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R. S. CURLEY ET AL

2,028,698

COTTON PICKING SYSTEM

Filed Nov. 5, 1931

3 Sheets-Sheet 1

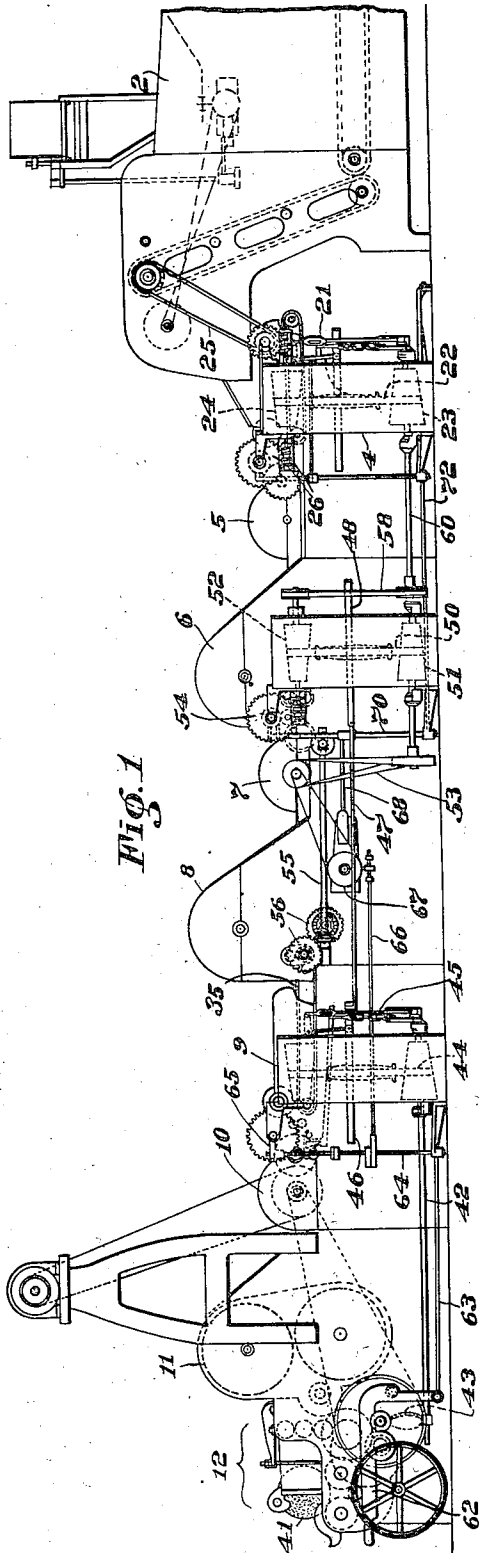


FIG. 1

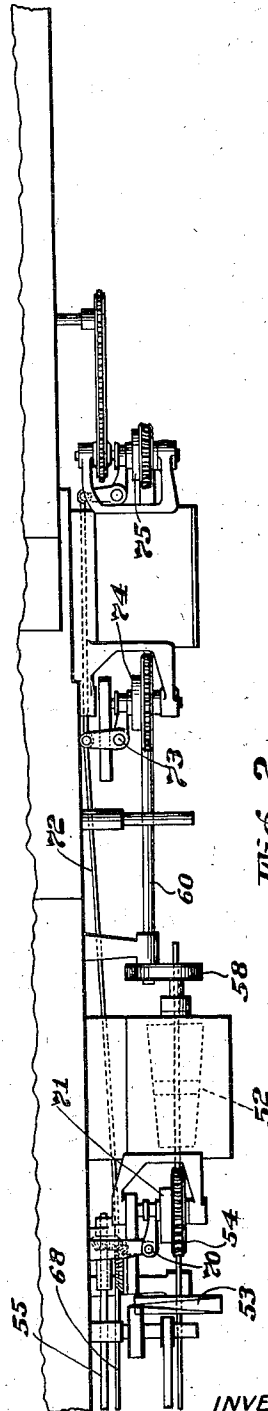


FIG. 2

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3 Sheets-Sheet 2

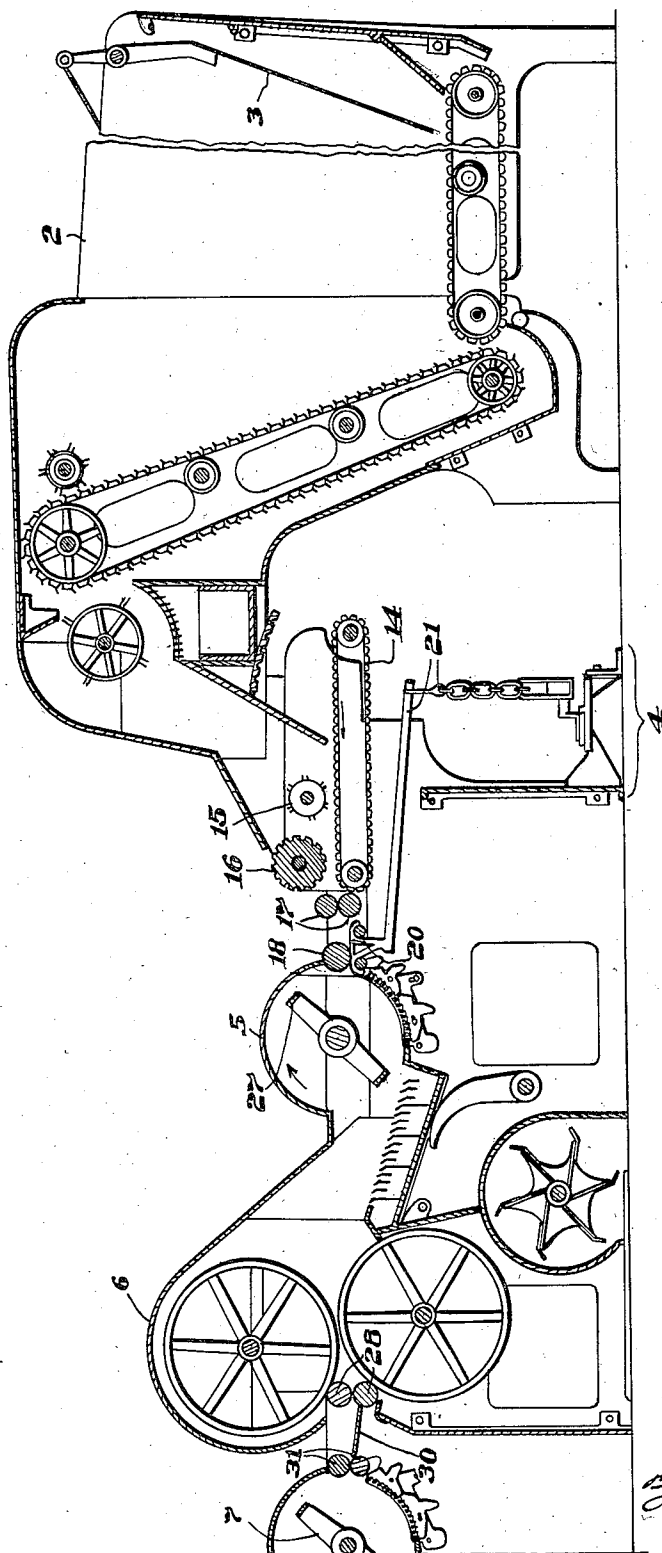


FIG. 3

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3 Sheets-Sheet 3

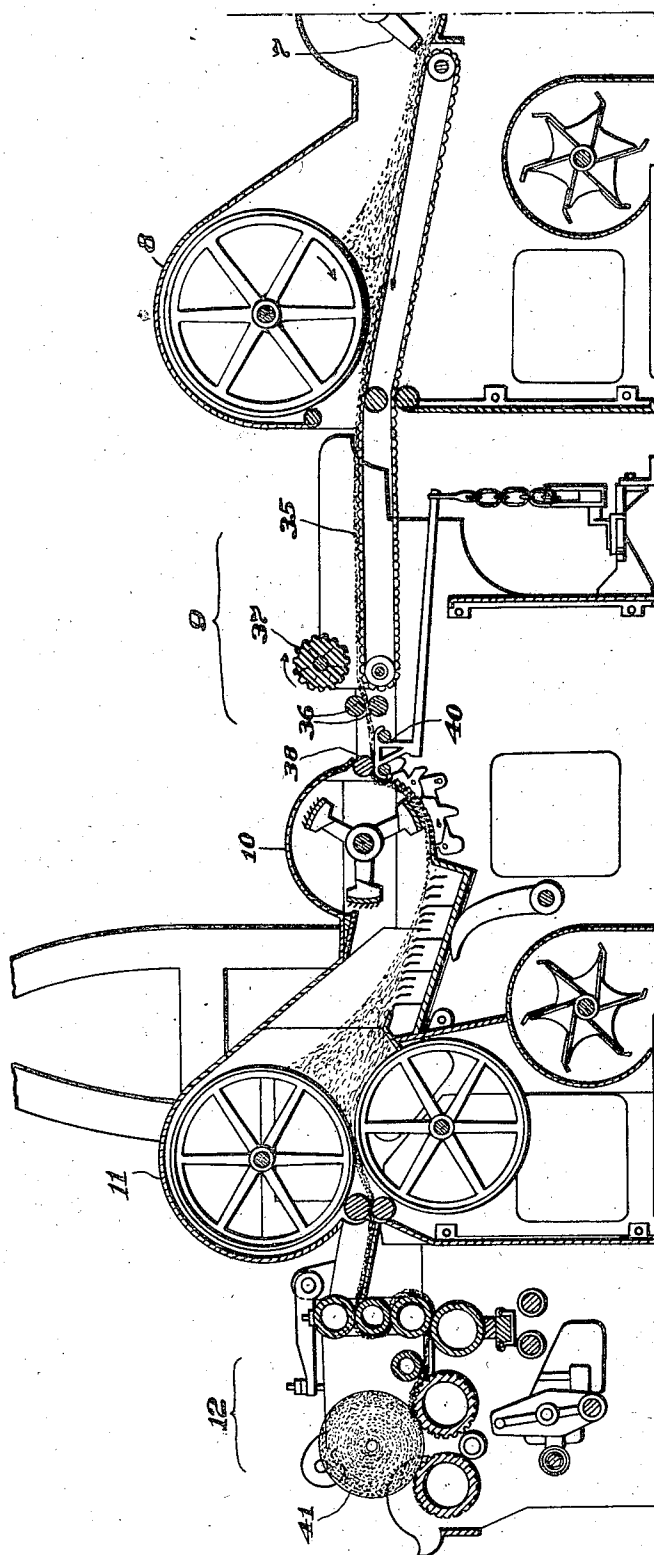


FIG. 4

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UNITED STATES PATENT OFFICE

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COTTON PICKING SYSTEM

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8 Claims. (Cl. 19—70)

In recent years the so-called "single process" picking has very substantially replaced the old two and three process systems which had formerly been used for many years. The single process system takes the cotton from a distributor, passes it through a series of picking operations and works it into the form of a finished lap ready to go to the carding machine without any manual handling whatever.

The present invention relates to systems of this type. It aims to improve such systems with a view to simplifying the apparatus required, while still producing work of the desired quality. The invention involves both a novel organization of apparatus and also a new process.

The successful operation of a single process picker system involves the feeding of the cotton to the final unit of the system with a high degree of evenness or uniformity. Such feeding of the cotton is commonly accomplished in the present commercial systems by using a hopper feeder, interposed in the system, and serving both as a feeding unit and also as a reservoir to hold a relatively large quantity of cotton at an intermediate point. This body of cotton is depended upon to effect, through suitable mechanism, the desired control of the rate of feed of the cotton at preceding points in the system. It is one of the objects of this invention to avoid the necessity for this intermediate hopper feeder.

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,

Fig. 1 is a side elevation of a single process picker system organized in accordance with this invention;

Fig. 2 is a plan view, on a larger scale, showing details of parts of the driving mechanism used in the system;

Fig. 3 is a longitudinal vertical sectional view of the first units in the system shown in Fig. 1, and

Fig. 4 is a view similar to Fig. 3 of the later units of the system.

