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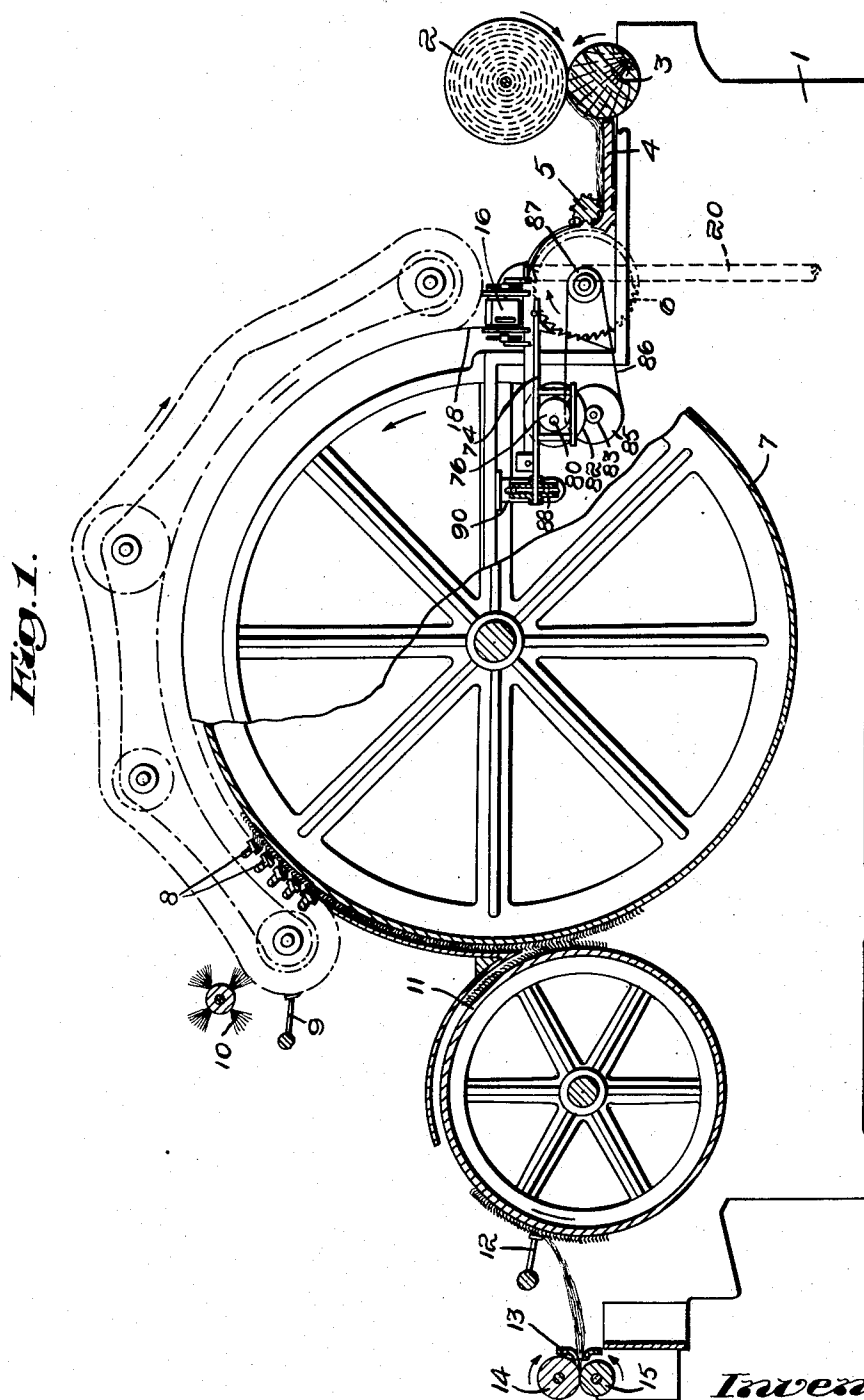
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2,433,810

METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

8 Sheets-Sheet 1



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METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

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Fig. 2.

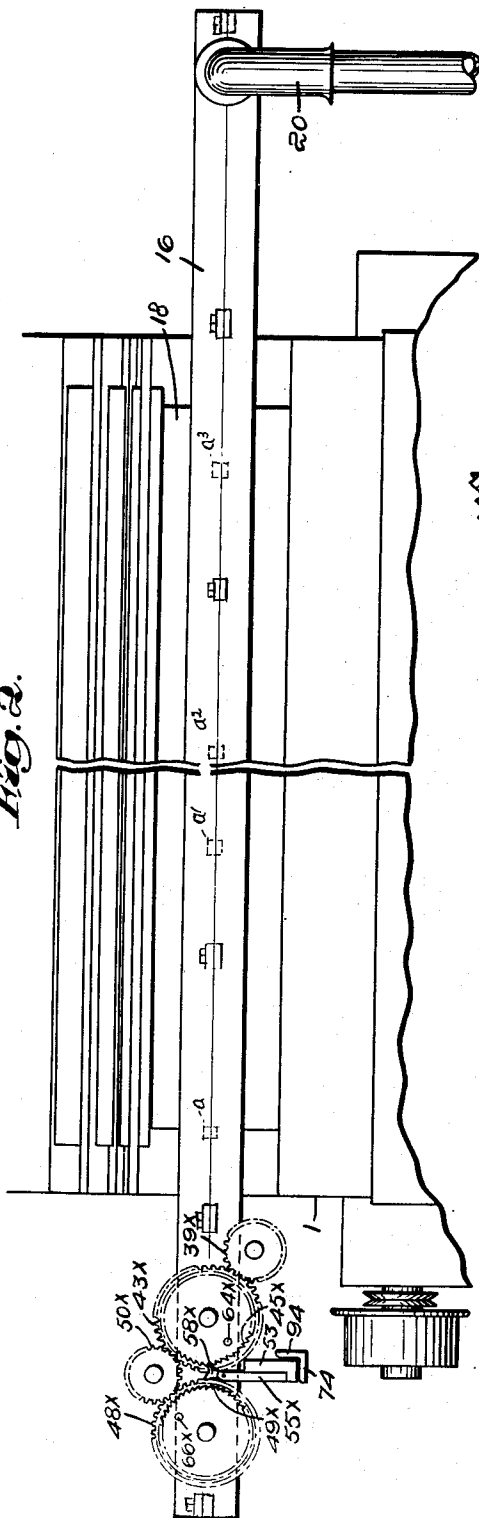
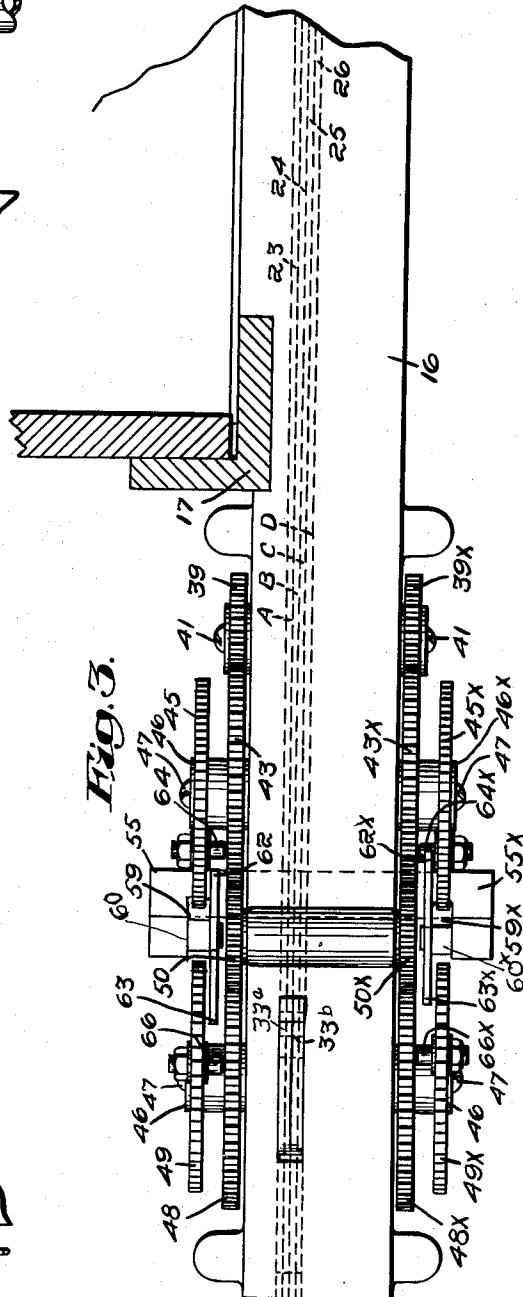


Fig. 3.



