.

When the hopper 10a of the carding unit A has received a predetermined quantity of stock, the movable back 15 of the hopper 10a operates to open the switches 2r and 1s and close the switch 2f, which causes the conveyor b to travel in a forward direction to deliver stock to the hopper 10b of the carding unit B.

The same procedure as hereinbefore described with respect to the filling of the hopper 10a now follows until the hopper 10b is filled, and so on throughout the whole of the battery A to L inclusive.

When the hopper 10k of the carding unit K is filled, the conveyor l delivers stock directly into the hopper 10l of the carding unit L. As previously noted the movable back 15 of the hopper 10l controls but one switch, i. e. the switch 12s in the stop circuit S .

As will be clear from the foregoing description, when the movable backs 15 of each of the hoppers 10a to 10k respectively were operated by the respective hoppers becoming filled, which in turn opened the reverse switches and the stop switches controlled thereby and closed the forward switches for the conveyers a to k inclusive, all the stop switches 1s to 11s were thereby opened, leaving only the switch 12s, controlled by the movable back 15 of the hopper 10l associated with the carding unit L, closed to feed current solely from the one side t^2 of the stop circuit S to the opposite side t^3 thereof and thence to the one side of the main circuit M , and through the interconnected conductors m^1 to m^{12} inclusive to the forward switch 12f in the hopper 11k of the carding unit K.

Thus, the fibres are fed from conveyor a to b to c and so on to l , and by the conveyor l into the hopper 10l of the carding unit L. When this hopper is filled, the movable back 15 thereof operates to open the switch 12s, thus completely opening the stop circuit S and shutting off all current from the main circuit M , the motors a^1 to l^1 and the motors z^{13} and y^{13} , whereby the feeding of stock from the compartment X^2 of the service bin X is completely stopped and all stock lying on the conveyers a to l , z , z^1 , y and x^2 remains quiescent.

Now, should the stock in any one of the hoppers 10a to 10l become depleted to the predeter-

mined extent necessary to cause the movable back 15 thereof to actuate the switches controlled thereby, the whole conveyer system up to the hopper requiring replenishing would be immediately actuated by the operation of these particular switches, while all the sections of the conveyer system beyond the hopper requiring replenishing would remain inactive.

For example, if the hopper 10g associated with the carding unit G should require replenishing, the movable back of that hopper will close the stop switch 7s, thereby providing current across the stop circuit S to the main circuit M to start the motors z^{13} , y^{13} , a^1 , b^1 , c^1 , d^1 , e^1 , f^1 and g^1 , and will close the reverse switch 8r and open the switch 8f, whereby the motor h^1 will be operated in reverse. Thus the conveyers X^2 , Y, Z^1 , z^2 , z , a , b , c , d , e , f , and g will move forwardly to transport stock from the compartment X^2 of the service bin X to the conveyer h , and the reversing of the conveyer h will drop the stock into the hopper 10g of the carding unit G.

The conveyer x^1 in the compartment X^1 of the service bin X may at any time during operation of the motor y^{13} be coupled thereto by a clutch 40 to load the compartment X^2 from the compartments X^1 when desired, or a separate manually controlled motor for operating the conveyer x^1 may be provided, if desired. Furthermore the clutch 40 may be constantly operative to cause simultaneous actuation of the conveyers x^1 and x^2 if desired.

Stock is fed from dryers, willows, pickers or other preliminary treating apparatus to the service bin X, or to either of the compartments X^1 and X^2 thereof separately, through the usual form of air duct blower system W, W including the usual form of condenser V, V.

I claim:

1. An apparatus for feeding material to a series of receptacle entrances, comprising a series of conveyer units collectively adapted to advance material along a path common to said entrances, and means associated with each receptacle and operable by variations in the volume of material therein for interrupting the material advancing movements of the conveyer units succeeding each of said entrances upon reduction of said volume to a predetermined limit in the receptacle fed thereby.

2. An apparatus for feeding material to a series of receptacle entrances, comprising a series of conveyer units collectively adapted to advance material along a path common to said entrances, means associated with each receptacle and operable by variations in the volume of material therein for interrupting the material advancing movements of the conveyer units succeeding each of said entrances upon reduction of said volume to a predetermined limit in the receptacle fed thereby, and means operable by said associated means for effecting reversal of the conveyer unit next succeeding each receptacle entrance concurrently with said interruption for diverting said material into said entrance.

3. An apparatus for feeding material to a series of receptacle entrances, comprising a series of receptacles, a series of conveyer units respectively terminating adjacent the entrances of said receptacles, and adapted normally to progressively advance material along a path common to said entrances, volume determining means in each receptacle, and means operable by said determining means for interrupting the material advancing movements of the conveyer units fol-

lowing each receptacle entrance when the volume of material therein reaches a predetermined minimum.

