SINGLE PROCESS PICKER SYSTEM

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Application August 11, 1933, Serial No. 684,690

24 Claims. (Cl. 19—65)

In recent years the so-called "single process picker systems" have almost universally displaced the former two-process and three-process systems used in preparing cotton for the carding operation. The former systems were chiefly from the latter in that they perform the entire picking operation in a single continuous process and work the cotton into a suitable condition for delivery to the card while avoiding any intermedia handling of the cotton. A system which has proved highly successful commercially and has gone into wide use is shown in the Curley Patent No. 1,908,224, granted May 9, 1933.

The present invention relates to systems of this general character and is also concerned with the machinery preceding the picker which prepares the cotton for the picking operation. It aims to improve such systems and machinery with a view to devising a simpler organization, reducing the initial expense of such installations, effecting a better blending of the stock, and producing a more uniform final product.

It has been definitely determined that the production of a sliver or roving in a carding machine depends chiefly upon the degree of uniformity in the lap fed to that machine. In other words, the production of such a roving or sliver, even with the best carding equipment and practices available, is vitally affected by the operations preceding carding, and if the lap fed to it has a substantial yard for yard variation in weight, nothing that can be done in the carding machine will correct that variation. It has also been determined that the production of a lap having a high degree of yard for yard uniformity is, in turn, dependent chiefly upon the rate of feed of the cotton to the beater of the finisher lapper. The present invention is especially concerned with this problem and it aims to devise a thoroughly practical solution for it.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a side elevation of a picker system embodying the present invention; Fig. 2 is a vertical, longitudinal, sectional view of the machine shown in Fig. 1; Fig. 3 is a diagrammatic view of certain parts of the controlling apparatus used in the system; Fig. 4 is a plan view showing a typical lay-out of the picking rooms of a system embodying this invention and illustrating, also, an automatic control system which forms an important feature of this invention; Fig. 5 is a diagrammatic side elevation of the lay-out shown in Fig. 4; Fig. 6 is a vertical, transverse, sectional view through a portion of the intermediate chute of the system illustrated in Fig. 1; Fig. 7 is a horizontal, diagrammatic view of a part of the driving mechanism of said system; Fig. 8 is a side elevation somewhat diagrammatic in character, of a modification; Fig. 9 is a similar view illustrating another modification; Fig. 10 is a plan view of parts of the mechanism illustrated in Fig. 9; Fig. 11 is a longitudinal, sectional view of a form of conveyor which preferably is used in this system; and Fig. 12 is a sectional view substantially on the line 11—11, Fig. 11.

We have found that an important factor in realizing the necessary degree of uniformity of feed to the finisher lapper to produce the high degree of yard for yard evenness or uniformity required in the finished lap consists in thoroughly opening the fiber and producing a complete and uniform blending of the stock before it is delivered to the beater of the finisher lapper. Our experiments have demonstrated that an important reason for the yard for yard variations which mills find so troublesome in their laps lies in the neglect of these factors. In order to eliminate these variations it is necessary, or at least advisable, to go back into the system of machinery which prepares the cotton for delivery to the pickers, since much of this work of properly opening, cleaning and preparing the fiber can be performed at this earlier stage in the entire process, and in machinery having a high production rate.

Referring more especially to the general lay-out illustrated in Figs. 4 and 5, the system there shown comprises two lines of opening machines indicated at A and B, respectively, these two lines being arranged in parallel. Each line of opening system includes a bale breaker 2 delivering into a hopper feeder 3 which, in turn, discharges its cotton into a horizontal opener 4 from which it is carried into a vertical opener 5, the latter machine having an apron feed which discharges its cotton on to a horizontal feed table 6. All of these units or machines in each system or line thus are arranged in series to act successively and continuously on a supply of loose cotton initially fed to the bale breaker and to deliver that cotton in an opened condition to the feed table 6. All of
these machines are well known in the industry. Usually the cotton is taken from the bales by hand and thrown upon the feed lattices of the bale breakers 2, and the proportions of the different grades of fiber which go into the final product are determined at this point.

The feed table 6 conveys the cotton in the direction indicated by the arrow in Fig. 4 to the intake end of a wind trunk 7 leading to a condenser 8. The fan 10 for this condenser and its delivery rolls may be driven by suitable connections with an electric motor 12. This condenser discharges its cotton out to the upper surface of a horizontal conveyor belt 13 of a Morton distributor which distributes the cotton to a series of hopper feeders 14. This distributor includes the usual gate arrangement controlled by feeler forks in the individual hoppers, as is well understood by those skilled in this art. Each hopper feeder also includes the usual lattice feeding arrangement. Consequently, in these feeders the cotton is so distributed and worked by the feeding mechanism that a highly effective action is produced in them. Such a cotton feeding action is further improved by causing all of the hoppers to discharge or feed on to a second horizontal feed table 15 which conveys the cotton to the intake end of another wind trunk 16 leading to a second condenser 17.

