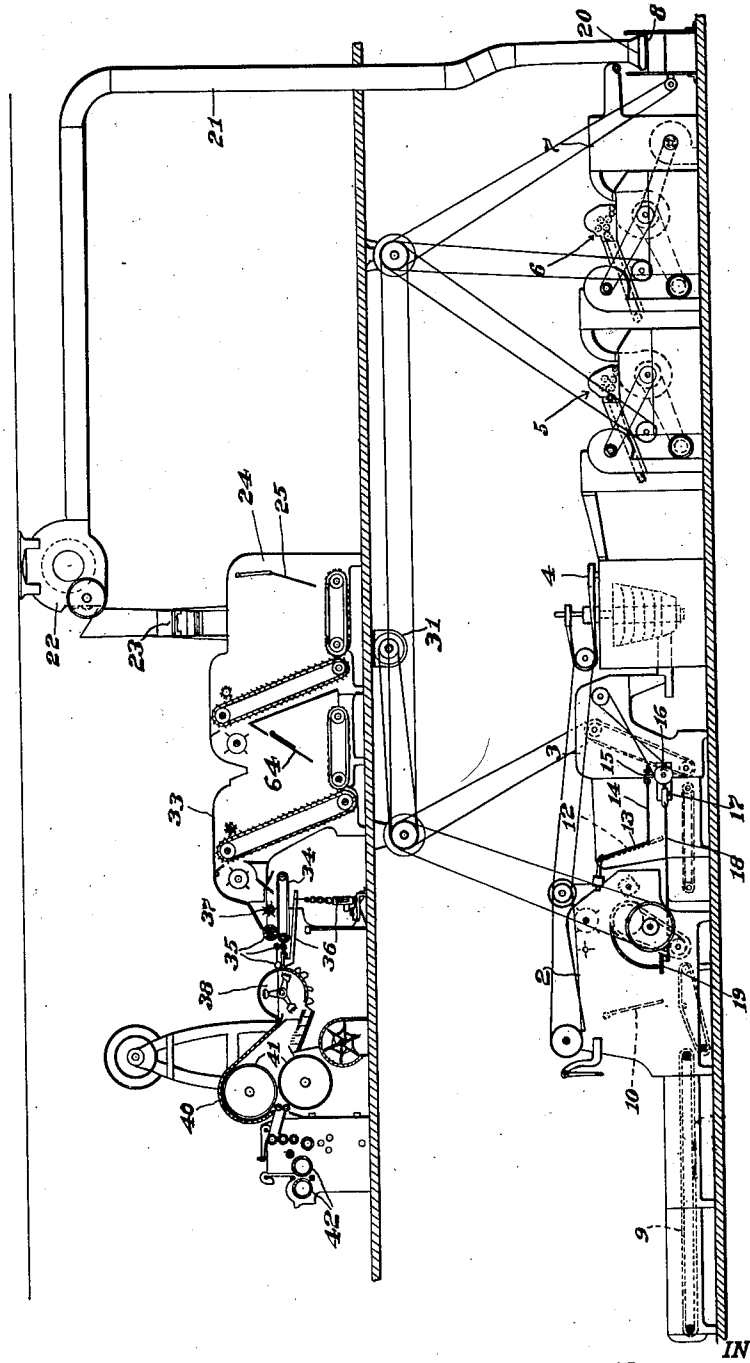
July 14, 1931. R. S. CURLEY 1,814,129

COTTON OPENING AND PICKING SYSTEM

Filed June 26, 1929 3 Sheets-Sheet 1

Fig. 1



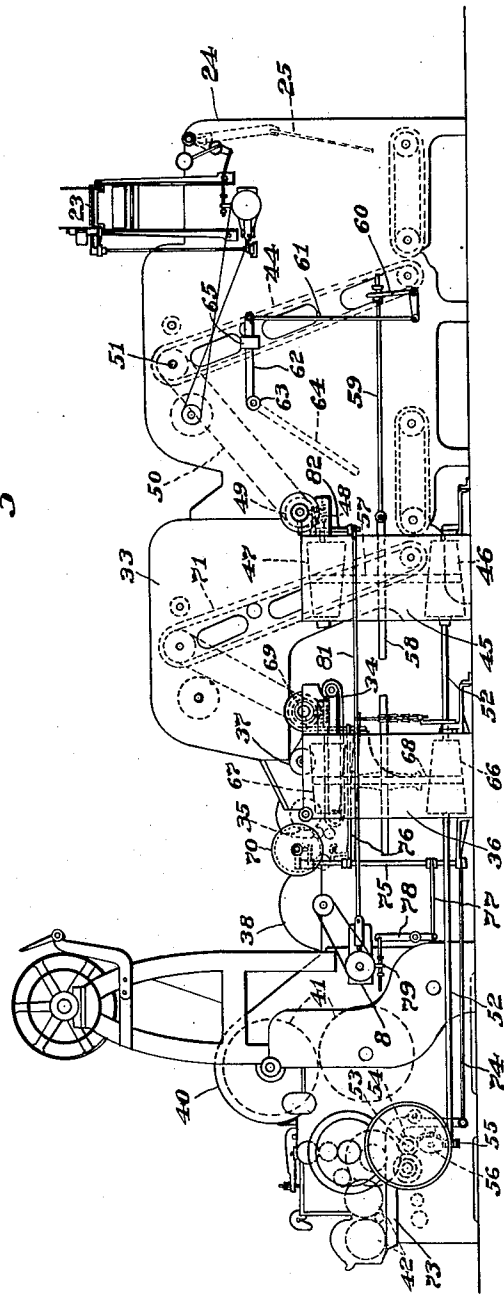
INVENTOR
Robert S. Curley,
BY
J. J. McCurdy,
his ATTORNEY.

July 14, 1931. R. S. CURLEY 1,814,129

COTTON OPENING AND PICKING SYSTEM

Filed June 26, 1929 3 Sheets-Sheet 2

Fig. 2



INVENTOR
Robert S. Curley,
BY
J. D. McCready,
his ATTORNEY.