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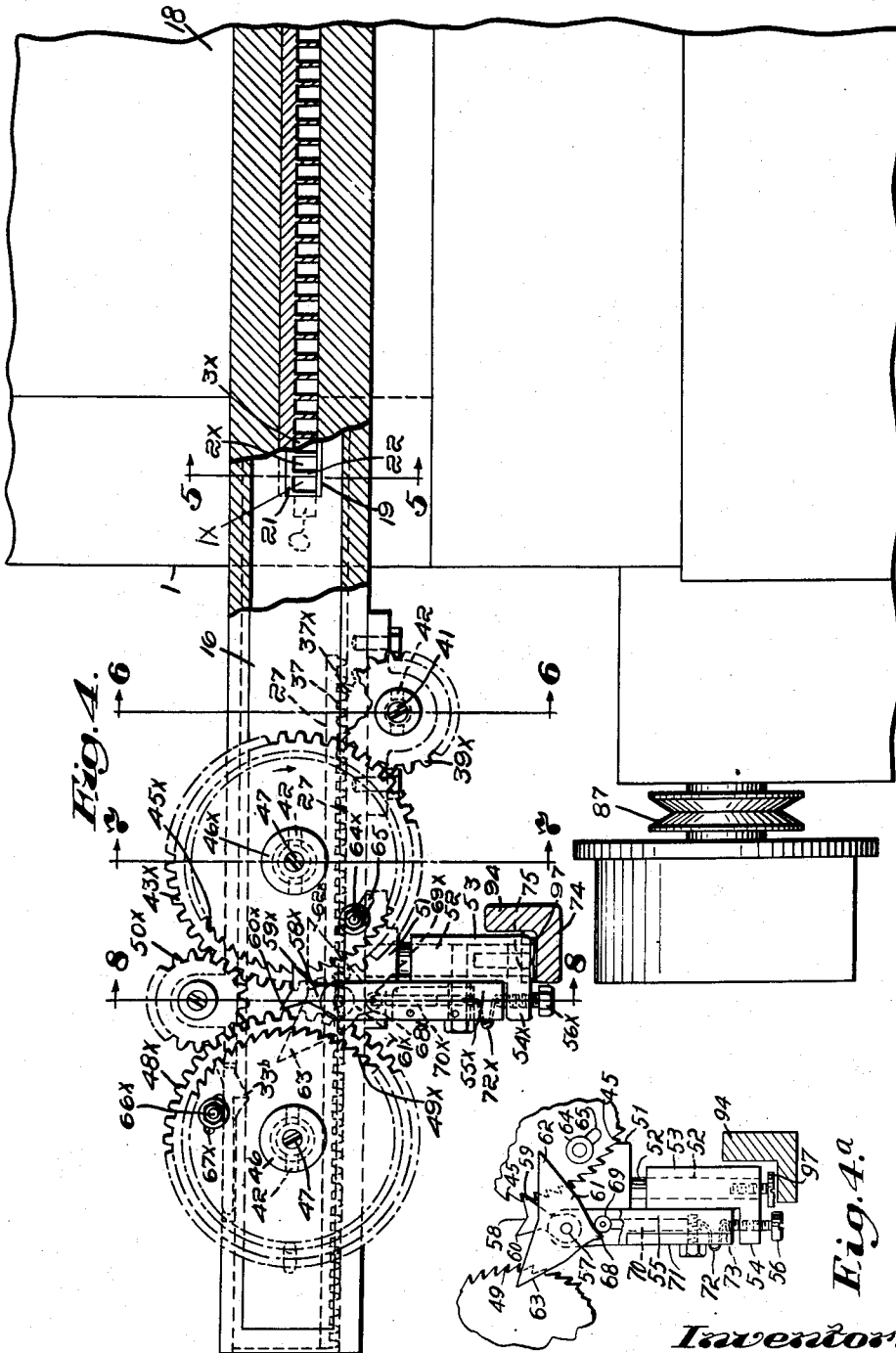
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METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

8 Sheets-Sheet 3



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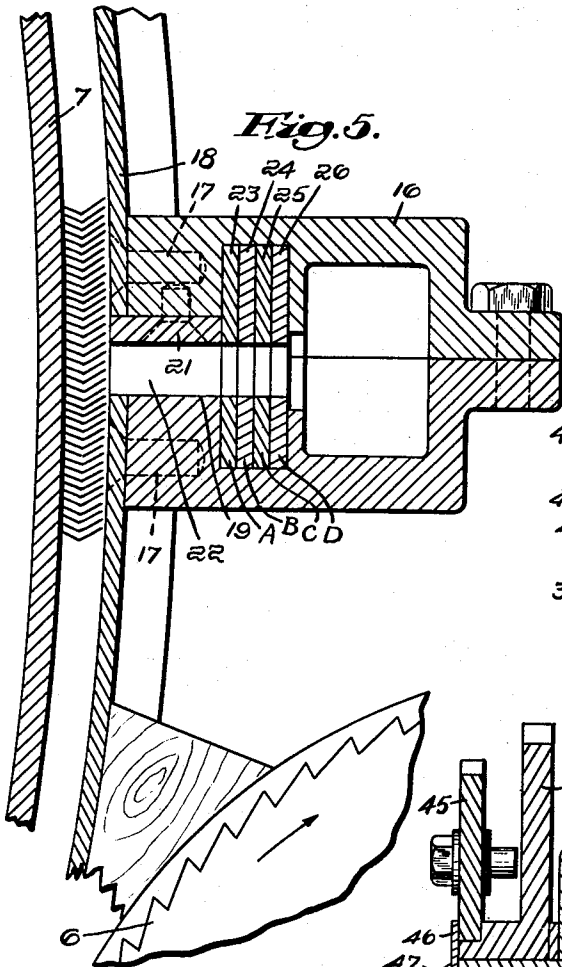
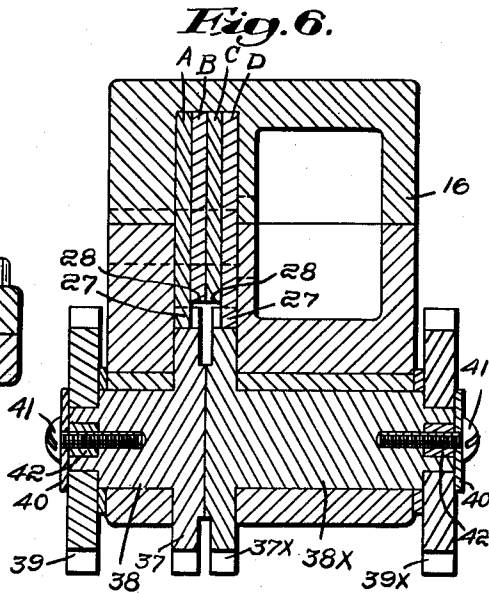
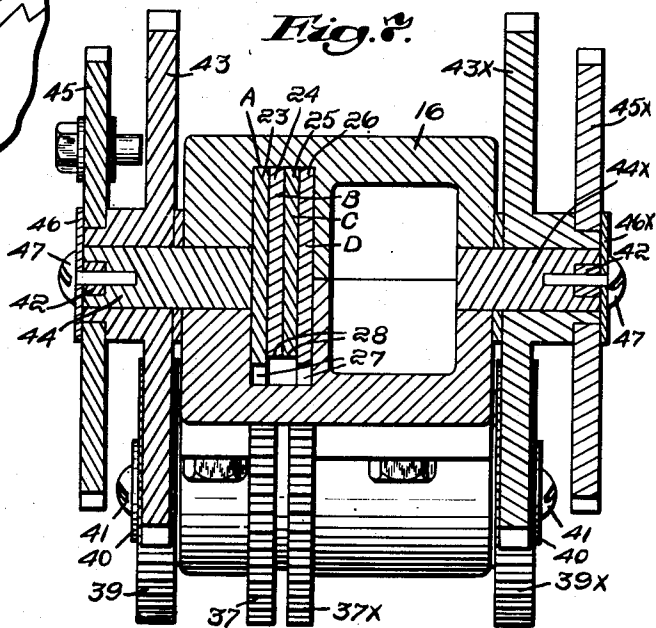
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METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

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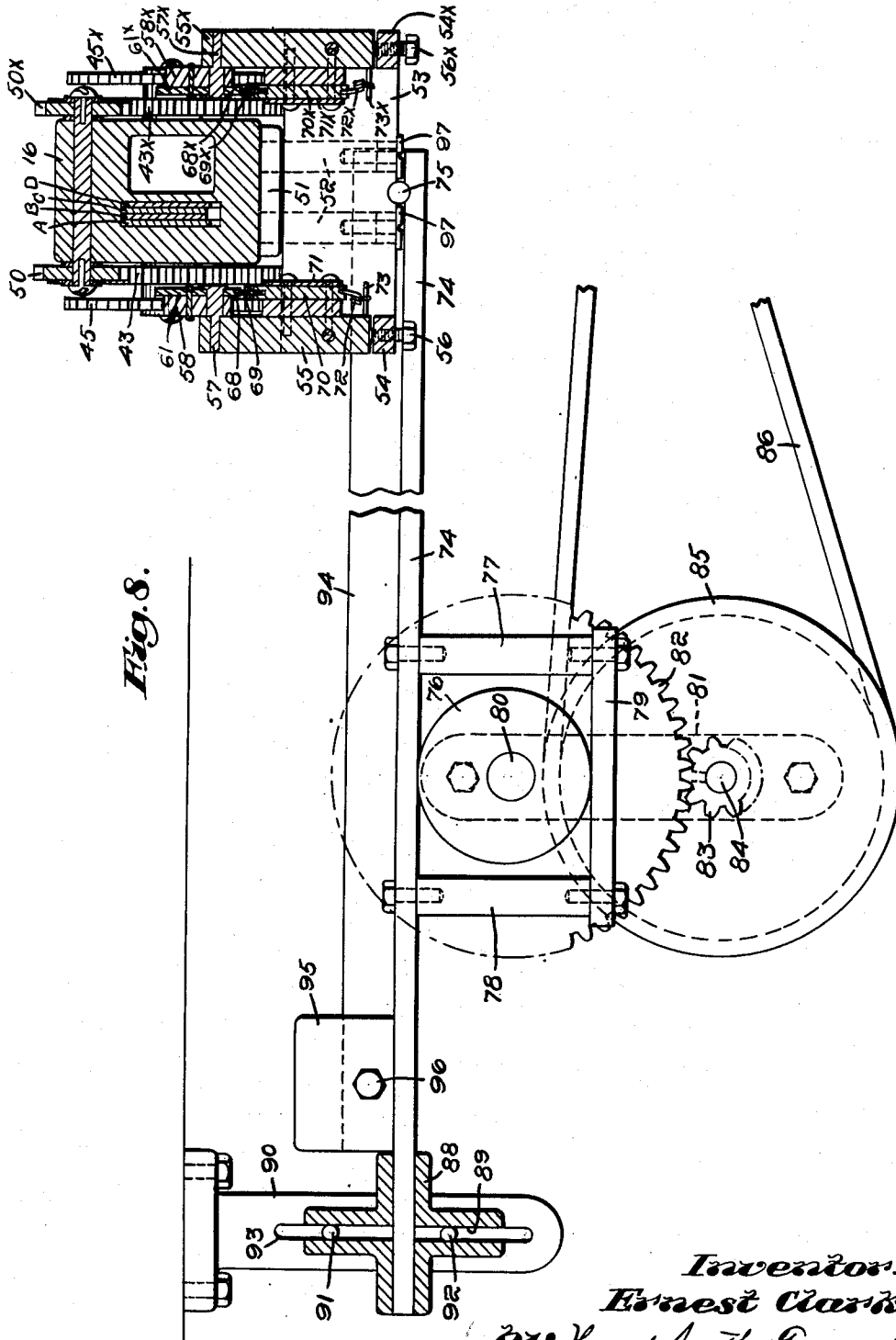
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METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

