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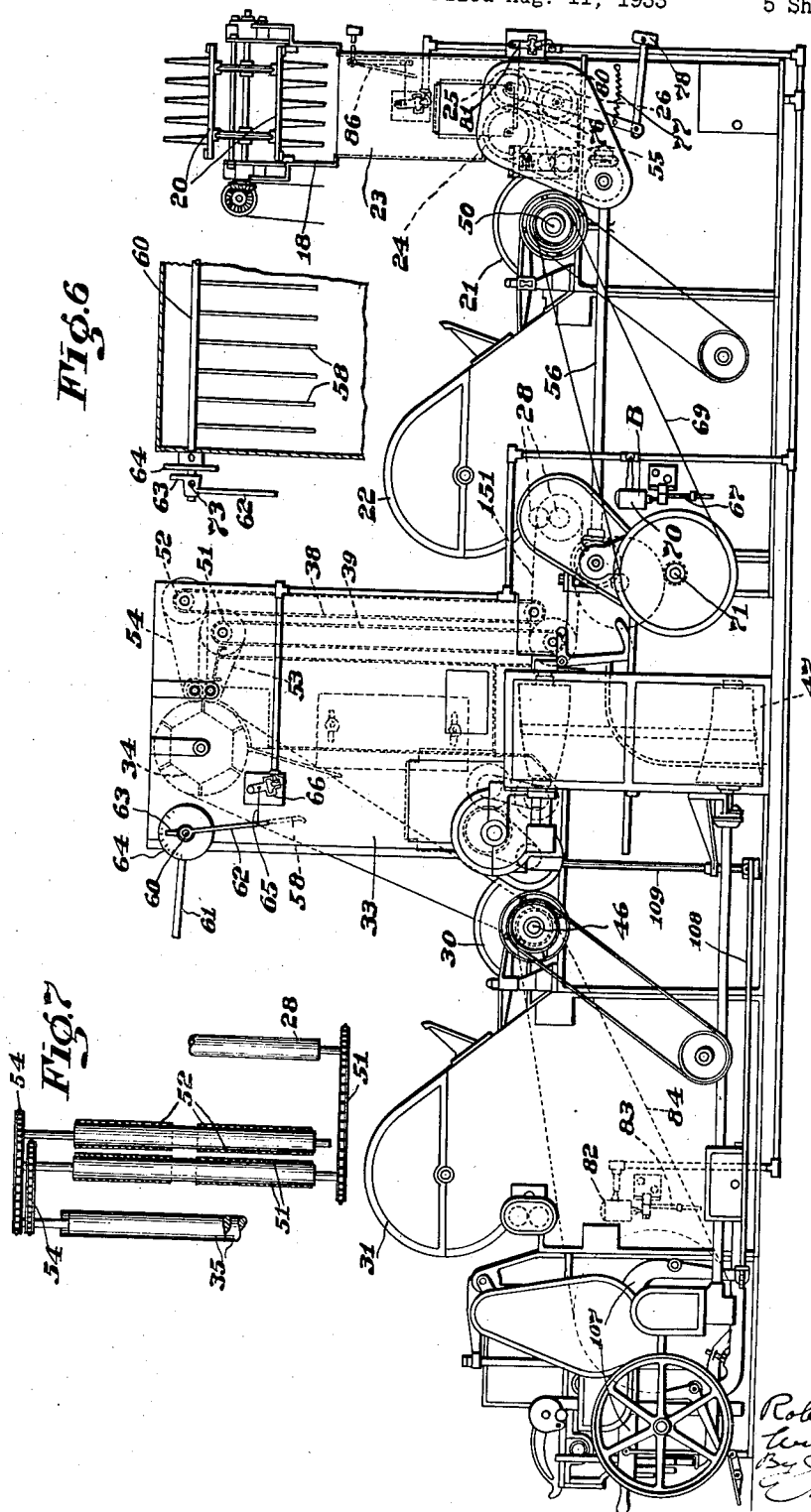
R. S. CURLEY ET AL