July 14, 1931. R. S. CURLEY 1,814,129

COTTON OPENING AND PICKING SYSTEM

Filed June 26, 1929 3 Sheets-Sheet 3

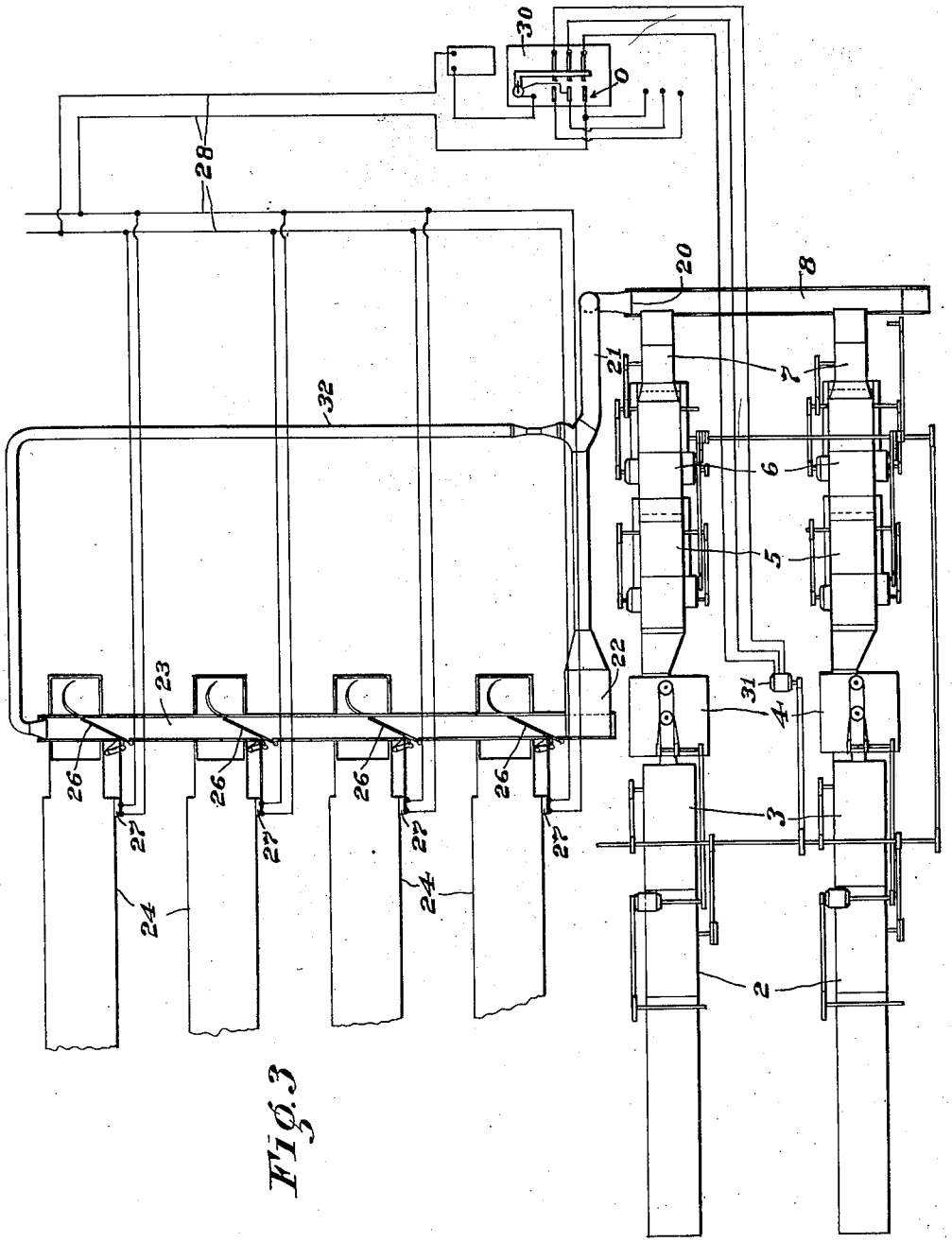


FIG. 3

INVENTOR
Robert S. Curley,
BY
J. H. McCready,
his ATTORNEY.

Patented July 14, 1931 1,814,129

UNITED STATES PATENT OFFICE

ROBERT S. CURLEY, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO SACO-LOWELL SHOPS, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

COTTON OPENING AND PICKING SYSTEM

Application filed June 26, 1929. Serial No. 373,737.

This invention relates to the preparation of cotton for carding.

The usual method of preparing cotton for the carding operation consists in opening the bales of cotton, passing the cotton through a series of machines which serve to break up the wads, loosen the fibre, and free it from a large percentage of the foreign materials originally associated with it, subsequently performing a series of picking operations on the cotton, and finally working it into the form of a finished lap. The cotton has, of course, been ginned before baling, the bale breaker never being called upon to handle unginned cotton. The preliminary operations of bale breaking, opening and cleaning are performed in the opening room, and the cotton then is transferred to the picker room and delivered to the picking machines or lappers. A single set of opening machines will supply a considerable number of pickers, and the cotton ordinarily is conveyed automatically from the opening machines to the picker room and distributed automatically to the feed hoppers of the individual pickers. The laps from the first or breaker lapper subsequently go to an intermediate lapper, and the laps produced by these intermediate machines later are taken to a finisher lapper. In the intermediate and finisher lapper the webs unwound from the laps produced by previous machines are superposed one on the other so that their irregularities are averaged and a more uniform finished lap is produced.