8 Sheets-Sheet 5



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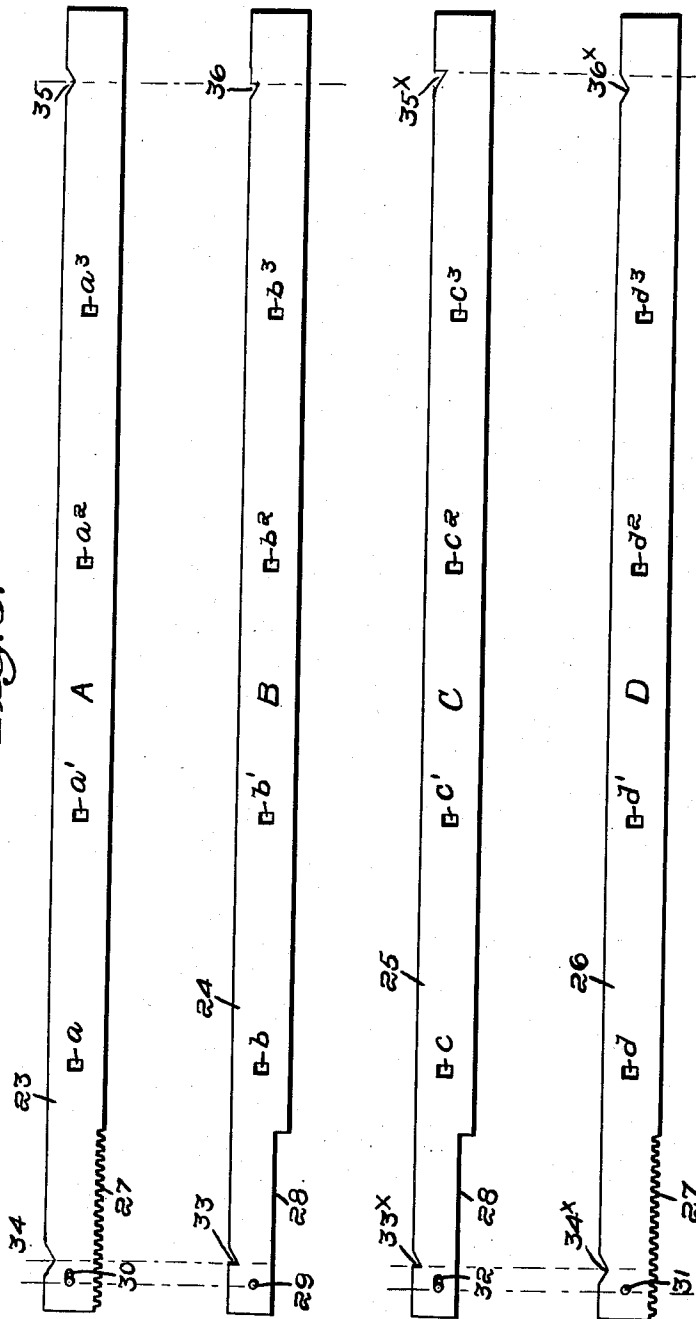
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METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

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Fig. 9.



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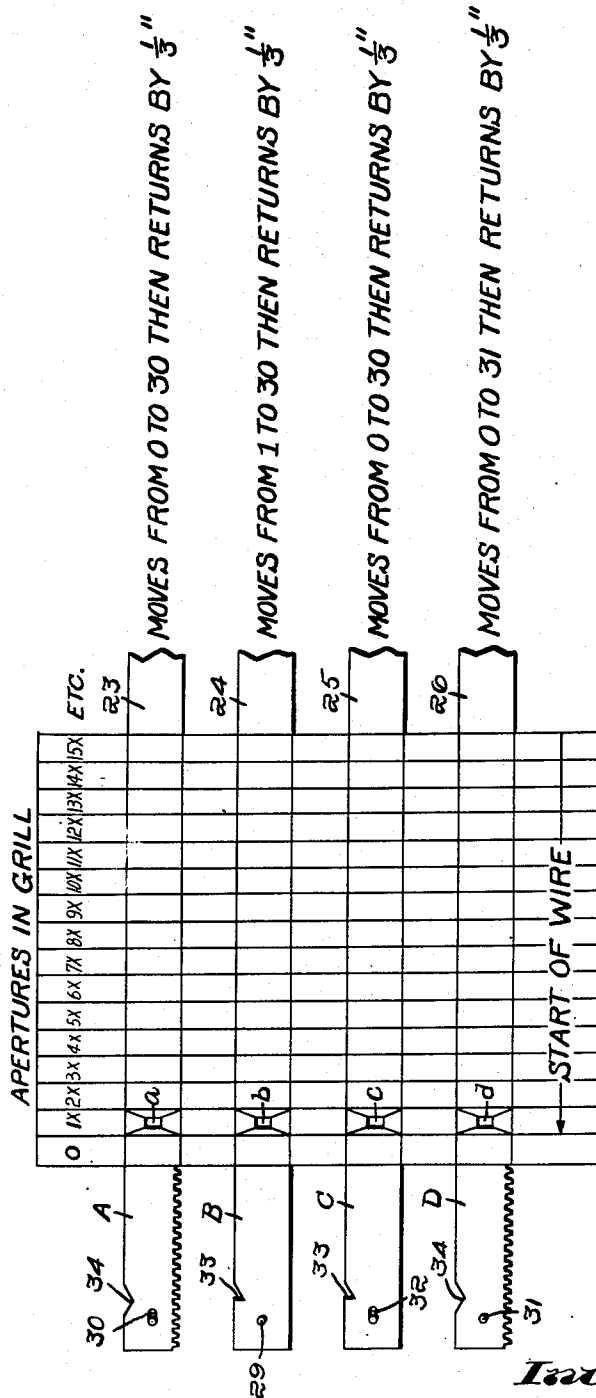
2,433,810

METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

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Fig. 10.



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2,433,810

METHOD AND APPARATUS FOR STRIPPING CYLINDERS OF TEXTILE MACHINES

Filed Feb. 19, 1944

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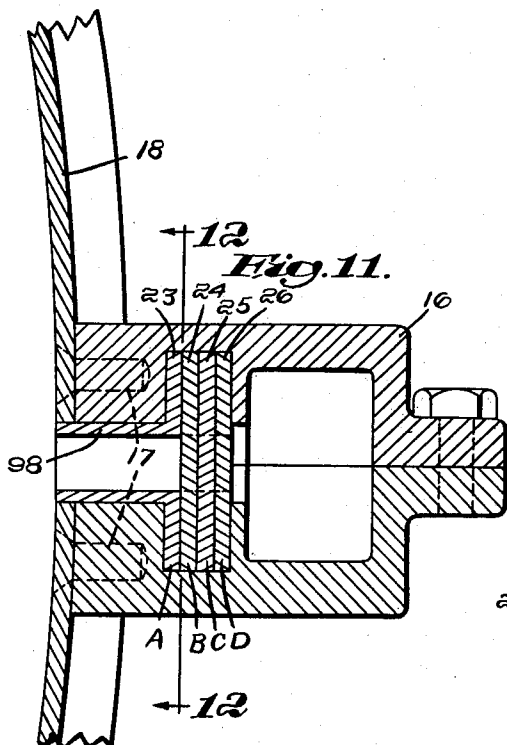


Fig. 12.

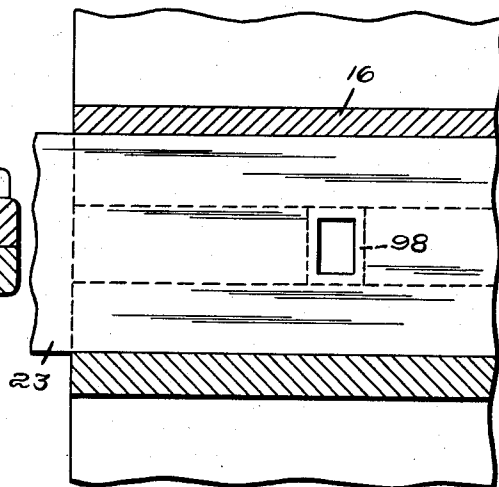


Fig. 13.

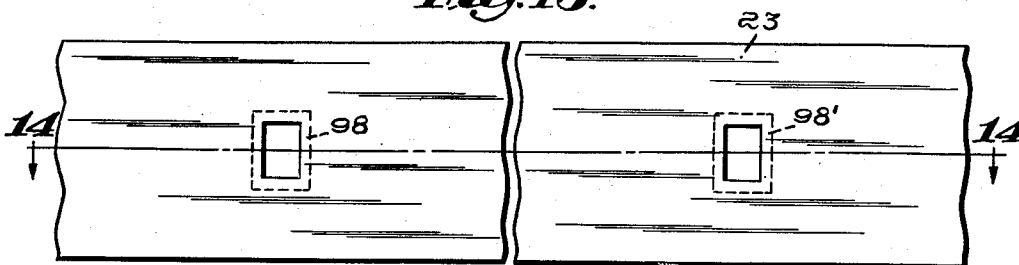


Fig. 14.



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UNITED STATES PATENT OFFICE

2,433,810

METHOD AND APPARATUS FOR STRIPPING
CYLINDERS OF TEXTILE MACHINESErnest Clark, Brockton, Mass., assignor to Abington Textile Machinery Works, Abington, Mass.,
a trust of Massachusetts

Application February 19, 1944, Serial No. 523,102

11 Claims. (Cl. 19—109)

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This invention relates to methods and apparatus for stripping from the toothed cylinder of a textile machine the residue of textile fibres and foreign material which is gradually accumulated and impacted thereon so as to form a mat which is not doffed in the usual operation of the machine.