The cotton is now suitably opened, blended and prepared for delivery to the picking systems. Several such systems, in this instance three, indicated, respectively, at C, D and E, are arranged parallel, and cotton is fed to them by a distributor 18 to which cotton is delivered by the condenser 11. Because of considerations of simplicity and economy, a rake distributor preferably is employed, such an apparatus including a channel or trough for conducting the cotton and a series of rakes connected together in an endless belt and which are dragged successively through the trough and consequently carry the loose cotton with them. At the points where the cotton is to be discharged a hole is formed from the bottom of the trough and it simply drops through this hole into some suitable receptacle. This type of distributor is well known so that no detailed description of it is required. Some of the rakes of this distributor shown at 18 are illustrated in Figs. 1 and 2 at 24. The picker system illustrated in Figs. 1 and 2 is unique in its general organization and in its extreme simplicity. It may be regarded as consisting of two sections, one, commonly termed the "breaker section" lying at the right of the line in Fig. 2, and the other, usually termed the "finisher section", being located at the left of said line.

Considering the breaker section first, it will be observed that it includes a beater 21 and a condenser 22, these two units being of common type and cooperating in the usual manner. Associated with the beater is a feeding mechanism which comprises an approximately upright chute 23, the upper end of which opens directly into the trough of the rake conveyor so that cotton can flow freely from the latter under normal operating conditions the chute will constantly be kept full of loose cotton. This body of cotton is supported on two fluted feed rolls 24 and 25 revolving in opposite directions and mounted in the bottom of the chute. They thus cooperate with each other to feed a web of cotton downwardly out of the chute. Another fluted roll 26 driven in the direction indicated by the arrow in Fig. 2 acts on this web to guide it toward the feed rolls 27 of the beater 21, the blades of the beater picking the cotton directly from the rolls.

We have found that if the cotton is well opened a chute feeding mechanism of the character just described will deliver cotton with a high degree of uniformity. This beater 21, condensed in the screen section 22, and fed from the condenser by the usual delivery rolls 28 into the finisher section.

The latter section comprises a beater 30 and a condenser 31 connected therewith in the usual manner and to the upper surface of a horizontal conveyor belt 32 of a Morton distributer which distributes the cotton to a series of hopper feeders 33. This distributor includes the usual gate arrangement controlled by feeler forks in the individual hoppers, as is well understood by those skilled in this art. Each hopper feeder also includes the usual lattice feeding arrangement. Consequently, in these feeders the cotton is so distributed and worked by the feeding mechanism that a highly effective action is produced in them. Such a cotton feeding action is further improved by causing all of the hoppers to discharge or feed on to a second horizontal feed table 34 which conveys the cotton to the intake end of another wind trunk 35 leading to a second condenser 36.

The cotton is now suitably opened, blended and prepared for delivery to the picking systems. Several such systems, in this instance three, indicated, respectively, at C, D and E, are arranged parallel, and cotton is fed to them by a distributor 37 to which cotton is delivered by the condenser 32. Because of considerations of simplicity and economy, a rake distributor preferably is employed, such an apparatus including a channel or trough for conducting the cotton and a series of rakes connected together in an endless belt and which are dragged successively through the trough and consequently carry the loose cotton with them. At the points where the cotton is to be discharged a hole is formed from the bottom of the trough and it simply drops through this hole into some suitable receptacle. This type of distributor is well known so that no detailed description of it is required. Some of the rakes of this distributor shown at 37 are illustrated in Figs. 1 and 2 at 24. The picker system illustrated in Figs. 1 and 2 is unique in its general organization and in its extreme simplicity. It may be regarded as consisting of two sections, one, commonly termed the "breaker section" lying at the right of the line in Fig. 3, and the other, usually termed the "finisher section", being located at the left of said line.

Considering the breaker section first, it will be observed that it includes a beater 38 and a condenser 39, these two units being of common type and cooperating in the usual manner. Associated with the beater is a feeding mechanism which comprises an approximately upright chute 40, the upper end of which opens directly into the trough of the rake conveyor so that cotton can flow freely from the latter under normal operating conditions the chute will constantly be kept full of loose cotton. This body of cotton is supported on two fluted feed rolls 41 and 42 revolving in opposite directions and mounted in the bottom of the chute. They thus cooperate with each other to feed a web of cotton downwardly out of the chute. Another fluted roll 43 driven in the direction indicated by the arrow in Fig. 3 acts on this web to guide it toward the feed rolls 44 of the beater 45, the blades of the beater picking the cotton directly from the rolls.

We have found that if the cotton is well opened a chute feeding mechanism of the character just described will deliver cotton with a high degree of uniformity. This beater 45, condensed in the screen section 46, and fed from the condenser by the usual delivery rolls 47 into the finisher section.

The latter section comprises a beater 50 and a condenser 51 connected therewith in the usual manner and to the upper surface of a horizontal conveyor belt 52 of a Morton distributer which distributes the cotton to a series of hopper feeders 53. This distributor includes the usual gate arrangement controlled by feeler forks in the individual hoppers, as is well understood by those skilled in this art. Each hopper feeder also includes the usual lattice feeding arrangement. Consequently, in these feeders the cotton is so distributed and worked by the feeding mechanism that a highly effective action is produced in them. Such a cotton feeding action is further improved by causing all of the hoppers to discharge or feed on to a second horizontal feed table 54 which conveys the cotton to the intake end of another wind trunk 55 leading to a second condenser 56.