Preliminary to a detailed description of the construction shown, it may be pointed out that this system is intended to be used at essentially the same point in cotton preparing operations as are the present single process systems. Usually the cotton, after being opened, is conveyed pneumatically from the opening room to the picker room. In the latter room it is distributed by any suitable apparatus, the so-called Morton distribu-

tor being very commonly used for this purpose. The system shown in the accompanying drawings is designed to be used in connection with a Morton distributor and comprises a hopper feeder 2 equipped with the usual feeler fork or rake 3, which automatically controls the gate on the conveyor of the Morton distributor in a well known manner, and causes this apparatus to deliver cotton to the hopper 2 substantially in accordance with its requirements.

The hopper feeder includes the usual inclined feed lattice and it delivers cotton to an evenor 4, which, in turn, feeds the cotton to the first picker unit of the system, this unit comprising a beater section 5 and a condenser section 6. From the condenser the cotton passes into a second picker unit including a beater section 7 and a condenser section 8. The latter section delivers the cotton to another evenor 9, which feeds it to the final unit of the system, this unit consisting of a picker lapper or finisher lapper which includes a beater section 10, a condenser 11 and a lapper head 12. These various units are all of known constructions.

The details of construction of and certain of the connections between these various units are best illustrated in Figs. 3 and 4. Referring to Fig. 3 it will be seen that the hopper feeder 2 delivers its cotton in the usual manner directly on to the upper reach of a horizontal lattice 14 which carries the cotton forward under the driven rolls 15 and 16 to the feed rolls 17 immediately in front of the evenor roll 18. The usual pedal mechanism, parts of which are indicated at 20, cooperate with the roll 18 and with a lever mechanism of the type common in evenors, to adjust the evenor belt 22 running over the driving and driven cones 23 and 24, respectively, Fig. 1. The upper of these cones is connected through worm gearing with a chain 25 which drives the feed lattice of the hopper feeder, and also operates through another worm gearing mechanism 26 to drive the horizontal lattice 14, feed rolls 17 and the evenor roll 18, all in a well known manner.

As shown in Fig. 3 the evenor mechanism feeds the cotton to the first beater section, the beater 27 of this unit picking from the evenor pedals 20. It will be clear from the foregoing description that the entire feed of the cotton from the hopper feeder 2 to this first beater section is under the control of the evenor.

The screens of the condenser 6 receive the cotton from the beater section 5 and deliver a web of cotton in which the fibres are very loosely associated with each other to the rolls 28, Fig. 3,

commonly referred to as "delivery rolls." This web moves across a short plate 30 into the nip of another pair of rolls 31 which feed it to the beater section 7 of the second picker unit.

5 In a similar manner the cotton is taken from this beater by the condenser 8 and is delivered upon a horizontal lattice 35, Fig. 4, which carries it to the feed rolls 36 of the evenner 9. Preferably a driven roll 37 cooperates with the lattice 35 to
10 pack the cotton against the feed rolls 36. From this point the cotton passes under the evenner roll 38 and over the pedals 40, into the beater section 10 of the finisher unit, the condenser 11 taking the cotton from this beater and delivering it to the
15 calender rolls of the lapper head where the web is compressed and consolidated and finally is wound up into a lap 41.

It will be observed that in this system the cotton is fed automatically in a continuous stream
20 from one picker unit to the next, without interruption at any point between the hopper feeder 2 and the winding of the lap in the lapper head 12. A lap customarily weighs 48 lbs. although a variation of half a pound above or below this figure is
25 ordinarily considered permissible. In addition to this general standard of uniformity it is also highly desirable to have as little yard for yard variation as possible in the web.

When the cotton is delivered to the picker by a
30 Morton distributor there is necessarily considerable variation in the rate at which the cotton will be fed from the hopper feeder 2, due largely to variations in the quantity of cotton in the hopper at different times. While the control afforded by
35 the feeler or rake 3 and the mechanisms which it governs is fairly sensitive, nevertheless variations will occur in the quantity of cotton delivered to any supply hopper fed by a distributor. Such variations may be due to peculiarities of individual machines, or more especially to its position in
40 the line of machines fed by the distributor, since the feeder nearest the supply end of the Morton conveyor will, other things being equal, have a more uniform supply of cotton than will subsequent
45 feeders in the line, chiefly due to the fact that it has the first call on the supply carried by the conveyor so that it receives cotton whenever it wants it, whereas any other machine in the line receives cotton only when no other preceding machine is calling for cotton.