The general object of the invention is to provide a continuously operating method and apparatus for intermittently stripping the accumulated material from the cylinder in narrow furrows in such manner as to maintain a maximum and uniform production of the machine without interruption of the continuous operation thereof.

More specifically the invention relates to methods and apparatus for intermittently pneumatically stripping material accumulated on a card clothed cylinder or cylinders of a carding machine in such manner and at such times as to permit the production of a continuous sliver of uniform density and which will not in itself require the attendance of an operator, or at most require a minimum amount of his time.

A further object of the invention is to provide a pneumatic card stripping machine which will insure the production of a clean sliver of uniform density throughout its width with a minimum waste of good fibre.

I am aware that heretofore vacuum stripping apparatus has been employed for stripping card cylinders some of which has required the interruption of production during the stripping operation and others of which intermittently strip a continuously rotating card cylinder at intervals by singly or simultaneously stripping from the mat of accumulated material widely spaced furrows according to a predetermined pattern so as to leave unstripped areas of the mat therebetween, the pattern being such that the succession of furrows eventually remove the impacted mat of material from the cylinder.

In such apparatus the stripping has heretofore been accomplished in advance of or beyond the doffer. When vacuum or suction is applied to strip a narrow furrow from the mat substantially all the material immediately beneath the suction passage is removed from the cylinder but on either side of the suction passage the suction has insufficient pull to remove all the fibres acted upon by it and such adjacent fibres are loosened and partly drawn out and therefore project beyond the periphery of the card clothing forming "dog tails." Such loosened fibres are actually waste and should not go into the sliver. When such "dog tails" are produced beyond flats

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which cooperate with the carding cylinder and in advance of the doffer they are removed along with the good material when the sliver is combed from the doffer and form part of the sliver. Likewise, if the stripping is accomplished beyond the doffer the "dog tails" thus formed are carried along with and so embedded in the fresh fibre fed to the carding cylinder by the lick-in that they cannot be effectively removed by the flats. In either case therefore a substantial amount of waste is embodied in the sliver.

One of the important objects of the invention is to avoid the introduction of such waste "dog tail" material into the sliver. This is accomplished in the present invention by reducing the amount of "dog tail" produced by successively removing, in direct sequence, lengthwise of the cylinder in one direction adjacent furrows from the mat on the cylinder thereby producing the undesirable waste "dog tails" only along one side of each successive furrow and also by locating the stripping mechanism between the lick-in and the flats thereby enabling the flats to remove and discharge the undesirable fibres and foreign matter of the "dog tails" as well as so to card the good fibre into a uniform layer which when removed by the doffer will produce a sliver of uniform density throughout its width.

By thus stripping in said sequence the circumferential furrows from the mat of material accumulated upon the carding cylinder between the lick-in and the flats without interruption of the feeding-in of the stock, the uncarded stock and the furrow in the mat therebeneath are removed by the stripper before the remainder of the stock is carded by the action of the card clothing of the cylinder and flats thereby preventing the "dog tail" or "dog tails" from being forced or mashed into the clothing of the cylinder and enabling the flats to act upon and card the long fibres and refill the furrows with good fibre before the carded material upon the cylinder is presented to the doffer and removed therefrom by the doffer comb and insuring substantially uniform density of the sliver.

The method forming the subject matter of the present invention comprises stripping narrow furrows of the material accumulated upon the cylinder of a textile machine by successively stripping in said direct sequence and in repeated cycles from a mat of material accumulated thereon adjoining narrow furrows of said material with uniform periods of time intervening between the stripping of adjacent furrows and preferably simultaneously stripping each of a plurality of

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equally spaced adjacent furrows of said material with predetermined uniform periods of time intervening between the stripping of adjoining furrows.

The method further comprises broadly the stripping of the mat of material accumulated upon a carding cylinder of a carding machine having a licker-in and flats cooperating with said cylinder of narrow circumferential furrows from said mat of material intermediate of the licker-in and the flats thereby causing the waste material of the "dog tail" or "dog tails" projecting from the mat adjacent the edge or edges of the furrows to be discharged by the flats and the good fibre thereof carded into the furrow spaces to provide a substantially uniform layer of carded material to be removed by the doffer.

A further object of the invention is to provide suitable apparatus for performing the methods above described.

These and other objects and features of the invention will more fully appear from the following description and the accompanying drawings and will be particularly pointed out in the claims.

Preferred embodiments of the invention are illustrated in the accompanying drawings, in which,

Fig. 1 is a conventional end elevation, partially in section, of a standard carding machine illustrating the manner in which the continuous stripper embodying the invention is applied thereto, parts of the frame being omitted;

Fig. 2 is a detail rear side elevation centrally broken away illustrating the suction conduit as mounted on the back plate intermediate of the licker-in and the flats and showing a portion of the mechanism which is mounted upon the suction conduit for actuating the shutter valves of the stripper mechanism;

Fig. 3 is an enlarged detail plan view of a suction conduit with an end portion of the suction conduit, having mechanism for actuating the shutter valves of the stripping mechanism, and showing the shutter valves within the conduit in broken lines;

Fig. 4 is an enlarged side view, partly in section, illustrating the mechanism for actuating the shutter valves, the suction conduit and one form of a grill mechanism through the spaces of which suction is applied to strip adjacent furrows from the mat of material accumulated upon the carding cylinder;

Fig. 4a is a detail view illustrating the ratchet-actuating pawls and reversing mechanism shown mainly in dotted lines in Fig. 4;

Fig. 5 is an enlarged vertical sectional view on line 5—5, Fig. 4, illustrating the suction conduit, the valve mechanism with ports thereof in alignment and the passage through which stripping suction is applied to the accumulated mat on the cylinder;

Fig. 6 is an enlarged detail vertical sectional view on line 6—6, Fig. 4;

Fig. 7 is an enlarged detail vertical sectional view on line 7—7, Fig. 4, of the suction conduit, the shutter valves and mechanism for actuating the same;

Fig. 8 is an enlarged detail view, partially in vertical section, on line 8—8, Fig. 4, and illustrating also in side elevation the mechanism for actuating the mechanism controlling the shutter valves;

Fig. 9 is a view showing four cooperating shutter valves one above the other in the position in

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which equally spaced ports therein are positioned in registry, it being understood that the valves when assembled closely contact;

Fig. 10 is a view diagrammatically illustrating the relative movements of the respective shutter valves during the operation of the stripping mechanism;

Fig. 11 is an enlarged detail vertical sectional view of a modification of the invention in which one of the shutter valves is provided with a tubular extension reciprocally mounted in a slot in the wall of the suction conduit and permits elimination of the grill shown in Fig. 4;

Fig. 12 is a detail sectional view on line 12—12, Fig. 11;

Fig. 13 is a vertical elevational view centrally broken away of the shutter slide valve having the tubular extension shown in Fig. 11; and,

Fig. 14 is a horizontal sectional view on line 14—14, Fig. 13.

Preferred forms of mechanism for performing the method above described are illustrated in the accompanying drawings as applied to a usual form of carding machine which, as illustrated in Fig. 1 of the drawings, comprises usual parallel suitably spaced and connected side frames 1 supporting the various parts of the carding mechanism, and illustrates the usual roll of lap 2 from which the lap is delivered by the lap roll 3 upon a feed plate 4 from which it is delivered by a feed roll 5 to the rotating toothed licker-in 6 from which it is drawn by the card clothed surface of the more rapidly rotating main carding cylinder 7. The lap or web on the carding cylinder is then acted upon by the usual series of flats 8 which are provided with card clothing and which closely surround and travel in the same direction as that of the periphery of the carding cylinder and serve to draw the fibres into substantial parallelism and from which shorter fibres and foreign material are removed by a stripping comb 9 and a stripping brush 10. The carded fibres are removed from the carding cylinder by the usual card clothed doffer 11 which travels at a slower peripheral speed than that of the carding cylinder and the carded fibres are removed from the doffer by a doffer comb 12 and delivered in sheet form to a trumpet 13 from which it is drawn in the form of a silver by a pair of calender rolls 14 and 15.

In the operation of carding machines a mat of uncarded waste material accumulates upon the carding cylinder and gradually builds up on the clothing thereof sufficiently to interfere with proper carding operation and heretofore the stripping of this mat from the carding cylinder has been accomplished by stopping the production of the machine and mechanically or pneumatically removing the mat from it, or in other instances by providing pneumatically operated mechanism for progressively removing narrow furrows from the mat by suction applied at spaced intervals lengthwise of the carding cylinder. In usual carding mechanisms the mat is stripped from the cylinder either between the flats and the doffer or between the doffer and the licker-in. Where a vacuum stripper for removing narrow furrows is applied between the flats and the doffer to remove furrows of the mat in the continuous stripping operation the nozzle not only removes a furrow from the mat but also loosens fibres on either side of the edges of the furrow and draws them up so that they project beyond the teeth of the card clothing forming what are known in the art as "dog tails."

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These loosened fibres are actually waste and should not go into the sliver, but being drawn above the card clothing are caught by the doffer and combed off with the good material.

The "dog tails" are similarly produced where the stripper is located between the doffer and the lick-in and the "dog tails" are intermingled with the new stock which is fed in by the lick-in and is not wholly removed by the action of the flats. One of the objects of the present invention is to prevent the "dog tails" thus produced from becoming a part of the good carded material which forms the sliver. This is accomplished in the present invention by stripping furrows from the accumulated mat continuously at intermittent intervals between the lick-in and the flats so that the projecting "dog tails" are acted upon by the flats and the undesirable material removed by the comb 9 and brush 10.

In usual pneumatic card stripping operations the mat is stripped in spaced furrows so that "dog tails" containing the waste material are drawn up from each of the edges of the furrows. The present invention comprises stripping in direct sequence adjoining furrows from the mat at predetermined intervals in which case the "dog tails" containing the undesirable waste materials are drawn up from one side only of the furrows thereby reducing by half the amount of waste material which has to be removed by the flats to produce a clean sliver.