The system just described is the so-called "three process picker system". In some cases one of the picking operations is eliminated, thus producing a so-called "two process picker system". Whether a two or three process system is used depends largely on the requirements of individual mills, and particularly on the nature of the goods being made. On fine work and under conditions where accuracy is desirable, the three-process system has generally been regarded as the standard in this country. The lap produced by a finisher lapper or finisher picker is supposed to weigh forty-eight pounds, and usually the requirements are such that a variation of one-half pound plus or minus is considered the maximum variation allowable.

A so-called "one process picker system" also has been proposed heretofore in which the cotton is opened and cleaned in the manner above described, then goes through a series of picking operations without producing a lap, and finally is delivered to a finisher picker which produces a finished lap. Such systems obviously effect a substantial reduction in the labor required to prepare the cotton for carding, and due to recent improvements these single process picker systems are now going into use very rapidly.

The present invention is especially concerned with single process picker systems, and it aims to increase the efficiency of such systems. It is an object of the invention so to improve systems of this type that a greater production can be obtained from a given investment in machinery while still maintaining the quality of the finished product within entirely satisfactory limits.

As above stated, the capacity of the opening and cleaning machines is much greater than that of picking machines and the present invention, therefore, proposes to perform a much greater part of the work of preparing the cotton for carding before the cotton is delivered to the pickers, thus leaving very little of the preparatory work to be performed in the latter machines. I have found that a surprisingly high percentage of the work expected of the pickers can be performed in the opening room machinery at a saving in time, floor space and equipment, and that the work required of the pickers, which necessarily have a more limited production, can be correspondingly reduced.

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 diagrammatic side elevation of a system organized in accordance with this invention, some of the units being shown in section;

Fig. 2 is a side elevation of the finisher picker or lapper and the feeding mechanism therefor; and

Fig. 3 is a diagrammatic plan view of the system shown in Fig. 1.

Referring first to Figs. 1 and 3, the system there shown comprises two series of opening and cleaning machines, arranged side by side, and adapted to act continuously and successively on a supply of cotton. Each series of machines includes a bale breaker 2, hopper feeder 3, vertical opener 4, and two lattice openers 5 and 6 arranged in series, and the second of these machines discharging into a screen section or condenser 7 equipped with an apron for delivering the opened cotton to a horizontal feed table or lattice 8. All of these units may be, and preferably are, of the common commercial constructions and they are connected end to end so that a continuous stream of cotton passes through them from the bale breaker to the feed table or lattice apron 8. These machines are all operated in the usual manner, the cotton being thrown on to the feed apron 9 of the bale breaker 2 and carried continuously from one machine to the next and finally delivered to the lattice 8.

Preferably the bale breaker is equipped with the usual controls including a belt shipper operated by the feeler 10, Fig. 1, in the hopper of the bale breaker and serving to stop the movements of the lattices when the hopper becomes filled. Preferably, also, an additional control is provided between the hopper feeder 3 and the bale breaker, this control including a feeler fork 12 mounted in the hopper of the feeder 3 and connected with an arm 13 outside the hopper. A rod 14 connects the lower end of this arm to the control lever 15 of a positively acting unit 16 substantially like that shown in the Shaw application Serial No. 343,493 filed February 28, 1929 and assigned to the assignee of this invention. The slide 17 of this unit is connected through a rod 18 to a belt shifter 19 for controlling the driving belt of the bale breaker.

When the weight of cotton in the feed hopper 3 becomes sufficient to force the feeler fork 12 backwardly, it operates through the positive control unit 16 to shift the driving belt for the bale breaker on to the loose pulley, thus stopping the feed lattices of the bale breaker, and consequently interrupting the delivery of cotton from the bale breaker to the hopper feeder. As the supply of cotton in the hopper feeder becomes depleted, the weighted arm connected with the feeler fork 13 moves the fork forward, thus reversing the action of the unit 16 and causing it to start the bale breaker into operation again. The control mechanism thus serves to maintain the supply of cotton in the hopper 3 within substantially predetermined limits, and enables the hopper to feed cotton more uniformly than otherwise would be the case.