The cotton is now suitably opened, blended and prepared for delivery to the picking systems. Several such systems, in this instance three, indicated, respectively, at C, D and E, are arranged parallel, and cotton is fed to them by a distributor 57 to which cotton is delivered by the condenser 56. Because of considerations of simplicity and economy, a rake distributor preferably is employed, such an apparatus including a channel or trough for conducting the cotton and a series of rakes connected together in an endless belt and which are dragged successively through the trough and consequently carry the loose cotton with them. At the points where the cotton is to be discharged a hole is formed from the bottom of the trough and it simply drops through this hole into some suitable receptacle. This type of distributor is well known so that no detailed description of it is required. Some of the rakes of this distributor shown at 57 are illustrated in Figs. 1 and 2 at 24. The picker system illustrated in Figs. 1 and 2 is unique in its general organization and in its extreme simplicity. It may be regarded as consisting of two sections, one, commonly termed the "breaker section" lying at the right of the line in Fig. 4, and the other, usually termed the "finisher section", being located at the left of said line.

Considering the breaker section first, it will be observed that it includes a beater 58 and a condenser 59, these two units being of common type and cooperating in the usual manner. Associated with the beater is a feeding mechanism which comprises an approximately upright chute 60, the upper end of which opens directly into the trough of the rake conveyor so that cotton can flow freely from the latter under normal operating conditions the chute will constantly be kept full of loose cotton. This body of cotton is supported on two fluted feed rolls 61 and 62 revolving in opposite directions and mounted in the bottom of the chute. They thus cooperate with each other to feed a web of cotton downwardly out of the chute. Another fluted roll 63 driven in the direction indicated by the arrow in Fig. 4 acts on this web to guide it toward the feed rolls 64 of the beater 65, the blades of the beater picking the cotton directly from the rolls.
is also connected in the usual manner with the other elements of the finisher section, and the upper or driven cone of this evener is positively connected with the cone roll 42 so that the speed of these rolls varies inversely with changes in the thickness of the web of cotton passing between the pedals 43 and the feed roll 44. As indicated in Fig. 1 the shaft of the upper cone of the evener is geared directly to the shaft of the feed roll 44 in the usual manner. The feed roll is chain connected with the shaft of one of the two feed rolls 41 which are geared together and the other of the latter feed rolls is chain connected to the shaft of the roll 42.

The driving connections for the usual elements of the breaker section are similar to those commonly used heretofore, the breaker shaft 50 being driven continuously from a motor or some other convenient source of power, and the other elements of this section deriving their power from this shaft. The connections between this shaft and the delivery rolls 28 of the screen section on condenser 22 are like those commonly used heretofore. For the purpose of driving the vertical conveyor belts 38 and 39 the shaft of the lower roll for the belt 38 has a sprocket and chain connection, indicated at 131, with the lower roll of the delivery rolls 28. The shaft of the upper roll 51 for this belt is connected by the chain 53 with the shaft of one of the feed rolls 35 and the shafts of these two rolls are geared together and that of the other roll 35 is connected by the chain 54 with the shaft of the upper belt pulley or roll 62. All of these elements, therefore, are driven at a substantially constant speed.

The driving mechanism for the feed rolls 24 and 55 includes a chain 55 driven from the usual side shaft 56 and driving the shaft of the roll 24. The two feed rolls are geared together and chain connections between the latter roll and the fluted roll 26 and the lower feed roll 27 drive these rolls.

It will be observed that in this picker system as shown in Figs. 1 and 2, the breaker section and the finisher section are driven entirely independently of each other. This is quite contrary to any arrangement heretofore used successfully in a single process picker system which has proceeded commercially. We have found, however, that by preparing the cotton in the manner above described and delivering it to the chute 33 in a well opened and fluffy condition, the feed rolls 41 will deliver a web having a high degree of evenness, providing a substantially constant quantity of cotton is maintained in the chute. If, in addition, the web delivered by the feed rolls 41 is fed through an evener, as shown, and this evener is arranged to control the speed of the feed rolls, then an exceptionally high degree of screen uniformity in the sheet produced in the calender can be realized.