2,057,641

SINGLE PROCESS PICKER SYSTEM

Filed Aug. 11, 1933

5 Sheets-Sheet 1



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2,057,641

SINGLE PROCESS PICKER SYSTEM

Filed Aug. 11, 1933

5 Sheets-Sheet 2

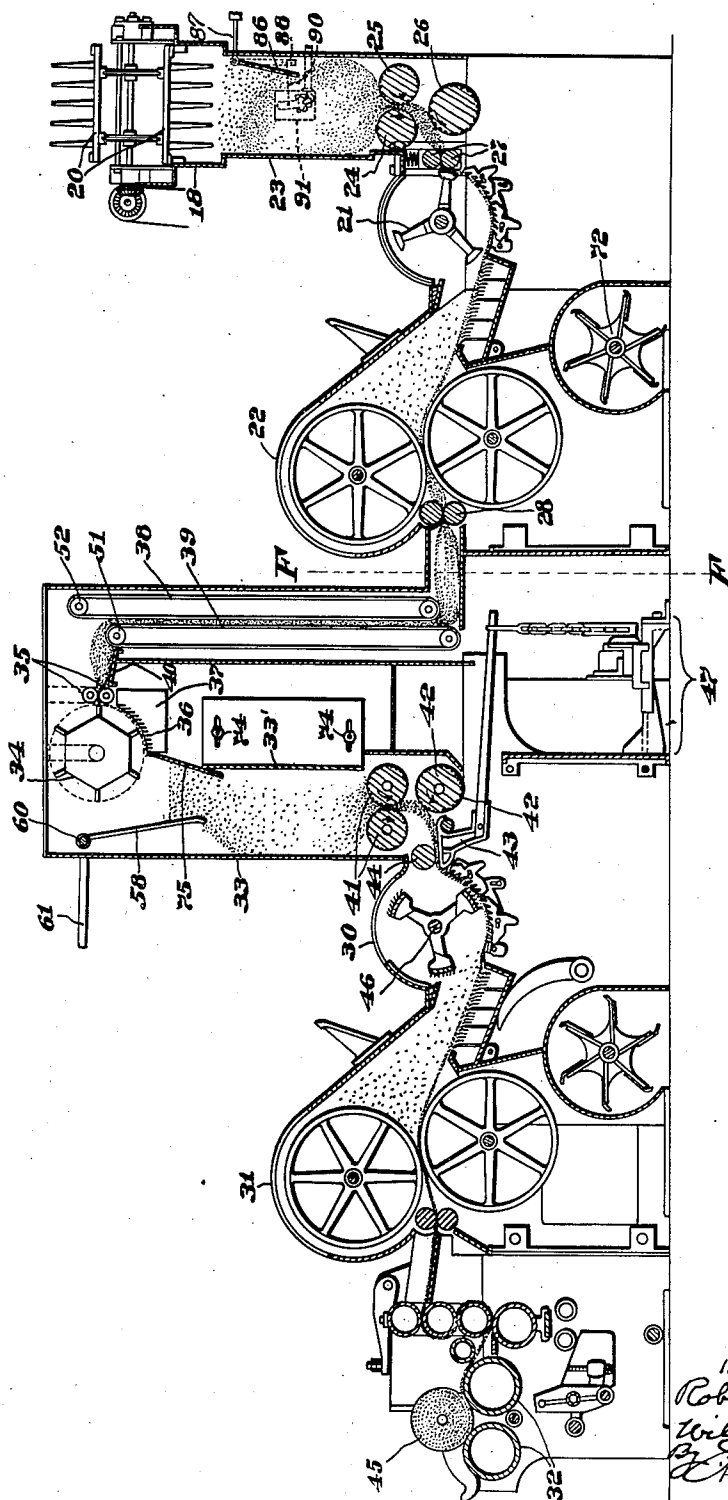


Fig. 2

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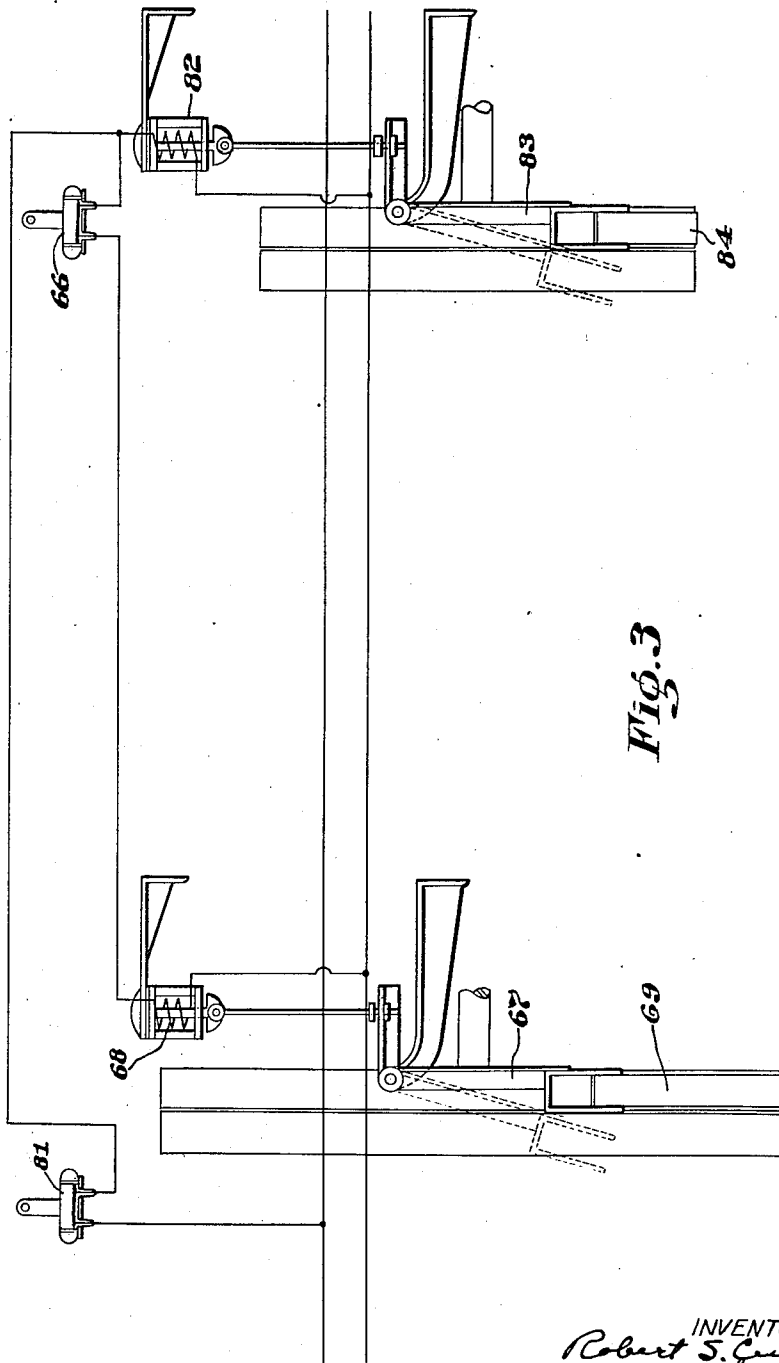
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2,057,641