The organization of opening and cleaning machinery is more elaborate than that ordinarily used in the opening room, but all of the units are of large capacity and the entire series of machines is capable of delivering a high output of cotton, completely opened, and cleaned much more thoroughly than is usually the practice.

The cotton prepared in this manner is carried by the lattice apron 8 to the intake end 20 of a pneumatic conveyor or tube 21 which delivers it to the condenser 22 of a Morton distributor of the well known construction. The belt for this distributor is indicated at 23 in Fig. 3. This distributor conveys the cotton to the feed hoppers 24 for a series of finisher pickers or lappers. Each of these hoppers is equipped with the usual feeler fork 25, Fig. 1, arranged to control a gate 26 Fig. 3, cooperating with the conveyor belt 23 to divert cotton into its respective hopper when the supply of cotton in the hopper becomes depleted. The mechanism for enabling the feeler fork to control or operate the gate in this manner may be like that used in the well known Morton distributor, or, more preferably, like that shown in the Shaw application above designated. In any event, the arrangement is such that so long as an ample supply of cotton remains in the hopper 24 for any lapper, the gate for that particular hopper will lie beside the conveyor belt 23 and no cotton will be discharged into the hopper. As soon, however, as the supply of cotton in any hopper becomes depleted, the feeler fork in that particular hopper will be moved forward and will result in swinging the gate which it controls partly across the belt 23 where it will divert cotton into the hopper. This action continues until the supply of cotton in the hopper has been replenished, at which time the feeler fork will be moved backwardly by the increased weight of cotton and will result in returning the gate to its original position beside the belt 23.

Preferably this system is equipped with an automatic control system like that shown in my earlier Patent No. 1,630,375 for automatically shutting down the bale breakers 2 and hopper feeders 3 when none of the feed hoppers 24 require cotton. This control system includes a switch 27, Fig. 3, associated with the gate operating mechanism of each hopper feeder 24, the arrangement being such that when any gate is in its open or cotton diverting position the switch associated with that particular gate will be closed. These switches are connected in parallel across a circuit 28, Fig. 3, which controls the switch 30 for the motor 31 that drives the bale breakers 2 and the hopper feeders 3. The nature of this control system will be readily

understood from a reading of my Patent No. 1,630,375. For present purposes it is sufficient to state that so long as any hopper feeder 24 is calling for cotton, the motor 31 will be kept in operation and the bale breakers 2 and hopper feeders 3 will continue to function in their usual manner. As soon, however, as the requirements of all the hopper feeders 24 have been supplied and the gates 26 consequently are all open, the control circuit 28 then will be opened, thus causing the motor switch 30 to open. This shuts down the bale breakers 2 and the hopper feeders 3 and the feed lattices of the other units.

The cotton in transit when such a shut down occurs is delivered into a loop 32, Fig. 3, which receives the cotton delivered at the discharge end of the conveyor belt 23 and returns it again to the conveyor tube 21 just in front of the condenser 22. This cotton, therefore, is kept in circulation until it is again needed by one of the pickers.

The mechanism for feeding the distributed cotton to the respective finisher lappers involves novel features. Referring to Figs. 1 and 2 it will be seen that the hopper feeder 24 delivers cotton into another hopper feeder 33, this arrangement being substantially like that of the usual tandem feeder. Each hopper is equipped with the usual feed lattices. The second or back feeder 33 delivers cotton to a feed lattice 34 which carries it to the feed rolls 35 of an evener mechanism, indicated in general at 36. A press roll 37 driven at a considerably higher speed than the lattice 34 acts on the cotton to crowd it against the foremost of the feed rolls 35 and thus enables the evener mechanism to operate more accurately. The evener mechanism feeds the cotton into the beater 38 of the finisher lapper or finisher picker lapper 40, the cotton being carried between the condenser cylinders 41 and through the calender rolls to the winding rolls 42 where it is wound into a lap.