It is extremely important, however, to maintain the quantity of cotton in the chute 33 at substantially a constant level. For this reason and because of the very fluffy nature in which the cotton should be maintained at this point, an exceptionally delicate mechanism must be provided to control the level of the cotton in the chute 33. As shown, this mechanism comprises a feeder fork 66 mounted in the upper part of the chute 33 and secured rigidly on a shaft 68 which is supported in roller or ball bearings. An arm 61 also secured to this shaft tends to swing the feeder 58 forward, or toward the right, Figs. 1 and 2. Consequently, this feeder is responsive to very small variations in the quantity of cotton in the upper part of the chute. Fastened adjustably to the end of this shaft is an arm 62 equipped with a pointer 63 which cooperates with a graduated sector or scale on the eye of the feed roll 44 secured rigidly to the shaft 50 and the lower end of this arm is connected by a link 65, Fig. 1, with a tilting mercury switch 66. This switch operates an electro-magnetic control which either starts and stops the breaker section of the picker system, or adjusts the speed of one of the break sections, as may be desired. The particular arrangement illustrated in Figs. 1 and 3 operates on the start and stop principle. It comprises a belt shifter 67 normally held in its running position, as shown in Fig. 3, by means of a solenoid or electro-magnet 68 and controlling the position of the belt 69 through which all of the feeding instrumentality in the breaker section are driven from the breaker shaft 50. Normally the switch 66 is closed and the solenoid is energized, but when this switch is opened it energizes the electromagnet 68, Figs. 1 and 3, whereupon the weight of the solenoid plunger operates to throw the belt shifter 67 into its dotted line position, Fig. 3, and thereby shifts the belt 69 on to a loose pulley on the shaft 71 and thus stops all of the cotton feeding instrumentality in the breaker section. In other words, it stops everything except the beater 50 and the fan or blower 72 for the screen section 22. This opening movement of the switch occurs when the level of the cotton in the chute 33 rises sufficiently to force the feeder fork or rake 58 toward the left, Figs. 1 and 2. Shortly after this action occurs the level of cotton in the chute will drop sufficiently to enable the weighted arm 61 to swing the rake or feeder back toward the right again, whereupon the switch 66 will be closed, the solenoid or electro-magnet 68 will be energized, and will shift the belt 69 back to the fast pulley again and cause the breaker to resume its normal cotton feeding operations. This belt shifting movement of the plunger can be assisted by a spring if desired. Consequently, the variations in the quantity of cotton in the chute 33 will be maintained within very narrow limits. Preferably the beater 34 is so positioned with reference to the rake 58 as to direct the incoming cotton against it. This arrangement appears to respond quickly to minor changes in the supply in the level of cotton in the chute. It may here be pointed out that a chute feeding mechanism is a very different mechanism from a hopper feeder, and the latter cannot be substituted for the former in this system without losing very important advantages of this invention.

In order to enable the attendant to adjust the level at which the cotton will be maintained the hub of the pointer arm 62 is releasibly secured to the shaft 60 by means of a set screw 78, Fig. 6. When such a change is desirable, therefore, it is simply necessary for the operator to loosen the set screw and then to rotate the flanged hub 64 and the rake to the desired position, the arm 62 remaining stationary during this operation, and then to tighten up the set screw. This changes the relationship between the position of the rake and that of the arm 62 and the switch 66. Considerable adjustment in the weight of the web delivered by the feed rolls 41 can be obtained in this manner. A further variation in the weight of this web can be produced by adjusting the cross-sectional dimensions of the chute 33. For this purpose the
rear wall 33', Fig. 2, of this chute preferably is made adjustable toward and from the front wall. The former is made in a U-shape with flanges extending backwardly, and these flanges are slot
ted to receive bolts 14—14 for securing the part 26 in its adjusted position, the bolts projecting
through the outer or main walls of the enclosure
in which the cotton containing space or chamber
is located. A plate 75, Fig. 2, hinged at its upper
end adjacent to the end of the grid 38 so as to
swing freely following the movements of the plate
32', during its adjustment and always rests
against the upper edge of this plate. With this
arrangement a very considerable variation in the
weight of cotton contained in the chute can be
made and such adjustment is valuable in con-
trolling the weight of the lap that will be pro-
duced.

For example, we have found it possible simply
by adjusting the rake, as above described, to ob-
tain laps at any desired weight between ten
ounces and sixteen ounces to the running yard
without making any change in gearing. A fur-
ther adjustment of this weight can be obtained
by changing the position of the plate 33', as
above described. This feeding arrangement also
enables us to use a draft of four to one between
the rear wall and the calender in all weights of
lap from ten to sixteen which has never been
possible heretofore, so far as we have been able
to learn, in any picker system to which loose
cotton is fed. This feature is of great practical
importance since it enables the user to increase the
beats per inch to which the cotton is subjected
and thus to effect a better cleaning and a su-
perior preparation of the cotton for carding.

In controlling the yard for yard variations in
the weight of the lap the sensitivity of the feeler
fork or rake and the control which thus is af-
forded over the quantity of cotton maintained
in the chute are important factors. The fact
that the rake is delicately mounted and that it
is required simply to operate a very sensitive
switch, contributes greatly to this result.

As above stated, the chute 23 of the feeding
mechanism for the beater 21 of the breaker sec-
tion is normally maintained full of cotton. It
may happen, however, that some accident in the
picking system will result in this chute becom-
ing empty, and it is desirable under such circum-
stances to prevent the cotton from running out.
An additional automatic control, therefore, is
provided for this purpose. It consists in mount-
ing the feed roll 28 on links, one of which is shown
at 76 in Fig. 1, so that it can swing toward and
from its companion roll 24, both of these links
being pivoted on the shaft of the feed roll 28 and
at least one of them being extended below this
shaft. A spring 77 acts on this extension in a di-
rection to press the roll 25 normally toward the
other roll 24. A handle 78 also is connected to
this extension so that the roll 25 can be manu-
ally moved, when desired. Normally the rolls
are separated by a distance equivalent to the
thickness of the web of cotton being fed through
them, but if the supply of cotton in the chute
should become depleted and the web should run
out from between these rolls, the roller 28 would
immediately be moved toward the left, Fig. 1, and
the movement will be transmitted through a link
80 to a second, normally closed, mercury switch
81, Figs. 1 and 3. This switch is in series with
the switch 66 so that when this occurs it will op-
erate through the connections above described
to shut down the breaker section. A second elec-
tro-magnet 82, Figs. 1 and 3, is connected in par-
allel with the electro-magnets 68, and operates a
belt shifter 83 that controls the belt 84 through
which all of the cotton feeding mechanism of the
finisher section is driven. When this belt is shifted
on to the loose pulley by the de-energization of the electro-magnet 82, it
shuts down all of the cotton feeding units of the
finisher section. In other words, the operation of the switch 81 in the manner just described will
shut down the cotton feeding units of the entire
picker system and leaves simply the beaters and
blowers running. In this connection it may be
pointed out that while the conveyor belts 38 and
39 are driven from the breaker section, they are
not, strictly speaking, a part of either the breaker
or finisher section but are feeding units which
carry cotton from one section to the other.