The variations in the rate of flow of cotton to the first picker unit in the system are substantially reduced by the evenner 4 and this fact materially reduces the work required of the second
55 or final evenner 9, thus permitting a closer setting of the latter evenner so that it will deliver cotton to the beater 10 of the lapper with a very considerable degree of uniformity or evenness.

In order further to reduce such variations, connections are provided to enable the second evenner
60 9 to exercise a very close control over the feeding mechanisms located between the intermediate units, and a general control over the operation of the first evenner 4. Referring to Fig. 1 it will be
65 seen that the lower cone of the final evenner 9 is secured fast on a shaft 42 which is driven from the calender shaft through an angular driving mechanism 43 like that shown in Patent No. 1,397,244. The evenner includes a belt 44 running on the upper
70 and lower cones and also the usual lever mechanism 45, operated by the evenner pedals, for adjusting the belt 44. The upper or driven cone of the evenner mechanism drives the feed rolls 36, the evenner roll 38 and the lattice 35 through connections similar to those provided between the evenner

4 and the corresponding parts, this mechanism being well known in this art. Such a mechanism is shown, for example, in pending application, Serial No. 425,570, assigned to the assignee of this invention.

The lever mechanism 45 of the evenner adjusts the belt shipper carried by the slide 46, and this slide is connected by a link 47 to a similar slide 48 carrying another belt shipper for controlling the position of a belt 50 running on two cones 51 and
10 52 of a variable speed mechanism. The lower of these cones is driven at a substantially constant speed by means of a belt connection 53 running to the shaft of the beater 7. The speed of the upper cone, however, is entirely under the control
15 of the evenner 9 and the shaft of this upper cone 52 carries a worm for driving the worm wheel 54 which is gear-connected with the screens of the condenser 6, the delivery rolls 28 and feed rolls 31. This gear 54 also is connected through bevel gear-
20 ing and a horizontal shaft 55 with gears 56 which drive the screen of the condenser 8.

It will also be seen from an inspection of Fig. 1, that the driving shaft 23 of the evenner 4 is driven from the upper cone 52 of the variable speed
25 mechanism through the belt connection 58 and the horizontal shaft 60.

As above indicated, the first evenner 4 will operate so far as it can to reduce the variations in the thickness of the web which it delivers to
30 the first beater section 5. It can, however, effect only a relatively rough evening operation. The second, or final evenner 9 delivers a sheet which is far more uniform than that delivered by the first evenner. This is due to the fact that it does
35 not have the extreme variations to contend with which the first evenner must handle; and this, in turn, is partly due to the action of the first evenner, and partly also to the fact that the parts which feed the cotton from the condenser 6 to the
40 beater section 7, and from the second condenser 8 to the evenner 9 are all under the control of the latter evenner. Consequently, when this evenner finds that the cotton is coming to it too fast, it operates automatically through the mechanism just described to slow down, not only its
45 own feed lattice 35 and feed rolls 36, but also all of the preceding feeding units, including those controlled by the evenner 4. On the other hand, if the sheet coming to the pedals of the evenner
50 is too thin, it will automatically speed up all of the preceding feeding units. In this way the second evenner exercises a general control over the operation of the first evenner and, in addition, it also controls the speed of the three intermediate feeding units.