In the present invention the application of suction to strip furrows from the accumulated mat is so coordinated with the peripheral speed of the carding cylinder and the peripheral speed of the lick-in that sufficient good fibre is carded into the channel from which the furrow is removed to produce a substantially uniform layer of good material before the adjoining furrow is removed from the mat, so that by the present invention a sliver of uniform density throughout its width is produced.

The preferred forms of stripper mechanism embodying the present invention comprise a suction conduit 16, preferably of rectangular cross section, as illustrated in detail in Figs. 5, 6, and 7, which is secured by suitable machine screws 17 to the back plate 18 and extends diametrically throughout the length and beyond the ends of the main carding cylinder 7 and is located between the lick-in and the flats as shown in Figs. 1-4, 5. The conduit 16 is provided with a narrow longitudinal slot 19 forming an intake the end of which lies in close proximity to the card clothing of the rotating carding cylinder. A pipe 20, which is suitably connected to the conduit 16, leads to means for exhausting the air from the conduit to produce a suitable vacuum therein. Desirably the conduit is made of complementary sections provided with flanges which are connected together by bolts, as illustrated in Fig. 5.

In the construction disclosed in Figs. 1-4 the intake aperture 19 is provided with a grill or grid 21 having a series of narrowly spaced parallel partitions 22 forming intake apertures and suitable shutter valves are mounted in the wall of the conduit between the suction chamber thereof and the ports for selectively establishing communication between the chamber of the conduit and intake aperture or equally spaced apertures thereof.

Any suitable type of valve mechanism may be employed to accomplish the purposes herein described. The preferred embodiments of the in-

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vention are illustrated herein as applied to a usual carding machine having a carding cylinder 40" in length and rotating at a speed of 165 revolutions per minute or approximately $2\frac{2}{3}$ revolutions per second. In the preferred construction illustrated the valve mechanism comprises two pairs of shutter valves 23, 24, and 25, 26, of equal length, one of which pairs will be designated for convenience of description of operation as A and B and the other of which pairs will be designated as C and D. The respective shutter valves are provided with four rectangular ports *a, b, c, d*, and each with three other ports *a', b', c', d'*, etc., as shown in Fig. 9, and with extensions of suitable length therebeyond. The under edges of the shutter valves 23—A and 26—D, which will be described as the driving shutters, are provided with rack teeth and the shutter valves 24—B and 25—C respectively, which will be described as the driven shutters, are relieved by a recess 28 to a depth greater than the length of the gear teeth 27 of the shutter valves 23 and 26. The shutter valves are mounted face to face in a suitable guideway in the wall of the suction conduit, as illustrated in Figs. 5, 6 and 7, and are so actuated as to bring their respective ports *a, b, c, d*, into alinement at predetermined intervals to permit stripping of narrow furrows through the apertures in the grill, each of which is approximately $\frac{1}{3}$ " in width.

Means are provided for so actuating the respective shutter valves that the ports *a, b, c, d*, of all of the valves, will be in alinement only at predetermined intervals and are so actuated as successively to cause stripping of adjacent furrows at predetermined intervals. This is accomplished by providing means for causing differential movements respectively between each of the pairs of shutter valves and also for causing differential movement between the valves of each pair. When, as illustrated in Fig. 9, in which the valves are shown in superposed relation with the ports *a, b, c, d*, of all valves in alinement, provision for such differential movement at the end of each traverse is made by providing the shutter valve 24—B with a pin 29 adapted to engage a slot 30, $\frac{1}{3}$ " plus the diameter of the pin 29 in length, in the shutter valve 23—A, and the shutter valve 26—D with a pin 31 adapted to engage a slot 32, $\frac{1}{3}$ " in length, in the shutter valve 25—C. Inasmuch as the shutters are likely to cling together at the time their direction of traverse is reversed the shutter valves are provided with notches adapted to be engaged by a spring detent adapted temporarily to hold one shutter of each pair of shutter valves in stationary position during the initial reversing movement of the other.

As shown in Fig. 9 the shutter valves 24—B and 25—C are provided respectively with right angle notches 33 and 33x, while the shutter valves 23—A and 26—D are provided respectively with V-shaped notches 34 and 34x adapted upon movement thereof respectively to raise the detent out of the right angle notches 33 and 33x upon movement of the driving shutters $\frac{1}{3}$ ". The opposite ends of the shutter valves 24—B and 25—C are provided with right angle notches 36 and 35x, while the shutter valves 23—A and 26—D are provided with V-shaped notches 35 and 36x.

Suitable detents 33b, 33a are provided to engage the notches and to restrain the shutter valves having the right angle notches from longitudinal movement until released by the riding up of the detents 33b and 33a upon the angular surfaces of the V-shaped notches 34x and 34 of the other

shutter valves, thereby to produce a differential movement of the valves of the respective pairs, as will hereinafter be more fully described.

The mechanism for actuating the shutter valves Figs. 3, 4, 7, comprises duplicate gears 37 and 37x which engage the rack teeth 27 of the shutter valves 23 and 26 respectively and desirably are formed integrally with aligned shaft sections 38 and 38x which are mounted in suitable bearings secured to the under side of an extension of the conduit 16 which projects beyond the side frame 1. Suitable like gears 39 and 39x are fixedly secured to reduced outer end portions of the shaft sections 38 and 38x as illustrated in Fig. 6. Inasmuch as the mechanisms for intermittently rotating the gearings which respectively actuate the shutters or valves are similar but operate such mechanisms at times in opposite directions those which actuate the shutter 23 have been designated herein by suitable numerals and like mechanism for actuating the shutter 26 distinguished therefrom by the use of the same numeral with the superscript x. In some instances one of the numerals thus designated does not appear upon the drawing because the part is hidden by other mechanisms.

Means are provided for clamping the gears 39 and 39x upon the ends of the shafts in such manner that the gears can be readily adjusted into perfect synchronism. In the preferred construction shown circular disks 40 are mounted upon the reduced ends of the shafts 38 and 38x and overlie the outer faces of the respective gears (Fig. 6). Clamping screws 41 extending axially into the shafts serve to clamp the respective gears 39, 39x firmly upon the shouldered ends of the shaft 38, 38x. Locking keys 42 are seated in suitable recesses in the end portions of the shafts 38, 38x and the gears 39, 39x.

The gears 39 and 39x respectively mesh with identical gears 43 and 43x which are rotatably mounted upon stud shafts 44 and 44x which are fixedly mounted in the walls of the conduit and project laterally therefrom in axial alignment (see Fig. 7). The hubs of the gears 43 and 43x are provided with reduced end portions upon which circular ratchets 45 and 45x are fixedly clamped by circular plates 46 and axial screws 47 and keys 42 of the character previously described.

Inasmuch as it is desired to cause a traverse of the shutter valves first in one direction and at the end of said traverse differentially to move the shutters of the respective pairs relatively to each other and thereafter cause them to travel in unison in the same direction, means are provided for reversing the direction of rotation of the gears, Figs. 1, 3, 4. In the present construction this is accomplished by providing pairs of gears 48 and 48x in all respects similar to the gears 43 and 43x and mounted upon stud shafts projecting from opposite sides of the conduit and having hubs similar to the hubs 44 upon which are clamped circular ratchets 49 and 49x in the same plane with the ratchets 45 and 45x, but spaced therefrom and providing intermediate gears 50 and 50x which constantly mesh respectively with the gears 43 and 43x and 48 and 48x as illustrated in Figs. 3 and 4.

Suitable means are provided for simultaneously actuating the respective ratchets to rotate the gears 43 and 43x in one direction to cause the gears 37 and 37x to move the driving slides 23 and 26 in one direction, and alternatively for

rotating the ratchets 49 and 49x and the gears 48 and 48x to which they are attached in the opposite direction, thereby causing the intermediate gears 50 and 50x to rotate the gears 45 and 45x in the opposite direction, and consequently to rotate the gears 37 and 37x in a direction to cause the pairs of slides 23—24, 25—26, to traverse in said opposite direction.

The preferred mechanism for accomplishing this purpose comprises a stand 51 which is fixedly secured to the under side of the conduit 16 and is provided with a pair of downwardly extending preferably cylindrical posts 52 upon which is mounted a sliding frame 53 having laterally projecting lower ends 54 and 54x, see Figs. 4 and 8.

Plates 55 and 55x are adjustably supported upon screws 56 and 56x which are mounted in the laterally projecting ends 54 and 54x of the sliding frame 53, as shown in Figs. 4, 4a and 8. The upper ends of the plates 55 and 55x are provided with inwardly extending shafts 57 and 57x having enlarged inner bearing portions upon which pawls 58 and 58x are rotatably mounted. The pawls 58 and 58x are respectively provided with oppositely extending triangular ratchet engaging teeth 59 and 60 and 59x and 60x as shown in Figs. 4 and 4a, adapted respectively alternatively to engage the ratchets 45 or 49 and 45x or 49x, thereby to reverse the direction of rotation of the gears 43, 43x, and the gears 48, 48x, and consequently to reverse the direction of rotation of the gears 39, 39x, and the direction of movement of the pairs of shutters which are respectively driven by the gears 39 and 39x as heretofore described.

The pawls 58 and 58x have bolted to them like reversing cams 61 and 61x having laterally extending preferably triangular end portions 62, 62x and 63, 63x the edges of each being adapted to be engaged by studs 64 and 64x adjustably secured in slots 65 in the ratchet disks 45 and 45x a short distance from the periphery thereof as shown in Fig. 3, Fig. 4, and Fig. 4a. The oppositely extending portions 63, 63x of the reversing cams 61, 61x are adapted likewise to engage studs 66 and 66x adjustably mounted in similar slots in the ratchet disks 49 and 49x. The lower ends of the cams 61, 61x are provided with downwardly extending triangular projections 68 and 68x which are engaged by detent rollers 69 and 69x upon the upper ends of slide bars 70 and 70x which are secured by plates 71, 71x against the inner faces of the respective plates 55 and 55x. Springs 72 and 72x which engage the lower end of the sliding bars 70 and 70x and are mounted at their lower ends upon studs 73 and 73x projecting inwardly from the plates 55 and 55x serve to retain the rollers in engagement with the recesses in the downwardly extending portions of the cams 61 and 61x.