SINGLE PROCESS PICKER SYSTEM

Filed Aug. 11, 1933

5 Sheets-Sheet 3



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2,057,641

SINGLE PROCESS PICKER SYSTEM

Filed Aug. 11, 1933

5 Sheets-Sheet 4

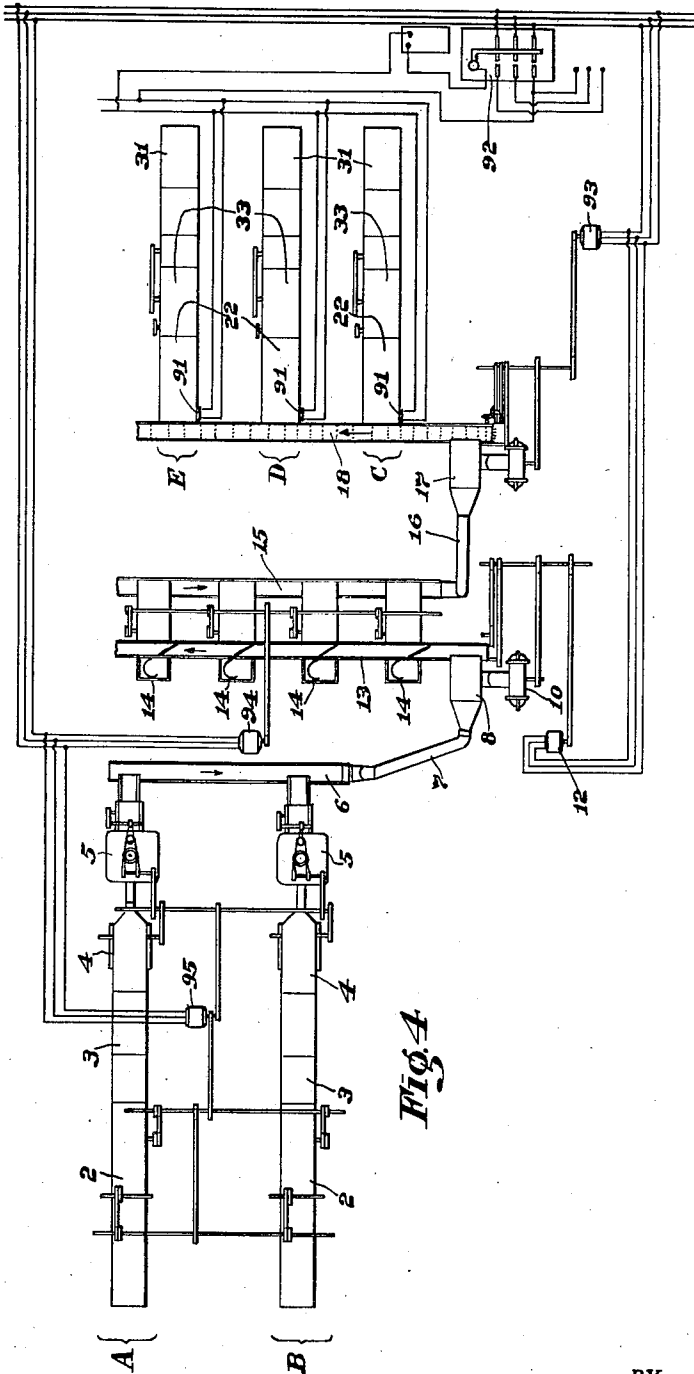


Fig. 4

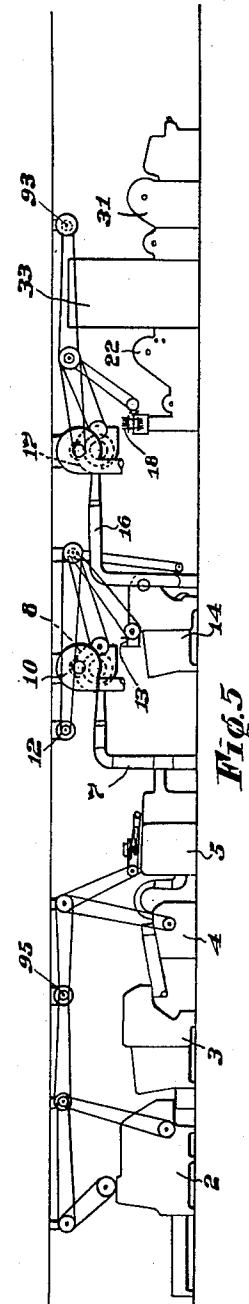


Fig. 5

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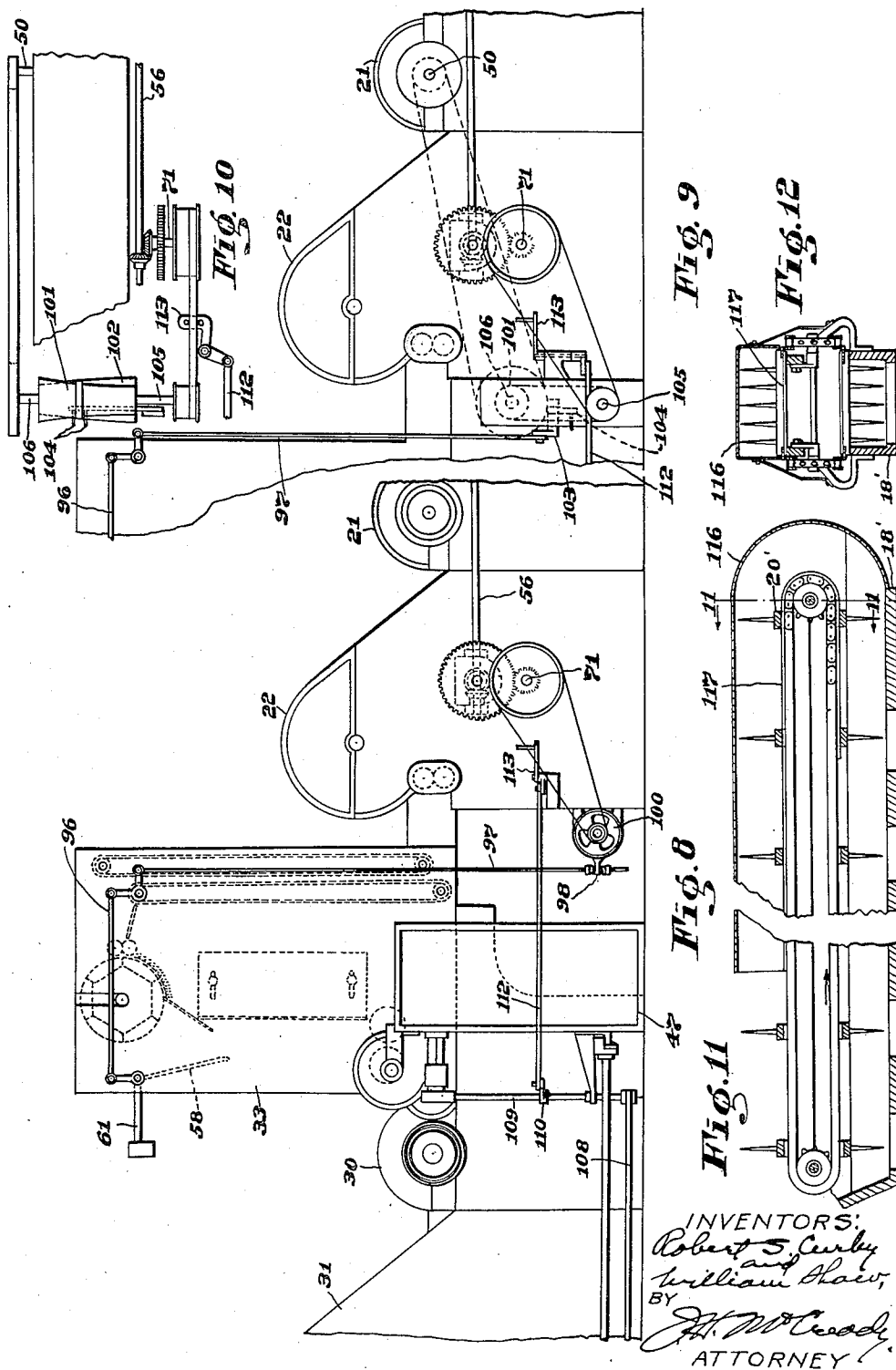
R. S. CURLEY ET AL