In single process picker systems now in use, a second hopper feeder is located immediately in front of the evenner 9 and is utilized to exercise a control over the rate of feed of cotton through
60 preceding parts of the system. We have found, however, that this additional hopper feeder can be dispensed with, and the system correspondingly simplified, if suitable provision is made to deliver an abnormally thick web of cotton to
65 the pedals of the evenner mechanism 9. This may be accomplished in a variety of ways, but in the system shown this object is realized by making the condenser 8 of abnormally large capacity and driving the condenser screen and its delivery lattice at a lower speed than usual so that the cotton will be thickened at this point in the stream and an abnormally heavy web will be delivered to the evenner pedals. For example, the ordinary web of standard width of forty or
75

forty-five inches handled in a system of this character weighs in the neighborhood of twenty-four ounces to the running yard. We have found, however, that if the web delivered to the pedals of the eveners 9 is thickened to such an extent that the web weighs from forty to sixty ounces (a weight of between fifty and fifty-five ounces being preferred) the eveners then will deliver a far more even and uniform sheet than when it handles a web of lighter weight. The increased weight of the web may require an increase in diameter of the condenser screen from the usual twenty-two inch size to, say, twenty-seven to thirty inches. Any suitable type of condenser may be used. It is preferable, also, to so regulate the feed of cotton to the first eveners 4, that the web acted upon by the eveners pedals will weigh from forty to sixty ounces to the running yard, it being understood that in referring to the web, both here and throughout the specification, a web of standard width is meant unless the contrary is specifically stated. However, the same ratio between width and weight per running yard can be maintained in special widths.

This arrangement thus avoids any large accumulation of cotton at any point in the system. Instead of breaking or interrupting the stream of cotton between two adjacent units, as in an arrangement in which an intermediate hopper feeder is used, the present system maintains a continuous, unbroken stream of cotton flowing from the delivery rolls or lattice of each unit to the infeed of the next, the integrity of the stream being maintained during this entire feeding operation. This arrangement also avoids the necessity for folding or doubling the web at an intermediate point in the system which feature has been used in one of the prior single process systems. While in practice this prior system in which the doubling feature is used has proved very satisfactory, the present system is simpler. It maintains an approximately uniform flow of cotton between the delivery end of each picking unit and the infeed of the next, the cross-sectional area of cotton when compacted under a given pressure being substantially uniform throughout each section of the stream between said delivery and infeed points. At the same time the cross-sectional area of one section of the stream between certain of said pickers may be different from that in another section, and the cotton in one part of any section may be fluffed up at some points and more compacted at others. This is the case, for example, between the condenser 8 of the second picker unit and the beater 10 of the final unit where the cotton is compacted in passing through the feed rolls 36, and is still further compressed in passing under the eveners roll 38, although approximately equal quantities of cotton are moving past each successive point along the lattice 35 between the condenser 8 and the rolls 36, and a like quantity is also travelling at any instant past each of the rolls 36 and 38. In this sense the stream of cotton between the condenser 8 and the beater 10 may be said to be "uniform", as distinguished from a condition in which the stream of cotton is folded or doubled at some point in its feeding movement and the cross-sectional area and the quantity of cotton are correspondingly increased at said doubling point.

The feeding of the cotton to the second eveners in the form of a condensed web as it issues from the condenser 8 is of advantage in facilitating the control of the cotton and avoids difficulties

which have been experienced in prior systems where the cotton comes to the second condenser in a very fluffy condition and consequently in a large and rather unwieldy stream.

When the winding of the lap has been completed the machine automatically shuts down or "knocks off" in a manner well understood by those skilled in this art, and the mechanism provided to accomplish this object preferably is arranged to shut down all the feeding units throughout the system. For this purpose the usual knock-off lever or bar 62, Fig. 1, is connected by link 63 with an arm projecting laterally from the upright rock-shaft 64, so that the dropping of the bar 62 will rock this shaft about its axis. This movement operates a clutch lever 65 to throw out a clutch through which the worm wheel driven by the upper cone is connected with the other units which it drives. Another arm on this rock-shaft is connected by a link 66 to the control lever of a positive driving unit 67, like that shown and described in the Shaw Patent No. 1,735,135, this unit being constantly driven by a belt connection with the shaft of the beater 7. This unit is operatively connected by a link 68 with a second rock shaft 70 carrying a lever for operating the clutch 71, Fig. 2, through which the worm wheel 54 drives the cotton feeding units associated with the condensers 6 and 8. Another link 72 connects the rock shaft 70 with a third rock shaft 73 which is arranged to operate the clutch 74 located between the upper cone 24 and the rolls that feed the cotton into the beater section 5. A similar connection with the rock shaft 73 controls the clutch 75 through which the eveners mechanism 4 drives the lattice of the hopper feeder 2.