When the finisher section knocks off at the
completion of a lap, all of the cotton feeding
mechanisms in it are stopped, as in any finisher
picker, but this does not affect the operation of the breaker section being controlled solely by the switches 66 and 81, as just described.

It is desirable to control the operation of the
supply system which prepares the cotton for pick-
ing in the beater 21 of the breaker section of the
picking systems so that all the cotton which
they take will be supplied at practically all times,
but the delivery of an oversupply will be pre-
vented. This is conveniently accomplished by
pivotally mounting a feeler fork or rake 86, Fig. 2,
in the upper part of each chute 23 and connecting
it with a weighted arm 87 which urges it in-
wardly. Normally the weight of cotton in this
chute will hold the rake against the wall of the
chute. An arm 86 secured on the shaft of the
rake outside the chute is connected by a link 80
with a mercury switch 81 in such a manner that
this switch is held open so long as an ample sup-
ply of cotton is maintained in the chute. If this
supply becomes depleted, however, the feeler fork
then will move inwardly and this movement will
result in closing the mercury switch 81. In Figs.
1 and 2 the rake 86 and switch 81 are shown in
intermediate positions between those which
they take when the chute is either empty or com-
pletely full. As shown in Fig. 4, all of these
switches are connected in parallel with an elec-
tro-magnetic master switch 82 of a well known
commercial type. Consequently, so long as any
switch remains closed current will be maintained
on the closing magnet of the master switch, but
when all of the chutes are full and the cotton
picking systems therefore can take no more cot-
ton, all of the switches 81 will be opened, thus re-
leasing the electro-magnet of the master switch
82, whereupon this switch will automatically
open. As shown in Fig. 4 this switch connects 12
of the motors 93, 94, 95 and 12 which drive the
various units of the cotton supplying system, so
that when the switch 82 opens, all of these motors
will be shut down and the operation of the cot-
ton supplying units will be stopped. They will
be started up again automatically, however, as
soon as any picker system calls for more cot-
ton, such a call being initiated by the inward
movement of any feeler fork 86 and the conse-
quently closing of the mercury switch 81 which it con-
trols.

In some systems, due to local conditions, it is
desirable not to have the motors 82 and 83 which
operate the blowers for the condensers 8 and 17.
shut down, and these motors need not be placed under the control of the master switch 92.

As above stated, it is entirely feasible to utilize the control arm 110, Fig. 6, on the 95 to vary the speed of the various units which feed cotton into the chute 33. A number of different arrangements can be made suitable for this purpose and one such arrangement is illustrated in Fig. 6. Here the feeder fork 58 is connected through a link 57 to the speed controlling lever 95 of a variable speed electric motor 100. This motor is belt connected to the shaft 71 of the breaker unit and operates through connections similar to those shown in Fig. 1 for driving all of the feed units between the chutes 23 and 33. Consequently, when the quantity of cotton in the chute 33 increases beyond a predetermined value, it operates through the connections just described to reduce the speed of the motor 100 and consequently, to cause all of the feeding elements between the chutes 23 and 33 to operate at a reduced speed. On the other hand, when the feeder fork 58 says that the quantity of cotton in the chute 33 is too small, it operates through the same connections to speed up the rate of delivery of the cotton to the breaker unit. Figs. 9 and 10 show similar connections for enabling the feeder fork 58 to adjust the belt of a variable speed drive including upper and lower cones 101 and 102, respectively, Fig. 10. Here the link 57 is connected through a bell crank lever 105 with the belt shifter 104 and serves to adjust the belt shifting device, as required, to increase or decrease the speed of the driven shaft. In the arrangement shown this is the lower shaft 105 which is belt connected to the shaft 71, the upper shaft 105 of the variable speed motor 100 and is driven at a constant speed from the beater shaft 50.

When a variable speed drive is used, as in the arrangement shown in Figs. 8, 9 and 10, it is desirable to shut down the breaker unit as well as the feeding elements when the machine knocks off. As shown in Fig. 1, the drop arm 102 is connected through a link 108 and an upright rock shaft 109 to the clutch (not shown) through which the upper cone of the conveyer 47 drives the feeding units between the chute 33 and the breaker unit. Fig. 6. Fig. 8 shows how the rock shaft 109 is connected through a link 112 to a belt shifter 113 which controls the driving belt between the motor 100 and the shaft 71 and serves to shift this belt onto a loose pulley on the shaft 71 when the machine knocks off. The same connections shift the belt in the reverse direction when the drop bar is raised to start the machine into operation again. Essentially the same arrangement is utilized in the construction illustrated in Figs. 9 and 10.