In order to produce a uniform lap it is essential that the cotton be fed to the lapper at a very uniform rate. There necessarily is considerable variation in the quantity of cotton in the first hopper 24, due partly to the nature of the control mechanism and partly to the manner in which the hoppers are fed with cotton by the Morton distributor. This variation produces corresponding variations in the rate of feed of cotton into the second hopper 33. If the quantity of cotton in this second hopper can be maintained substantially constant the rate of speed of the cotton out of the hopper will be maintained relatively uniform. In order to accomplish this object the inclined lattice 44 in the first hopper 24 is driven from a variable speed mechanism 45 which comprises a lower driving cone 46 and an upper driven cone 47. The shaft of the upper cone 47 carries a worm 48 driving a worm wheel 49 on a shaft which is connected by a chain 50 to the driving shaft 51 for the lattice 44. The lower cone 46 is mounted on a shaft 52 which is driven from the shaft 53 of the lapper through two spur gears 54 and 55 mounted, respectively, on the shafts 53 and 52, and an intermediate spiral gear 56 which meshes with both of said spur gears. The driving connection between the cones 46 and 47 consists of a belt 57 the position of which is controlled by a belt shifter or adjuster 58. A rod 59 connects this belt adjuster with a bell crank lever 60, which, in turn, is connected by a link 61 with an arm 62 secured on a rock shaft 63 to which the feeler fork 64 is secured. This feeler fork is mounted in the hopper of the second feeder 33 and it is urged forward by an adjustable weight 65 carried by the arm 62. The feeler thus is responsive automatically to changes in the weight of cotton in the second hopper 33.

Variations in the quantity of cotton in this hopper, therefore, operate through the connections just described to adjust the belt 57 backward or forward and thereby to increase or reduce the rate of travel of the feed lattice 44. The connections are such that when the quantity of cotton in the hopper 33 becomes too great, the lattice 44 will be slowed down and the rate of delivery of cotton to the hopper 33 correspondingly reduced. On the other hand, if the supply of cotton in the hopper 33 drops below substantially a predetermined weight, the feeler will operate through the variable speed mechanism 45 to speed up the lattice 44 and thus to increase the rate of delivery to the hopper 33. It has been found in practice that this mechanism is very sensitive and that it maintains the variations in the quantity of cotton in the hopper 33 within very narrow limits.

The evener mechanism 36 is substantially like that used heretofore in feeding a lapper from a hopper feeder. It includes a driving cone 66 fast on the shaft 52, a driven cone 67, and a belt 68 connecting said cones. The shaft of the upper cone carries worms for driving the worm wheels 69 and 70, respectively, and the first of these worm wheels drives the inclined lattice 71 in the hopper feeder 33, while the second worm wheel drives the feed rolls of the evener, the lattice 34, and the roll 37. The evener also includes the usual adjusting nut or turn buckle for enabling the operator to vary the feed manually as, for example, to compensate for changes in density of the fibre.

This evener mechanism acts on the cotton delivered by the second hopper feeder 33 and it cooperates with it to produce an exceptionally uniform feed of cotton to the lapper. It serves to smooth out and reduce

any variations in the feed of cotton from the hopper 33.

When a lap has been completed and the lapper consequently "knocks off" or shuts down automatically, it is necessary to stop the entire feed of cotton from the hopper 24 to the lapper. For this purpose the drop bar 73, Fig. 2, of the lapper is connected by a link 74 with an upright shaft 75 having an arm at its upper end for throwing in or out the clutch between the worm wheel 70 and the shaft which it drives. Additional connections including a link 76 operate to throw out the corresponding clutch between the worm wheel 69 and its shaft. The throwing out of these clutches stops the feed lattices in the hopper 33, the feed rolls of the evener, the apron 34, and the press roll 37. Additional connections also are operated by the shaft 75, these connections including a link 77 and a lever 78 which operate the control lever 79 of a positively driven unit 80 like that shown in the Shaw application above referred to. The slide for this unit is connected through a link 81 with an arm extending from an upright shaft 82, and the upper end of this shaft carries an arm for operating a clutch through which the worm wheel 49 is connected with the shaft on which it revolves. Consequently, when the drop bar 73 falls this clutch is thrown out and the feed lattices in the hopper 24 are automatically stopped.