4. An apparatus for feeding material to a series of receptacle entrances, comprising a series of receptacles, a series of conveyer units respectively terminating adjacent the entrances of said receptacles and adapted normally to progressively advance material along a path common to said entrances, volume determining means in each receptacle, means operable by said determining means for interrupting the material advancing movements of the conveyer units following each receptacle entrance when the volume of material therein reaches a predetermined minimum, and means operable by said determining means for reversing the first conveyer unit following each receptacle entrance concurrently with said interruption for diverting material from said path into the affected receptacle.

5. An apparatus for feeding material to a series of receptacle entrances, comprising a series of receptacles, a series of conveyer units respectively terminating adjacent the entrances of said receptacles and adapted normally to progressively advance material along a path common to said entrances, volume determining means in each receptacle, means operable by said determining means for interrupting the material advancing movements of the conveyer units following each receptacle entrance when the volume of material therein reaches a predetermined minimum, and means controlled by the determining means of all of said receptacles collectively for interrupting the material advancing movements of all the conveyer units of the series when the determining means of all the receptacles indicate maximum volume of material in said series of receptacles.

6. A material feeding apparatus comprising a row of open-top receptacles, a longitudinally aligned series of conveyer units above and parallel to said row with adjacent ends of successive units overlying said open tops respectively, means for driving said units concurrently in a forward direction to advance material progressively from one end of said row to the opposite end thereof and including reversible driving means for each unit following the open top of the receptacle at the first end of said row, drive control means in each receptacle for effecting forward or reverse movement of the unit immediately following each receptacle under the influence of predetermined maximum and minimum volumes respectively of the material contained therein, and means operable by the control means in each receptacle for stopping all the units following a unit operating in reverse.

7. A material feeding apparatus comprising a row of open-top receptacles, a longitudinally aligned series of conveyer units above and parallel to said row with adjacent ends of successive units overlying said open tops respectively, means for driving said units concurrently in a forward direction to advance material progressively from one end of said row to the opposite end thereof and including reversible driving means for each unit following the open top of the receptacle at the first end of said row, drive control means in each receptacle for effecting forward or reverse movement of the unit immediately following each receptacle under the influence of predetermined maximum and minimum volumes respectively of the material contained therein, and means operable by the control means in each receptacle and collectively throughout all the receptacles of the

row for stopping all of said units when the control means of all of the receptacles indicate maximum volumes of material therein.

8. A material feeding apparatus comprising a row of open-top receptacles, a longitudinally aligned series of conveyer units above and parallel to said row with adjacent ends of successive units overlying said open tops respectively, means for driving said units concurrently in a forward direction to advance material progressively from one end of said row to the opposite end thereof and including reversible driving means for each unit following the open top of the receptacle at the first end of said row, drive control means in each receptacle for effecting forward or reverse movement of the unit immediately following each receptacle under the influence of predetermined maximum and minimum volumes respectively of the material contained therein, means operable by the control means in each receptacle for stopping all the units following a unit operating in reverse, and means operable by the control means in each receptacle and collectively throughout all the receptacles of the row for stopping all of said units when the control means of all of the receptacles indicate maximum volumes of material therein.

9. A material feeding apparatus comprising a supply bin, a row of receptacles, a conveyer system for transporting material from said bin to said receptacles including a series of independent conveyer units respectively adapted to advance said material progressively along said row, material measuring means in each receptacle, and means responsive to predetermined actuations of the measuring means in any one of said receptacles for stopping the conveyer units and inter-

rupting said progression therebeyond and for diverting the material thereinto.

10. A material feeding apparatus comprising a supply bin, a row of receptacles, a conveyer system for transporting material from said bin to said receptacles including a series of independent conveyer units respectively adapted to advance said material progressively along said row, material measuring means in each receptacle, means responsive to predetermined actuations of the measuring means in any one of said receptacles for stopping the conveyer units and interrupting said progression therebeyond and for diverting the material thereinto, and means also responsive to predetermined actuations of the measuring means of all said receptacles collectively for interrupting the material transporting movements of the conveyer system as a whole.

11. A material feeding apparatus comprising a supply bin, a row of receptacles, a conveyer system for transporting material from said bin to said receptacles including movable flooring in said bin, a series of independent conveyer units respectively adapted to receive material from said movable flooring and advance said material progressively along said row, material measuring means in each receptacle, means responsive to predetermined actuations of the measuring means in any one of said receptacles for stopping the conveyer units and interrupting said progression therebeyond and for diverting the material thereinto, and means also responsive to predetermined actuations of the measuring means of all said receptacles collectively for interrupting the material transporting movements of the conveyer system as a whole.

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