It may be pointed out that in many installations it will be desirable to run the rake distributor continuously so long as the system is in operation, or, in other words, not to shut down this distributor when the operation of the opening system is stopped because of the fact that all of the chutes are full called to the fact that the bang is constant, therefore, are fully supplied. This result may be realized simply by making the control of the motor which drives the distributor independent of the feelers 86 and the switches 91 operating therein, therefore, being run continuously. Attention is also given to the fact that it is not necessary to equip all of the chutes 23 with the feelers 86 and the switches 91 operated by them. That is, those chutes nearer the supply end of the distributor will be kept full of cotton continuously since they have the first pull on any supply of cotton, delivered by the distributor. The only chutes liable to be inadequately supplied are those at the opposite end of the distributor, or, in other words, those remote from the supply end. Consequently, if five or six chutes, or any substantial number, are supplied from a single director 97, it is desirable to save by equipping only, say, the last one or two chutes in the series with feelers 86 and switches 91, or some equivalent controlling apparatus. It is desirable to have at least two chutes at the end of the series equipped with feelers and switches so that the control afforded by one switch will be present in the system in the event that the picker unit associated with the other is stopped, either due to the unit being knocked off, or shut down for any other reason.

In some installations it will also be found desirable instead of stopping the operation of the bale breaker and other cotton supplying units, to reduce their speed when the requirements of the chutes 23 have been supplied, and to increase the speed again automatically when the chutes call for additional cotton. In a system of this design this can be done simply by using two speed electric motors to drive the various units and controlling them through a suitable switch 92, as will be readily understood by those skilled in this art. In other cases it will be necessary to include in the circuit controlled by the switches 91 any two magnetically operated device for shifting a belt from a high speed to a low speed pulley, or for adjusting a variable speed motor, or other type of variable speed drive, such, for example, as that shown in Figs. 9 and 10.

In any of these arrangements, whether they shut down the opening units or merely reduce their speed in response to the requirements of the chutes, it is necessary to take care of the surplus cotton in transit, especially that in the distributor 18. This can be done in the manner illustrated in Figs. 11 and 12 by employing one of the upper run of the distributor rakes 25 in a suitable inverted trough or casing 116 so that the surplus cotton not delivered to the chutes will simply by carried around by the rakes continuously until it drops into one or more of the chutes. A plate 117 underlies the upper run of the rakes and supports the cotton while the latter is dragged along by the rakes and this is returned to the supply end of the distributor.

While we have herein shown and described a single process picker system which has proved to be highly satisfactory, it will be understood that the invention may be embodied in a considerable variety of other forms without departing from the spirit or scope thereof. Also, that features of the invention may be used in conjunction with other forms of apparatus, for example, it is desirable for some purposes to introduce another unit including a beater and a condenser between the breaker section and the chutes 38, the condenser of the section so introduced delivering its output to the belts 38 and 39 exactly as does the breaker section shown in Figs. 1 and 2. In fact, the details of any installation embodying the invention necessarily will vary with the local conditions under which the installation is to be operated.

Having thus described our invention, what we desire to claim as new is:

1. In a cotton picking system, the combination...
of a plurality of picking units arranged in series for operation successively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, a chute feeding mechanism associated with each of said beaters for feeding cotton to them, and means for continuously feeding the stream of cotton discharged by one of said units in a continuous and unbroken condition to said chute feeding mechanism for the next succeeding unit, the latter chute feeding mechanism including means for picking the cotton in said stream and delivering it to its respective chute in a light and fluffy condition.

2. A cotton picking system according to preceding claim 1 in combination with means responsive to variations in the quantity of cotton in the upper part of the feeding chute for the final unit for controlling the delivery of cotton thereto from a preceding picker unit in such a manner as to maintain a substantially constant quantity of cotton in the latter chute.

3. In a cotton picking system, the combination of an approximately upright chute, a distributor for feeding loose cotton into the upper end of said chute, feed rolls at the bottom of said chute on which the body of cotton in the chute is supported, a cotton picker located adjacent to the bottom of said chute, mechanism for driving said chute feed rolls to cause them to feed cotton through the bottom of said chute toward said picker, a feeder in said chute responsive to variations in the quantity of cotton in the chute, driving mechanism for said distributor, and means including said feeder for controlling the operation of said driving mechanism.

4. In a cotton picking system, the combination of an approximately upright chute, a distributor for feeding loose cotton into the upper end of said chute, feed rolls at the bottom of said chute on which the body of cotton in the chute is supported, a cotton picker located adjacent to the bottom of said chute, mechanism for driving said chute feed rolls to cause them to feed cotton through the bottom of said chute toward said picker, a feeder in said chute responsive to variations in the quantity of cotton in the chute, driving mechanism for said distributor, and means including said feeder for controlling the operation of said driving mechanism.