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SINGLE PROCESS PICKER SYSTEM

Filed Aug. 11, 1933

5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE

2,057,641

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 differ 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 intermediate manual 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 it 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 for the opening and 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 on 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 blending 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 in parallel and cotton is fed to them by a distributor 18 to which cotton is delivered by the condenser 17. 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 the distributor shown at 18 are illustrated in Figs. 1 and 2 at 20. 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 F—F, 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 connected to each other 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 into the chute and 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 cotton is picked in the 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 includes a calender head of a common or suitable type for delivering the web to the winding rolls 32, all of these parts being constructed and arranged in a well known manner. A novel mechanism is provided, however, to feed the cotton from the breaker section to the beater. It comprises an upright chute 33 of approximately rectangular form in horizontal section with a beater 34 located in the upper end thereof and arranged to pick from a pair of feed rolls 35. A grid 36 and a dust box 37 are associated with this beater. The cotton issues from the delivery rolls 28 in the form of a web in which the fibers are very loosely associated, and this web is carried between two systems of upright belts 38 and 39 and across a short guide plate 40 to the feed rolls 35. At this point the beater subjects the cotton to a further picking operation, loosening the fiber, and beating out of it a substantial proportion of the fine dirt still carried by it. This beating action is not necessarily as severe as that of the beaters 21 or 30, but it does tend strongly to free the fibers from each other, it effects a further cleaning operation, and it discharges the cotton into the chute 33 in a very light and fluffy condition. This arrangement also effects an important additional blending of the fiber. Consequently, the body of stock resting on the feed rolls 41 at the bottom of the chute 33 has an exceptionally homogeneous consistency. It will be observed that the beater 34 throws the cotton downwardly against the grid 36 and then discharges it into the lower part of the chute where it falls through the chute by gravity. Also, that no suction or blower mechanism is used in connection with this beater. Consequently, the dirt and waste materials fall through the grid 36 into a dead air space in the dust drawer 37. This arrangement has been found to produce a cleaning action which is surprisingly effective at this point in the process.

The feed rolls 41 are similar to those shown at 24 and 25 in the first chute 23, they are driven in opposite directions, and consequently, they feed a web of cotton out of the bottom of the hopper and into contact with the fluted roll 42 which directs the web across the pedals 43 of an evenner mechanism and under the feed roll 44 cooperating with said pedals. The blades of the beater in the beater section 30 pick directly from the pedals. The cotton is carried forward through the finisher lapper in the usual manner and is rolled up into the wound lap 45.

The driving mechanism required for the different units will be readily understood by those skilled in this art from an inspection of Fig. 1, and little detailed description of this mechanism is required. It may be pointed out, however, that the shaft 46 of the beater section 30 usually is driven continuously by direct connections with a motor or some other suitable source of power, and that the beater 34 is belted directly to the shaft 46. The evenner indicated in general at 47

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 feed rolls 41 and the 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 beater 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 or 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 39 has a sprocket and chain connection, indicated at 151, with the lower 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 52. All of these elements, therefore, are driven at a substantially constant speed.

The driving mechanism for the feed rolls 24 and 25 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 proved successful 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 yard for yard 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 evenner, as shown, and this evenner is arranged to control the speed of the feed rolls, then an exceptionally high degree of 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 feeler fork 58 mounted in the upper part of the chute 33 and secured rigidly on a shaft 60 which is supported in roller or ball bearings. An arm 61 also secured to this shaft tends to swing the feeler 58 forward, or toward the right, Figs 1 and 2. Consequently, this feeler 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 a flanged hub 64 which is secured rigidly to the shaft 60 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 operation of said section, 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 instrumentalities in the breaker section are driven from the beater shaft 50. Normally the switch 66 is closed and the solenoid is energized, but when this switch is opened it de-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 instrumentalities 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 feeler 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 feeler 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 assist the rake in responding 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 releasably secured to the shaft 60 by means of a set screw 73, 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 again. 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 slotted to receive bolts 74—74 for securing the part 33' 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 36 so as to swing freely follows the movements of the plate 33' 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 controlling the weight of the lap that will be produced.