In the construction plainly illustrated in Fig. 4 both pairs of shutter valves 23, 24 and 25, 26 are positioned as having been moved to the left nearly to the full limit of their movement and the end 59x of the pawl 58x is in engagement with the teeth of the ratchet 45x so that upon the next upward movement of the slide 53, and consequently the pawl 58x, the ratchet 45x and its attached gear 43 will be rotated in a clockwise direction, thereby causing the gear 37x which engages the rack 27x of the shutter valve 26 to force it and the companion valve 25 to the left. As the intermittent rotation of the ratchet

45x continues the stud 64x will engage the under surface 62x of the reversing cam 61x and release the end 59x of the pawl 58x from the ratchet 48x and cause the end 60x to engage the ratchet 48x thus depressing the roller 69x and the slide bar 70x against the action of the spring 72x and causing it to roll from the recess over the projecting end 68x of the reversing cam and thereafter to hold the pointed end 60x of the pawl in engagement with the teeth of the ratchet 48x so that upon the next upward movement of the pawl the direction of traverse of the shutter valves 26 would be reversed. In the meantime the detent 33b has entered the notches 33x and 34x in the slides 25 and 26 and on completion of its final stroke to the left the slide 25 will be withheld from movement in said reverse direction until the driven shutter valve 26 has traveled $\frac{1}{3}$ " to the right thereby causing the detent 33b to be raised by the sloping side of the notch 34x out of engagement with the notch 33x in the slide 25, and as the pin is then moved to the opposite end of the slot 32 the shutter valves 25 and 26 will move into unison toward the right.

By suitable adjustment of the studs 64 and 66 upon the ratchets 45 and 49 a differential movement is also produced between the shutter valves 23—A and 24—B at the reversal of traverse of these valves from the left to the right. As the pin 29 of the shutter valve 24—A engages the right end of the slot 30 in the shutter valve 23—A during the travel of the pair to the left, the stud 64 is so set as to cause the cam 61 to shift the pawl from engagement with the ratchet 45 into engagement with the ratchet 49 at the end of the traverse to the left of the pair of valves 23—A, 24—B. At this time the detent 33a engages the notches 33, 34 in this pair. However, as the pin 29 in the shutter valve 24—B engages the right end of the slot 30 in the driven shutter valve 23—A the shutter valve 24—B will be locked against longitudinal movement until the driven shutter valve 23—A is moved $\frac{1}{3}$ " to the right when the detent 33a will be raised by the inclined edge of the notch 34 so that thereafter the pair of shutter valves 23—A and 24—B will travel in unison to the right.

It will be apparent that after the differential movement between the shutter valves of the respective pairs has been effected at the end of their traverse in unison to the left, they will all traverse in unison to the right until they are again reversed at the end of the traversing movement to the right at which time differential movement between the shutter valves of each pair will be produced by the engagement of the studs 66 and 66x respectively with the portions 63 and 63x of the pawl-shifting cams 61 and 61x in which case the sequence of relative movement of the valves of each pair is reversed before the travel in unison to the left.

Suitable means are provided for accurately reciprocating the sliding frame 53 and the mechanisms carried thereby. In the preferred construction illustrated a rigid bar 74 underlies the sliding frame 53 and extends in parallelism with the side frame 1 and a cylindrical bar 75 is seated centrally in complementary recesses in the slide 53 and the bar 74 providing a pivotal support for the sliding frame 53. The bar 74 rests intermediate of its length upon a cam 76 and downwardly extending spaced plates 77 and 78 are connected at their lower ends by a plate 79 which engages the eccentric cam 76 thereby during the rotation of the eccentric causing a positive up-

ward and downward movement of the bar 74. The eccentric 76 is fixedly secured to a shaft 80 mounted upon suitable brackets 81 which are connected to the side frame 1. The cam shaft 80 has mounted upon it a gear 82 which meshes with a pinion 83 having a shaft 84 provided with a pulley 85 which is driven by a belt 86 from a pulley 87 fixedly secured to the shaft of the lick-in 6 as shown in Figs. 1 and 8. The bar 74 has slidably mounted upon its opposite end a crosshead 88 provided with a central vertical slot 89 and is slidably mounted upon a bracket 90 secured to and depending from the side frame 1 of the machine. Pins 91 and 92, which are adjustably mounted in a slot 93 in the bracket 90, respectively limit the upward and downward movements of the horizontal bar 74. The bar 74 desirably is provided with a longitudinal reinforcing web 94 upon which is adjustably mounted a counterweight 95 adapted to be fixedly secured in adjusted position by a clamping screw 96 and so positioned as to counterbalance the weight of the slide 53 and the pawl actuating mechanisms carried thereby.

By reason of this balancing of the bar 74 upon the cam 76 rotation of the lobe of the cam upwardly raises the bar 76 bodily until the end of the bar which is guided in the slot 89 in its cross head 88, as shown in Fig. 8, engages the pin 91 which is secured to the bracket 90. The pin 91 when thus engaged forms a fulcrum and continued upward rotation of the lobe of the cam 76 swings the bar about this fulcrum thereby raising the opposite end of the bar 74 more rapidly. As this more rapidly moving end of the bar 74 is pivotally connected by the cylindrical bar 75 to the sliding frame 53 the sliding frame is raised rapidly and the plates 55 and 55x with the respective pawls which are mounted upon them thus quickly rotates the ratchets engaged by said pawls one step.

Upon further continued rotation of the cam 76 as the crest of the lobe recedes from engagement with the bar 74, the balanced bar 74 descends bodily. During the downward movement the end which is guided by the cross head 88 is limited by engagement of the pin 92.

In order to prevent such excessive downward movement of the sliding frame 53 when the bar thus descends as would cause the pawls 58 and 58x to pass over more than one tooth of the respective ratchets, so that when the bar 74 is again raised it will rotate the ratchet more than one step, suitable stop mechanism is provided to limit the downward movement of the sliding frame 53. As illustrated herein stop members in the form of screws 97 are adjustably secured to the lower ends of the posts 52 and are provided with large heads which underlie the sliding frame 53 and properly limit the downward movement thereof (Figs. 4 and 8).

A modified embodiment of the invention is illustrated in Figs. 11-14 inclusive which differs from that heretofore described in that the grill in the inlet aperture leading from the back plate of the card to the chamber of the suction conduit 16 is omitted and the shutter valve 23 instead of being merely supplied with a port α is provided with a rectangular nozzle 98 which slidably fits in the intake slot of the casing. The construction of the shutter valves 24, 25 and 26 otherwise is as hereinbefore described and the operation of the shutter valves 23—A, 24—B, 25—C, 26—D, is the same as heretofore described. When the ports of all the valves are in alinement suc-

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tion will be applied through the nozzle 98 to strip the narrow furrow from the mat of accumulated material upon the carding cylinder and by the timed movement of the valves will strip adjacent furrows from the mat at predetermined intervals in the manner hereinafter described with respect to both species of the invention.

For clearness in describing the operation of the machine the shutter valves 23, 24, 25, 26, will be referred to respectively as A, B, C, D, and the co-operating ports therein as a, b, c, d, etc.

Fig. 10 represents the relative positions of the shutter valves A, B, C, D, with the ports a, b, c, d, in alinement, and in communication with the first aperture in the grill, the apertures in the grill being numbered consecutively as 1X, 2X, 3X, etc., and it will be noted that a space at the left of the aperture 1X is designated as 0 to provide for the differential movement between the shutter valves of each pair at the reversal of the direction of traverse of all the shutter valves.

Referring to Fig. 9 it will be noted that by reason of the position of the pin 29 of the shutter valve B in the slot 30 in the shutter valve A the shutter valves A and B always have their ports a and b in alinement when traveling in unison toward the right and out of alinement when traveling to the left. The shutter valves C and D always have their ports c and d in alinement when traveling toward the left, and out of alinement when the shutters C and D are traveling toward the right.

The actual amount of movement of each shutter is however as follows: The end aperture of the grill which is at the left end of the card clothing of the carding cylinder is numbered 1X, the next 2X, etc. A non-existing aperture beyond the grill is called zero or 0. The movements of the shutter A will be $\frac{1}{3}$ " for $10\frac{1}{3}$ " or from zero to 30. The movement of shutter B will be 10", limited by the pin 29 in slot 30 and from 1 to 30. The movement of shutter C will be $10\frac{1}{3}$ ", again limited by the pin 31 with slot 32 and from zero to 30. The movement of shutter D will be 10" plus two movements of $\frac{1}{3}$ " each or from zero to 31. This movement is accomplished by the action of the studs 64-64x, and 66-66x, and the pin and slot connection respectively between the shutter valves A-B, and C-D.

Assuming that the ports a, b, c, d, are in alinement, as shown in Fig. 10, to strip a furrow from the carding cylinder, the transverse of the shutter valves will position the ports in the respective shutter valves as follows: the ports a, b, c, d, are in alinement with the first aperture 1X of the grill which is opposite the left hand edge of the card clothing and suction when applied through the alined ports will strip the first furrow from the accumulated mat upon the cylinder. By reason of the rapid rotation of the carding cylinder and the relatively slow actuation of the shutter valves which are driven from the lick-in shaft the stripping of the first furrow will continue during approximately eight revolutions of the cylinder.

By the mechanism above described the shutter A is moved $\frac{1}{3}$ " to the right. This will move the port a to the position 2X as shown in Fig. 10, the shutter B being likewise moved to the position 2X. By reason of the fact that the shutter pin 29 engages the inner edge of the slot 30 on the shutter valve A the ports a and b are at this time in alinement. At this first movement of the shutter A to the right the shutter D is simi-

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larly moved to the left with the result that the shutter C is also moved to the left by reason of the engagement of the pin 31 in the shutter D with the outer end of the slot 32 of shutter valve C. The ports c and d are then in alinement at the zero position and $\frac{1}{3}$ " beyond the edge of the card clothing of the carding cylinder. The passageway for the flow of air through the ports a, b, c, d, is out of alinement.