5. In a cotton picking system, the combination of a plurality of picker units arranged in series for operating successively on a stream of cotton, each of said units including a beater and a condenser, a chute located between said units and discharging the cotton therefrom to the next succeeding unit of the system, and controlling means cooperating with said first mentioned mechanism to automatically maintain a substantially constant quantity of cotton in said chute.

6. In a cotton picking system, the combination of a plurality of picker units arranged in series for operating successively on a stream of cotton, each of said units including a beater and a condenser, a chute located between said units, mechanism for delivering to the upper part of said chute a continuous web of cotton received directly from and discharged by the first unit, a beater in the upper part of said chute for picking the cotton so delivered and discharging the cotton so acted upon into the chute where it will fall down through the chute by gravity, and means for actuating said chute for feeding the cotton therefrom to the next succeeding unit of the system.

7. In a cotton picking system, the combination of a picker unit, an approximately upright chute, a beater located at the upper end of said chute, means including a plurality of upwardly extending belts for gripping between them the web of cotton discharged by said unit and feeding it to said beater in position to enable the beater to pick the web, and to discharge the picked cotton directly into said chute where it will fall down through the chute by gravity, feeding means at the bottom of said chute on which the body of cotton in the chute is supported, mechanism for driving said feeding means to cause it to feed a web of cotton from said chute, a second cotton picker, and mechanism for conveying the latter web of cotton to the latter picker.

8. In a cotton picking system, the combination of a picker unit, an approximately upright chute, means for delivering to the upper part of said chute a continuous web of cotton received directly from and discharged by said picker unit, mechanism for feeding the cotton through the bottom of said chute, a beater located at the upper end of said chute in position to pick the cotton delivered thereto by said means, a rock- ing feeder fork mounted in the upper part of said chute to engage the cotton in said upper portion of the chute, said beater being arranged to discharge the cotton therefrom directly toward said fork, and means under the control of said fork for governing the operation of said cotton delivering means.

9. In a cotton picking system, the combination of a picker unit, an approximately upright chute, means for delivering to the upper part of said chute a continuous web of cotton received directly from and discharged by said picker unit, mechanism for feeding the cotton through the bottom of said chute, a beater located at the upper end of said chute in position to pick the cotton delivered thereto by said means, a feeder fork in engagement with the cotton in the upper part of said chute and responsive automatically to variations in the quantity of cotton in said upper portion of the chute, driving mechanism for said cotton delivering means, and means for causing said fork to regulate, in accordance with variations in the quantity of cotton in said chute, the speed at which said driving mechanism will operate said cotton delivery means.

10. In a cotton picking system, the combination of a plurality of picking units arranged in series for operating successively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, a chute feeding mechanism associated with each of said beaters for feeding cotton to them, and means for continuously feeding the stream of cotton discharged by one of said units in a continuous and unbroken condition to said chute feeding mechanism for the next succeeding unit, the latter chute feeding mechanism including means for picking the cotton in said stream and delivering it to its respective chute in a light and fluffy condition.

11. In a cotton picking system, the combination of a breaker picking unit and a finisher picker unit arranged in series for operating suc-
cessively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, mechanism for feeding the cotton from the first of said units into the second of said units, and means, including a motor and mechanism for shutting down said system, automatically when the supply of cotton in the first unit becomes depleted and before the cotton runs out of said first unit.

12. In a cotton picking system, the combination of a plurality of cotton pickers, a plurality of approximately upright chutes associated with the respective pickers, one for each picker, a rack distributor for feeding loose cotton continuously into the upper ends of said chutes, means for driving said rack distributor to cause each of the said chutes to receive cotton from the rack distributor, means for feeding the cotton to each chute, means for controlling the operation of said feeding means, a plurality of approximately upright chutes associated with the respective pickers, one for each picker, a distributor for feeding loose cotton continuously into the upper ends of said chutes, feeding means at the bottom of each chute on which the body of cotton in the chute rests, mechanism for driving said feed rolls to cause each of them to feed the cotton thorough the bottom of its respective chute, said feed rolls including a beater, and means for reducing the rate of operation of said feeding means approximately as soon as all of said chutes are filled.

15. In a cotton picking system, the combination of a plurality of cotton pickers, each provided with feeding means, a plurality of approximately upright chutes associated with the respective pickers, one for each picker, a distributor for feeding loose cotton continuously into the upper ends of said chutes, feeding means at the bottom of each chute, means for driving said distributor to cause each of said chutes to receive cotton from said distributor, and means for controlling the operation of said feeding means, a plurality of approximately upright chutes associated with the respective pickers, one for each picker, a rack distributor for feeding loose cotton continuously into the upper ends of said chutes, means for driving said rack distributor, means for feeding the cotton to each chute, means for controlling the operation of said feeding means, and electrical apparatus controlled by said switch for controlling the operation of said cotton supplying means.

16. In a cotton picking system, the combination of an approximately upright chute, means for feeding a continuous web of cotton to the upper part of said chute, mechanism for feeding cotton through the bottom of said chute, a beater mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means and to discharge the cotton so picked into the chute where it will fall down through the chute by gravity, a rockinger felt mounted in the upper part of said chute to engage the cotton in said upper portion of the chute, an electric switch arranged to be operated by said means under the control of said switch for governing the operation of said cotton delivering means.