For example, we have found it possible simply by adjusting the rake, as above described, to obtain laps at any desired weight between ten ounces and sixteen ounces in the running yard without making any change in gearing. A further 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 evenier roll 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 superior 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 afforded 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 section is normally maintained full of cotton. It may happen, however, that some accident in the preceding system will result in this chute becoming empty, and it is desirable under such circumstances to prevent the cotton from running out. An additional automatic control, therefore, is provided for this purpose. It consists in mounting the feed roll 25 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 26 and at least one of them being extended below this shaft. A spring 77 acts on this extension in a direction 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 manually 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 25 would immediately be moved toward the left, Fig. 1, and this 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 operate through the connections above described to shut down the breaker section. A second elec-

tro-magnet 82, Figs. 1 and 3, is connected in parallel with the electro-magnets 68, and operates a belt shipper 83 that controls the belt 84 through which all of the cotton feeding mechanism of the finisher section is driven. Consequently, 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 shuts 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, the operation of this 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 picking in accordance with the joint requirements of the picking systems so that all the cotton which they need will be supplied at practically all times, but the delivery of an oversupply will be prevented. 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 inwardly. Normally the weight of cotton in this chute will hold the rake against the wall of the chute. An arm 88 secured on the shaft of the rake outside the chute is connected by a link 90 with a mercury switch 91 in such a manner that this switch is held open so long as an ample supply of cotton is maintained in the chute. If this supply becomes depleted, however, the feeler fork then will be rocked inwardly and this movement will result in closing the mercury switch 91. In Figs. 1 and 2 the rake 86 and switch 91 are shown in intermediate positions between those which they take when the chute is either empty or completely filled. As shown in Fig. 4, all of these switches are connected in parallel with an electro-magnetic master switch 92 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 cotton, all of the switches 91 will be opened, thus releasing the electro-magnet of the master switch 92, whereupon this switch will automatically open. As shown in Fig. 4 this switch controls all of the motors 93, 94, 95 and 12 which drive the various units of the cotton supplying system, so that when the switch 92 opens, all of these motors will be shut down and the operation of the cotton supplying units will be stopped. They will be started up again automatically, however, as soon as any picker system calls for more cotton, such a call being initiated by the inward movement of any feeler fork 86 and the consequent closing of the mercury switch 91 which it controls.

In some systems, due to local conditions, it is not desirable to have the motors 12 and 93 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 afforded by the feeler 58 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. 8. Here the feeler fork 58 is connected through bell crank levers and links 96 and 97 to the speed controlling lever 98 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 feeler 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 latter chute.

Figs. 9 and 10 show similar connections for enabling the feeler 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 97 is connected through a bell crank lever 103 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 106 of the variable speed mechanism being 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 finisher unit when the machine knocks off. As shown in Fig. 1, the drop bar 107 is connected through a link 108 and an upright rock shaft 109 to the clutch (not shown) through which the upper cone of the evener 47 drives the feeding units between the chute 33 and the beater 30. An arm 110, Fig. 8, on the rock shaft 109 is connected through a link 112 to a belt shipper 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 here 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 topped because of the fact that all the chutes are full and their requirements, 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 operated by them, this motor, therefore, being run continuously. Attention is also called to the fact that it is not necessary to equip all of the chutes 23 with the feelers 86 and the switches 91 oper-

ated 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 call 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 distributor, some expense can be saved 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 some drives 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 an electro-magnetically operated device for shifting a belt from a high speed to a low speed pulley, or for adjusting a variable speed motor, or some 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 enclosing part of the upper run of the distributor rakes 20' in a suitable inverted trough or casing 116 so that the surplus cotton not delivered to the chutes will simply be 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 chute 33, the condenser of the section so introduced delivering its cotton 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 operate.