Upon the next operation of the shutter valve actuating mechanism the ports a and b are in alinement at aperture 3X. In like manner the shutter D is moved at the same but as the reversing stud 64x, Fig. 4, on the ratchet 45x has at this time reversed the traverse of the shutter D it has moved the port d of the shutter D to the aperture 1X. The shutter C has not however moved because the pin 31 in the shutter D has not contacted with the right hand end of the slot 32 in the shutter C until the shutter D has made its full traverse of $\frac{1}{3}$ ". The result so far described is that the port a is at 3X, port b at 3X, port c at zero, and port d at 1X.

The next operation of the shutter valve actuating mechanism traverses the shutters $\frac{1}{3}$ " and the positions are port a at 4X, port b at 4X, port c at 1X, and port d at 2X. Each successive movement by the operating mechanism will carry the shutters A, B, C, D, in unison to the right until the port a is at 30X, port b at 30X, port c at 27X, and port d at 28X, thus completing the traverse of the ports a, b, across $\frac{1}{4}$ of the width of the carding cylinder. Inasmuch as three other ports similar to the respective ports a, b, c, d, are provided in the respective shutter valves and spaced apart a distance of 10" with thirty apertures of the grill in each of said spaces, the same relation of these ports of the respective shutter valves above described will be maintained, thus stripping simultaneously four equally spaced furrows from the mass of material upon the carding cylinder.

At the last stroke of the operating mechanism the reversing stud 66 upon the ratchet 49 has engaged the face 63 of the cam 61 and upon the next stroke swung the pawl into engagement with the teeth of the ratchet 45, thus reversing the direction of traverse of the shutter valve A so that the shutter valve A will now go from right to left. It will be noted that when the shutter A is reversed from 30X to 29X the shutter B did not reverse because the pin 29 in shutter B had not contacted the opposite end of the slot 30 in the shutter A until it had completed its traverse and the position of the ports is

Ports.....	a	b	c	d
Grill apertures.....	29X	30X	28X	29X

Upon the next stroke of the operating mechanism the ports will be positioned as follows:

Ports.....	a	b	c	d
Grill apertures.....	28X	29X	29X	30X

At the next stroke of the operating mechanism the arrangement of the ports will be as follows:

Ports.....	a	b	c	d
Grill apertures.....	27X	28X	30X	31X

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the latter being opposite the furrow stripped from the cylinder when the ports *a*, *b*, *c*, *d*, were in alinement.

At this place the reversing stud on the ratchet 49x engages the face of the cam 62x and swings the pawl 58x so that its end 59x engages the ratchet 45x which controls the shutter D and reverses the traverse of the shutter D so that the next position of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	26X	27X	30X	30X

It will be noted that the reversing movement of the shutter D did not move the shutter C because the pin 31 in the shutter D had not contacted the left end of slot 32 in the shutter C until it had completed its traverse of $\frac{1}{3}$ ".

On the next stroke of the pawl mechanism the alinement of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	25X	26X	29X	29X

This same misalinement of ports continues until the shutter A has reached zero at which time the ports will be positioned as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	zero	1X	4X	4X

At this place the reversing stud 64 engages the surface 62 of the cam and swings the pawl 58 so that the end 60 engages the teeth of the ratchet 49 which controls the shutter A and reverses the traverse of this shutter so that upon the next stroke the position of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	1X	1X	3X	3X

the port *b* of the shutter B having not moved on this last stroke because the pin 29 was at the left end of the slot in shutter A.

Upon the next stroke the alinement of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	2X	2X	2X	2X

and therefore in position to strip a furrow next adjacent to the previously stripped furrow 1X.

This is the first time that the four ports *a*, *b*, *c*, *d*, have been in alinement, since they were alined with the aperture 1X, consequently the period of time intervening between the stripping of the first furrow and the second is the time which has elapsed during the traverse of the shutters throughout the entire distance from the 1st to the 30th furrow and return, thereby permitting ample time for the filling of the first stripped furrow with good carded material before the second furrow is stripped.

In the continued operation of the machine after two more strokes from the position in which

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the ports *a*, *b*, *c*, *d*, are in alinement, the arrangement of the ports will be as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	4X	4X	zero	zero

During these strokes the reversing stud 64x will engage the surface 62x of the cam and swing the pawl 58x so that its point 60x engages the ratchet 49x thereby reversing the direction of traverse of the shutter D so that the next stroke alines the ports as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	5X	5X	zero	1X

Such misalinement continues with each stroke until the port *a* is in alinement with the aperture 30X when the alinement of the ports will be as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	30X	30X	25X	26X

The next stroke causes a reversing movement of the shutter A in the manner above described so that alinement of the ports will be as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	29X	30X	26X	27X

and this misalinement continues until at the end of four more strokes the alinement is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	25X	26X	30X	31X

The next stroke reverses the direction of traverse of D and the alinement of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	24X	25X	30X	30X

Again this misalinement continues with each successive stroke until the port *a* is over zero at which time the alinement of the ports is as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	zero	1X	6X	6X

The next stroke reverses the direction of traverse of the shutter A and the ports are alined as follows:

Ports.....	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
Grill apertures.....	1X	1X	5X	5X

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After two more strokes all of the ports are brought into alinement as follows:

Ports.....	a	b	c	d
Grill apertures.....	1X	1X	1X	1X

so that the third furrow will be removed from the mat next adjacent to the previously stripped second furrow. The same sequence of operation continues until all of the furrows from the 1st to the 30th will have been stripped. At no time is there any alinement of the ports *a, b, c, d*, beyond the aperture 30X in the one direction and the aperture 1X in the other direction.

It will be seen from the above that the port *a* in the shutter A moves from the aperture 1X (at which time all the ports *a, b, c, d*, are in alinement) 29 strokes to the right, then 30 strokes to the left, and two strokes to the right before the ports are again in alinement at the aperture 2X, or a total of 61 strokes. In like manner, the shutter A will move from the aperture 2X, 28 strokes to the right, then 30 strokes to the left, and 3 strokes to the right making a total of 61 strokes, before the ports *a, b, c, d*, are again in alinement at 3X. This number of 61 strokes between alinements will continue until the ports *a, b, c, d*, are in alinement with the aperture 30X. At this point the number of strokes of misalinement will be greater and at the first new alinement it will be found that ports *a, b, c, d*, will be in alinement again to strip the furrow from the aperture 1X.

It has heretofore been pointed out that the shutters A and B have their ports only in alinement when the driver shutter A is moving to the right and the shutters C and D have their ports *c* and *d* in alinement only when the driver shutter D is moving to the left. Thus far it has been shown that a uniform number of strokes between each alinement of the ports *a, b, c, d*, are 61 strokes, and that this uniformity continues until the alinement of all the ports reach the aperture 30X at which time the alinement is as follows:

Ports.....	a	b	c	d
Grill Apertures.....	30X	30X	30X	30X

Upon reverse in the direction of traverse of the shutter A at this position the next stroke gives the following alinement:

Ports.....	a	b	c	d
Grill Apertures.....	29X	30X	29X	29X

The shutters C and D at this time are traveling from right to the left and at the next stroke the ports are positioned as follows:

Ports.....	a	b	c	d
Grill Apertures.....	28X	29X	28X	28X

This misalinement of ports *b* continues by $\frac{1}{3}$ " strokes of all the shutters until the shutter A

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reaches zero at which time the arrangement of the ports is as follows:

Ports.....	a	b	c	d
Grill Apertures.....	Zero.	1X	Zero	Zero

It so happens that the traverse of the shutters A and D reverse at this point so that at the next stroke the ports are in misalinement as follows:

Ports.....	a	b	c	d
Grill Apertures.....	1X	1X	zero	1X

It is to be noted that at this stroke the ports *b* and *c* remain stationary because the pin 29 of the shutter B and the pin 31 of shutter D will not move the length of the slots 30 and 32 respectively until the stroke had been completed with the result that the port *c* is in misalinement with the ports *a, b*, and *d*. The next stroke positions the ports as follows:

Ports.....	a	b	c	d
Grill Apertures.....	2X	2X	1X	2X

and this misalinement continues until the port *a* of shutter A reaches the aperture 30X at which time the ports are arranged as follows:

Ports.....	a	b	c	d
Grill Apertures.....	30X	30X	29X	30X

Upon reversal of the traverse of the shutter A the ports are next arranged as follows:

Ports.....	a	b	c	d
Grill Apertures.....	29X	30X	30X	31X

Shutter D then reverses and upon the next stroke the alinement is as follows:

Ports.....	a	b	c	d
Grill Apertures.....	28X	29X	30X	30X

On each successive stroke this misalinement continues until the port *a* of the shutter A reaches zero at which time the arrangement is as follows:

Ports.....	a	b	c	d
Grill Apertures.....	Zero	1X	2X	2X

The direction of traverse of the shutter A is then reversed and upon the next stroke all of the ports *a, b, c, d*, come into alinement with the aperture 1X. It will be noted that as the ports of the shutters thus approach alinement the driver shutter A was moving to the right and the driver shutter D was moving to the left in exactly the same way as the initial alinement of all the ports of the shutters were produced as heretofore described.

It will be again noted that shutter A with port *a* located at the aperture 30X (when all four ports *a, b, c, d*, were in alinement), that there were 30 strokes for the port *a* of the shutter A to reach zero, then 30 strokes to again reach the aperture

30X, and 30 strokes thereafter for the port *a* again to reach zero, and one stroke additionally to reach the aperture 1X before the four ports *a*, *b*, *c*, *d*, were in alinement at 1X, thereby making a total of 91 strokes of $\frac{1}{3}$ " movements of the respective shutters A and D.

Consequently 61 strokes of the mechanism is required to bring the ports *a*, *b*, *c*, *d*, in alinement between each aperture from 1X to 30X, and 91 strokes to make alinement between the aperture 30X and 1X. Therefore to make a complete cycle of the 30 apertures to cause the respective ports *a*, *a'*, *a2*, *a3*, completely to strip a card, it requires 61 strokes per aperture excepting one in one direction and 91 strokes in the reverse direction between the stripping of the apertures 30X and 1X. Therefore, with 29 apertures multiplied by 61 strokes added to 1 aperture multiplied by 91 strokes makes a total of 1860 strokes of the mechanism to a complete cycle.