17. In a cotton picking system, the combination of an approximately upright chute, means for delivering a continuous web of cotton to the upper part of said chute, a beater mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means and to discharge the cotton so picked into the chute where it will fall down through the chute by gravity, one wall of said chute being adjustable to vary the horizontal cross-sectional dimensions of the chute, and means at the bottom of said chute for supporting the cotton therein and feeding the cotton through the bottom of the chute.

18. In a cotton picking system, the combination of an approximately upright chute, means for delivering a continuous web of cotton to the upper part of said chute, a beater mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means and to discharge the cotton so picked into the chute where it will fall down through the chute by gravity, said means including rolls for feeding the cotton to said beater and from which said beater picks the cotton, a grid placed around which the cotton is thrown by said beater, parts providing a dead air space immediately below said grid, and means at the bottom of said chute for supporting the cotton therein and feeding the cotton through the bottom of the chute.

19. In a cotton picking system, the combination of an approximately upright chute, means for delivering cotton to the upper part of said chute, a beater mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means and to discharge the cotton so picked into the chute where it will fall down through the chute by gravity, said means including rolls for feeding the cotton to said beater and from which said beater picks the cotton, a grid placed around which the cotton is thrown by said beater, parts providing a dead air space immediately below said grid, and means at the bottom of said chute for supporting the cotton therein and feeding the cotton through the bottom of the chute.
down through the chute by gravity, means supporting one wall of said chute for lateral adjustment to vary the cross-sectional dimensions of the chute, a hinged plate 15 cooperating with said wall to guide the cotton over the upper edge of the wall, and a feeder in the upper part of said chute opposite to said plate and mounted for swinging movement in response to variations in the height of the cotton in the chute.

20. In a cotton picking system, the combination with a breaker picking unit and a finisher picking unit arranged in series for operating successively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, of a chute feeding mechanism located between said units, means for feeding a continuous web of cotton from the breaker unit to said mechanism, said mechanism including feed rolls and a beater for picking the cotton from said rolls, said beater and said rolls being located at the upper part of the chute of said feeding mechanism where the cotton so picked will fall down into the chute by gravity, said chute feeding mechanism including feed rolls at the bottom of said chute for feeding the cotton so picked out of the bottom of the chute, and means cooperating with the last mentioned feed rolls for feeding the cotton to the beater of said finisher unit.

21. In a cotton picking system, the combination with a breaker picking unit and a finisher picker unit arranged in series for operating successively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, of a chute feeding mechanism located between said units, means for continuously feeding the web of cotton delivered by the breaker unit to said mechanism in a continuous and unbroken condition, said mechanism including rolls for feeding said web and a beater for picking the cotton from said rolls, said beater and said rolls being located at the upper part of the chute of said feeding mechanism where the cotton so picked will fall down into the chute by gravity, said chute feeding mechanism including feed rolls at the bottom of said chute for feeding the cotton so picked out of the bottom of the chute, and an evener mechanism for feeding the cotton so delivered to the beater of said finisher unit, said last mentioned feed rolls being under the control of said evener mechanism.

22. In a cotton picking system, the combination with a breaker picking unit and a finisher picking unit arranged in series for operating successively on a stream of cotton to work it into the form of a wound lap, each of said units including a beater and a condenser, of a chute feeding mechanism located between said units, means for continuously feeding the web of cotton delivered by the breaker unit to said mechanism in a continuous and unbroken condition, said chute feeding mechanism including rolls for feeding said web and a beater for picking the cotton from said rolls, said beater and said rolls being located at the upper part of the chute of said feeding mechanism where the cotton so picked will fall down into the chute by gravity, said chute feeding mechanism including feed rolls at the bottom of said chute for feeding the cotton so picked out of the bottom of the chute, and means cooperating with the last mentioned feed rolls for feeding the cotton to the beater of said finisher unit, and a feeder in the upper part of said chute where it is responsive to variations in the quantity of cotton in said upper part of the chute, said feeding means for feeding the cotton to the chute being under the control of said feeder.

23. In a cotton picking system, the combination of an approximately upright chute, a beater mounted at the upper part of said chute, means for delivering a continuous web of cotton to said beater, said means including feed rolls from which the beater picks the cotton and discharges the picked cotton directly into the upper part of said chute where it falls down through said chute by gravity, feed rolls at the bottom of said chute on which the greater part of the weight of the cotton in the chute is supported, said rolls serving to feed the cotton through the bottom of the chute, a feeder fork in engagement with the cotton in the upper part of said chute and responsive automatically to variations in the quantity of cotton in said upper portion of the chute, driving mechanism for said cotton delivering means, and means under the control of said fork for controlling the operation of said driving mechanism.

24. In a cotton picking system, the combination of a plurality of cotton pickers, a plurality of approximately upright chutes associated with the respective pickers, one for each picker, a distributor for feeding loose cotton into the upper ends of said chutes and serving to maintain said chutes approximately filled with cotton substantially continuously, feeding means at the bottom of each chute, feeding means for each picker, said latter feeding means arranged adjacent said first feeding means, and mechanism for driving both feeding means to cause them to feed the cotton from the chute in a continuous unbroken stream to the beater of its respective picker.