Consequently, when the lapper knocks off, all of the feeding mechanisms throughout the system are automatically stopped, and similarly, when the drop bar 62 is raised to start the lapper again, all of the feeding mechanisms are started up substantially simultaneously.

While we have herein shown and described a preferred organization of apparatus, it will be evident that the invention may be embodied in a considerable variety of other forms without departing from the spirit and scope thereof. Also, that the method or process provided by this invention can be practiced with the aid of apparatus differing from the particular arrangement shown.

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

1. That improvement in methods of picking cotton which consists in performing a plurality of picking operations on a stream of loose cotton and finally working it into the form of a finished lap, feeding the cotton in a continuous and approximately uniform stream from the delivery of each of said operations to the infeed of the next, at an intermediate point in the process working the cotton into a thickened web in which the fibres are loosely associated with each other, and evening said thickened web.

2. That improvement in methods of picking cotton which consists in performing a plurality of picking operations on a stream of loose cotton and finally working it into the form of a finished lap, feeding the cotton in a continuous and approximately uniform stream from the delivery of each of said operations to the infeed of the next, at an intermediate point in the process working the cotton into a condensed and thickened web weighing at least forty ounces to the running yard in a web of standard width, and

evening said web before delivering the cotton to the next succeeding picking operation.

3. That improvement in methods of picking cotton which consists in performing a plurality of picking operations on a stream of loose cotton and finally working it into the form of a finished lap, feeding the cotton in a continuous and approximately uniform stream from the delivery of each of said operations to the infeed of the next, evening the cotton immediately prior to one of the later picking operations, and thickening the stream of cotton to present the cotton at said evening point in a web weighing at least forty ounces to the running yard in a web of standard width.

4. That improvement in methods of picking cotton which consists in performing a plurality of picking operations on a stream of loose cotton and finally working it into the form of a finished lap, feeding the cotton in a continuous and approximately uniform stream from the delivery of each of said operations to the infeed of the next, evening the cotton at an intermediate point in the process, and slowing up the rate of travel of the cotton immediately prior to the said evening operation to thicken the stream of cotton presented to the evening instrumentalities.

5. That improvement in methods of picking cotton which consists in subjecting the cotton to a plurality of picking operations and finally working it into the form of a lap, feeding the cotton in a continuous stream from each of said operations to the next, evening the cotton at an intermediate point in said process, thickening the stream of cotton by condensing it just before it reaches said evening point to present an abnormally thick stream of cotton to the action of the evening instrumentalities, and maintaining a well defined, continuous and approximately uniform stream of cotton constantly moving forward at each of the feeding points between the delivery of one picking operation and the infeed of the next.

6. That improvement in methods of picking cotton which consists in subjecting the cotton

to a plurality of picking operations and finally working it into the form of a finished lap, evening the cotton at an intermediate point in said process, thickening the stream of cotton by condensing it just before it reaches said evening point to present an abnormally thick stream of cotton to the action of the evening instrumentalities, and feeding the cotton continuously from each of said picking operations to the next in an approximately uniform stream, the integrity of which is constantly maintained during the feeding operation.

7. That improvement in methods of picking cotton which consists in subjecting a continuous stream of cotton to a plurality of beating operations, condensing the cotton between successive beating operations, evening the cotton prior to the final beating operation, utilizing a condensing operation preceding said evening operation to thicken the stream of cotton and to work the cotton into an abnormally thick web weighing between forty and sixty ounces to the running yard in a web of standard width, and feeding said web to the evening instrumentalities.

8. That improvement in methods of picking cotton which consists in subjecting a continuous stream of cotton to a plurality of beating operations, condensing the cotton between successive beating operations, calendering the web of cotton produced in the final condensing operation, winding said web to form a lap, evening the cotton prior to the final beating operation, causing the condensing operation preceding said final beating operation to slow up the rate of travel of the cotton and to work the cotton into a web weighing at least forty ounces to the running yard in a web of standard width, feeding said web to the evening instrumentalities, and acting on said stream of cotton at points preceding the latter condensing operation to reduce variations in the flow of cotton toward the point at which the latter condensing operation is performed.

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