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 feed rolls to cause them to feed cotton through the bottom of said chute toward said picker, a feeler in said chute responsive to variations in the quantity of cotton in the chute, driving mechanism for said distributor, and means including said feeler 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 feed rolls to cause them to feed cotton through the bottom of said chute toward said picker, a feeler in said chute responsive to variations in the quantity of cotton in the chute, cotton supplying means including said distributor for preparing the cotton for picking and delivering it to said chute, and means including said feeler for controlling the operation of said cotton supplying means.

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, mechanism for feeding the continuous web of cotton received directly from the first of said units and discharging it into said chute, said chute being equipped with feed rolls and means for picking the cotton from said rolls and delivering the cotton so picked directly into said chute, mechanism for feeding the cotton from the bottom of said chute 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 at the bottom of the chute for feeding the cotton therefrom to the next succeeding unit of said 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 receiving the latter web of cotton and feeding it 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 mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means, a rocking feeler 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 mounted at the upper end of said chute in position to pick the cotton delivered thereto by said means, a feeler 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, mechanism for feeding cotton from the first of said units into the chute of the next succeeding unit, and mechanism associated with the chute for the first unit for shutting down the system automatically when the supply of cotton in the latter chute becomes depleted.

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 next succeeding unit, 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 rake distributor for feeding loose cotton continuously into the upper ends of said chutes and serving to maintain said chutes approximately filled with cotton substantially continuously, a set of feed rolls 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 set of them to feed the cotton through the bottom of its respective chute toward the picker associated therewith, cotton supplying means for preparing the cotton for picking and delivering it to said distributor, apparatus responsive to variations in the quantity of cotton in those chutes remote from the supply end of the distributor, and means governed by said apparatus for automatically controlling the operation of said cotton supplying means in accordance with the requirements of the latter chutes.

13. 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 on which the body of cotton in the chute rests, said feeding means being adjacent said picker feeding means, mechanism for driving said feeding means at the bottom of the chutes to cause it to feed the cotton through the bottom of its respective chute toward the picker associated therewith, cotton supplying means for preparing the cotton for picking and delivering it to said distributor, and electrical means for automatically controlling the operation of said cotton supplying means in accordance with the requirements of said chutes.

14. 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 on which the body of cotton in the chute rests, said feeding means being adjacent said picker feeding means, mechanism for driving said feeding means at the bottom of the chutes to cause it to feed the cotton through the bottom of its respective chute toward the picker associated therewith, cotton supplying means for preparing the cotton for picking and delivering it to said distributor, a device responsive to variations in the quantity of cotton in a chute remote from the supply end of the distributor, and automatic means under the control of said device for maintaining said cotton supplying means in operation so long as any chute in said series is not adequately supplied with cotton and for reducing the rate of operation of said supplying means approximately as soon as all of said chutes are supplied.

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 on which the body of cotton in the chute rests, said feeding means being adjacent said picker feeding means, mechanism for driving said feeding means at the bottom of the chutes to cause it to feed the cotton through the bottom of its respective chute toward the picker associated therewith, cotton supplying means for preparing the cotton for picking and delivering it to said distributor, a feeler responsive to variations in the quantity of cotton in a chute remote from the supply end of the distributor, an electric switch arranged to be operated by said feeler, 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 delivering 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 rocking feeler 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 feeler, and 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 against which the cotton is thrown by said beater, parts providing a dead air dust 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, 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 feeler 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 feed-

ing 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, means cooperating with the last mentioned feed rolls for feeding the cotton to the beater of said finisher unit, and a feeler 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 feeler.

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 feeler 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.

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