When the drop bar is again lifted to start the lapper into operation the clutches just described are all thrown in again, thus causing the cotton feeding mechanisms in the various units to resume their functions.

It will now be appreciated that the invention provides a system which is entirely automatic in its action except for the operations of placing cotton on the aprons 9 of the bale breakers and taking the finished laps out of the lappers 40. Between these points the cotton is handled entirely automatically.

The nature of the controls is such that they require relatively little attention and such attention as is necessary is within the skill of the workmen ordinarily employed in a picker room.

It should be noted that in this system practically all of the work of preparing the cotton for the final lapping operation is performed before the cotton is delivered to the distributing mechanism. All of this work is done in machines of high capacity. Consequently, the work required of low production machines is simply that of making the lap. This system, therefore, affords a very high output for a given expenditure in equipment. At the same time it will produce laps of an evenness which compare favorably with that of prior picker systems, whether of the single process or three-process type. It will be understood that the term "lap" is herein used to designate a wound lap.

While I have herein shown and described a typical embodiment of my invention, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. That improvement in methods of preparing ginned cotton for carding which consists in substantially completing the preparation of the cotton for the final lapping operation while maintaining the cotton in a loose condition and without producing a wound lap, distributing the cotton so prepared to finisher lappers, and feeding the cotton at a substantially uniform rate to each lapper.

2. That improvement in methods of preparing ginned cotton for carding which consists in substantially completing the preparation of the cotton for the final lapping operation while maintaining the cotton in a loose condition and without producing a wound lap, distributing the cotton so prepared to finisher lappers, and automatically controlling the distribution of the cotton to the individual lappers in accordance with the requirements of the individual machines.

3. That improvement in methods of preparing ginned cotton for carding which consists in substantially completing the preparation of the cotton for the final lapping operation while maintaining the cotton in a loose condition and without producing a wound lap, distributing the cotton so prepared to the respective feeders of a plurality of finisher lappers, controlling the distribution of the cotton to said feeders in accordance with the requirements of the individual lappers, and feeding the cotton at substantially a uniform rate to each lapper.

4. That improvement in methods of preparing ginned cotton for carding which consists in substantially completing the preparation of the cotton for the final lapping operation while maintaining the cotton in a loose condition and without producing a wound lap, distributing the cotton so prepared to the respective feeders of a plurality of finisher lappers, controlling the distribution of the cotton to said feeders in accordance with the requirements of the individual lappers, feeding the distributed cotton from each feeder through a reservoir on the way to its respective lapper, and utilizing variations in the weight of cotton in each reservoir to control the rate of delivery of cotton to the reservoir to maintain a substantially constant weight of cotton therein.

5. In a cotton opening and picking system, the combination of a series of machines for opening and cleaning ginned cotton and completing its preparation for delivery to a finisher lapper, without forming a lap, said machines being arranged to act on the cotton continuously and successively, a plurality

of finisher lappers, and automatic means for carrying the cotton away from the last machine of said series and distributing it to said lappers.

6. In a cotton opening and picking system, the combination of a series of machines for opening and cleaning ginned cotton and completing its preparation for delivery to a finisher lapper, without forming a lap, said machines being arranged to act on the cotton continuously and successively, a plurality of finisher lappers, automatic means for carrying the cotton away from the last machine of said series and distributing it to said lappers, and means for receiving the cotton from said distributing means and feeding it to the respective lappers at a substantially constant rate.

7. In a cotton opening and picking system, the combination of a series of machines for opening and cleaning ginned cotton and completing its preparation for delivery to a finisher lapper, without forming a lap, said machines being arranged to act on the cotton continuously and successively, a plurality of finisher lappers, a feeder for each lapper, automatic means for carrying the cotton away from the last machine of said series and distributing it to the respective feeders for said lappers, and mechanism for automatically controlling the operation of said means in accordance with the demands of the lappers.

8. In a cotton opening and picking system, the combination of a series of machines for opening and cleaning ginned cotton and completing its preparation for delivery to a finisher lapper, without forming a lap, said machines being arranged to act on the cotton continuously and successively, a plurality of finisher lappers, a feeder for each lapper, automatic means for carrying the cotton away from the last machine of said series and distributing it to the respective feeders for said lappers, and mechanism for automatically controlling the operation of said feeders to maintain a substantially uniform rate of feed cotton to the respective lappers.

9. In a cotton opening and picking system, the combination of a series of cotton opening and cleaning machines arranged to act successively and continuously on a stream of ginned cotton to open it thoroughly and to complete its preparation for delivery to a finisher lapper, without forming a lap, a plurality of finisher lappers, a hopper feeder for each lapper, means for carrying cotton away from the last machine of said series and distributing it to the respective feeders for said lappers, a second hopper feeder for each lapper to which the cotton is fed from the first hopper feeder, and means responsive to changes in the quantity of cotton in the second hopper feeder for controlling the rate of delivery of cotton thereto from the first hopper feeder.

10. In a cotton opening and picking system, the combination of a series of cotton opening and cleaning machines arranged to act successively and continuously on a stream of ginned cotton to open it thoroughly and to complete its preparation for delivery to a finisher lapper without forming a lap, a plurality of finished lappers, a hopper feeder for each lapper, means for carrying cotton away from the last machine of said series and distributing it to the respective feeders for said lappers, a second hopper feeder for each lapper to which the cotton is fed from the first hopper feeder, an evener mechanism between each lapper and the second hopper feeder therefor, said evener mechanism controlling the rate of feed of cotton from the second hopper feeder to its respective lapper, and means responsive to changes in the quantity of cotton in the second hopper feeder for automatically controlling the rate of delivery of cotton thereto from the first hopper feeder.

11. In a cotton opening and picking system, the combination of a series of cotton opening and cleaning machines arranged to act successively and continuously on a stream of ginned cotton to open it thoroughly and to complete its preparation for delivery to a finisher lapper, without forming a lap; a plurality of finisher lappers; feeding mechanisms for the respective lappers; means for carrying the cotton from the last machine in said series to said feeding mechanisms; each of said feeding mechanisms comprising two hopper feeders arranged in series, the first of said feeders delivering cotton to the second; a variable speed mechanism for driving the cotton feeding elements of said first feeder; and means responsive to variations in the weight of cotton in the hopper of the second feeder for acting through said variable speed mechanism to control the rate of delivery of cotton to the second hopper in accordance with variations in the quantity of cotton therein.

12. In a cotton opening and picking system, the combination of a series of cotton opening and cleaning machines arranged to act successively and continuously on a stream of ginned cotton to open it thoroughly and to complete its preparation for delivery to a finisher lapper without forming a lap; a plurality of finisher lappers; a feeding mechanism for each of said lappers; means for carrying the cotton from the last machine in said series to said feeding mechanisms; each of said feeding mechanisms comprising two hopper feeders arranged in series, the first of said feeders delivering cotton to the second; an evener mechanism between said second feeder and said finisher lapper; a variable speed mechanism for driving said first

feeder; a feeler in the hopper of said second feeder; and connections for causing said feeler to control the rate of operation of the first feeder by said variable speed mechanism in accordance with variations in the quantity of cotton in the second feeder.

ROBERT S. CURLEY.