In view of the fact that each of the shutters is provided with 3 additional apertures each spaced 10" from the other similar adjacent furrows will be stripped from the mat in the same sequence thereby simultaneously stripping the four sections of a carding cylinder of 40" length.

In normal practice the stripping of a carding cylinder is carried out once every two or three hours depending upon the class of work produced. This usual stripping operation requires only a few minutes and produces uneven work and a loss of production.

If it is desired by the present invention to strip the card once in 90 minutes the cam which oscillates the pawl mechanism must be arranged to oscillate 1860 times in this 90 minutes, or approximately 20 times per minute or 3 seconds per revolution. With this speed each alined series of ports will open for one stroke or approximately 3 seconds and there being 30 apertures acted upon by the respective ports gives 90 seconds that the furrows of waste material are stripped from the card per cycle. In addition there are 61 strokes between each alinement of the ports, 60 closed strokes and one open stroke. The 60 closed strokes represent 180 seconds or 3 minutes. There is then a waiting period of 3 minutes until the ports are alined at the next adjacent aperture and strip the next $\frac{1}{3}$ " furrow of the mat from the cylinder.

A cylinder of a card normally runs at 165 R. P. M. or approximately $2\frac{3}{4}$ revolutions per second, so that at each alinement of ports at an orifice the $\frac{1}{3}$ " passage of the cylinder will pass the orifice approximately eight times.

Furthermore, in the continuous progressive stripping of adjoining furrows in a straight line across the face of the cylinder approximately $1\frac{1}{2}$ hours elapse between the beginning of the stripping of the series of adjacent furrows and the beginning of the next time of again stripping like furrows so that ample time is provided for the filling in of each furrow before the next stripping of the cylinder of like furrows. As a consequence such continuous stripping of the card will produce a continuous uniform sliver of good material.

Experiments definitely have proved that after stripping, a doffer requires approximately 6 to 8 revolutions to bring card sliver up to normal weight and as doffers run at 4 to 15 R. P. M. depending on the product required it will be clearly seen that the waiting period of 3 minutes between each successive stripping of an adjoining furrow permits the doffer to blend in the

newly stripped portion of production before the next adjoining passage of $\frac{1}{3}$ " is stripped, thus avoiding accumulation of a dog tail of waste material and making it unnecessary to strip the passages non-adjacent to each other, as in previous pneumatic strippers.

It has been shown that with four shutter valves A, B, C, D, having a movement of 31, 30, 31, and 32 spaces respectively that a uniform sequence of openings are made between the wire clothing of the cylinder and the vacuum chamber in the suction conduit. However, the invention is not necessarily limited to this arrangement of movement for if the shutters are so initially positioned that the shutter A has a movement from zero to 31, and shutter B from 1 to 31, and shutter C from zero to 32, and shutter D from zero to 33 the openings in the shutters will aline in an alternative sequence as follows:

Starting the movements with the alinement on 1—1—1—1 and the movement to take the same direction at the start as previously mentioned, it will be found that after 64 movements the alinement will be 3—3—3—3, and again after 64 movements the alinement will be 5—5—5—5. This sequence will continue until the alinements will be 31—31—31—31 at which time and after 95 movements the alinement will be 2—2—2—2.

After 64 movements the alinement will be 4—4—4—4 and the sequence continues in uniform alternate openings until the alinement reaches 30—30—30—30 when again after 95 movements the alinement will be 1—1—1—1 as at the start.

Other combinations can be arranged, shutter A from zero to 31, shutter B from 1 to 31, shutter C from zero to 34, and shutter D from zero to 35 will give a sequence of alinements of all shutters at 1, then 5, then 9 and continuing 13, 17, 21, 25, 29, 2, 6, 10, 14, 18, 22, 26, 30, 3, 7, 11, 15, 19, 23, 27, 31, 4, 8, 12, 16, 20, 24, 28, and back to 1.

It will therefore be apparent that the present invention is not only capable of successively stripping adjacent furrows of the matted material from the carding cylinder but is also adapted to strip furrows therefrom in alternating or pre-terminated sequence.

While the invention is described in detail with respect to the construction in which the intake aperture 19 is provided with a grille or grid having narrowly spaced partitions 22 forming intake apertures, and in which the shutter valves are provided with ports adapted to be alined in sequence in the manner herein described, the same operation will be performed where the grille is omitted and the shutter valve 23 provided with nozzles 98, 98', etc., etc., extending through the intake aperture with the remaining shutter valves cooperating therewith in the same manner.

It will be understood that the particular embodiments of the invention herein specifically shown and described are of an illustrative character and not restrictive of the meaning and scope of the following claims.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. Mechanism for stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, valve mechanism in said intake having a plurality of

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series of longitudinally aligned equally spaced narrow ports to confine the suction therethrough to narrow areas, and means for actuating said valve mechanism to cause said ports successively to strip in direct sequence adjoining narrow furrows of said material throughout the distances on said cylinder equal to the width of said ports and the spaces therebetween and with uniform periods of time intervening between strippings of adjoining furrows at least equal to the time necessary to permit reforming of the previously stripped furrow.

2. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising pairs of cooperating longitudinally reciprocable valves reciprocably mounted in said intake each having a plurality of equally spaced ports which when in registry will simultaneously strip narrow furrows of said material from said cylinder, means for differentially actuating said valves to bring the respective ports into registry progressively to strip adjoining furrows from said mat at predetermined time intervals not less than that required for said valves to traverse the entire length of the cylinder in both directions.

3. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising a plurality of complementary pairs of longitudinally reciprocable valves mounted in said intake each having a plurality of rectangular equally spaced ports which when in registry will strip narrow furrows of said material from said mat, means for reciprocating said valves jointly lengthwise of said cylinder, means for causing a relative movement of the valves of each pair at each end of the longitudinal traverse thereof, and means for causing a relative longitudinal movement of the pairs of valves at each end of the longitudinal traverse thereof operable successively to bring like ports of all valves into registry at predetermined time intervals progressively to strip adjoining furrows from said mat in successive cycles.

4. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising a plurality of complementary pairs of longitudinally reciprocable driving and driven valves mounted in said intake having equally spaced ports which when successively in registry will strip adjoining narrow furrows of material from said mat, means for simultaneously reciprocating the driving valves of each pair, means for causing the driving valve of each pair to drive its companion valve, means for causing relative longitudinal movement between the driving and driven valve of each pair at each reversal of direction of traverse, and means for causing longitudinal movement of one pair of valves relatively to the other at said reversal of traverse operable to bring the successive ports of all valves into registry at predetermined time intervals progressively to strip adjoining furrows from said mat,

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5. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising two pairs of complementary contacting driving and driven valves longitudinally movable in said intake and having equally spaced ports, the driving valve of each pair being provided with a toothed rack and the driven valve being recessed alongside said rack, pin and slot connections between the valves of each pair to provide a limited longitudinal movement therebetween at each reversal of traverse, independent gears engaging the respective racks, means for intermittently actuating said rack-engaging gears in unison to cause the valves to travel conjointly in the same direction of traverse, means for reversing the direction of rotation of said driving gears, thereby to cause a reversal of the direction of traverse of said pairs of valves operable in conjunction with the relative movement of the valves of each pair to bring the ports of all valves into registry in predetermined cycles progressively to strip adjoining narrow furrows from said mat and to cause misalignment of the ports of said valves during all other movements of said valves.

6. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising two pairs of complementary contacting driving and driven valves longitudinally movable in said intake and having equally spaced ports, the driving valve of each pair being provided with a toothed rack and the driven valve being recessed alongside said rack, pin and slot connections between the valves of each pair to provide a limited relative movement therebetween at each reversal of traverse, independent gears engaging the respective racks, pawl and ratchet means for intermittently actuating said rack-engaging gears in unison in one direction to cause the valves to travel conjointly in the same direction of traverse, means operable by said pawl and ratchet mechanism to reverse the direction of rotation of said driving gears, thereby to cause a reversal of the direction of traverse of said pairs of valves and operable in conjunction with the relative movement of the valves of each pair to bring the ports of all valves into registry in predetermined cycles progressively to strip adjoining narrow furrows from said mat and to cause misalignment of the ports during all other movements of said valves.

7. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, comprising two pairs of complementary contacting driving and driven valves longitudinally movable in said intake and having equally spaced ports, the driving valve of each pair being provided with a toothed rack and the driven valve being recessed alongside said rack, pin and slot connections between the valves of each pair to provide a limited relative movement therebetween at each reversal of traverse, main gears engaging respectively rack-driving gears, each rack-driv-

ing gear having a circular ratchet disk secured thereto, like complementary reversing gears provided with like ratchets geared by intermediate gears respectively to said main gears, reversible pawls reciprocally mounted between the respective ratchets of the main and complementary gears, and adjustable means on the respective ratchets for causing said pawls alternately to engage the ratchets of the respective main and complementary gears so to reverse the direction of traverse of the pairs of valves and to cause such relative movements of the valves of each pair as to bring like ports of all valves into registry in predetermined sequence progressively to strip adjoining furrows from said mat and to cause misalignment of the respective ports during all other movements of said valve.

8. Mechanism for repeatedly stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine comprising a suction conduit having a narrow intake extending longitudinally of the cylinder in close proximity to the periphery of the teeth thereof, a plurality of pairs of valves reciprocally mounted in said intake having equally spaced ports, means for reciprocating said valves to produce differential movements of said pairs at each end of traverse including like main gears each having a circular ratchet attached thereto, like complementary reversing gears having like circular ratchets attached thereto, gears intermediate of said main and complementary gears, a slide reciprocally mounted on said conduit having reversible pawls extending between the respective ratchets of said main and complementary gears, adjustable means on said ratchets for causing the pawls alternately to engage the ratchets of the main and complementary gears to reverse the direction of traverse of said valves, a bodily movable counterbalanced bar centrally mounted on a cam and having one end pivotally supporting said slide, adjustable means for limiting the upward movement of the opposite end of said bar upon rotation of said cam thereby to cause a quick actuating movement of said pawls, and a resulting quick movement of the pairs of valves.

9. The method of continuously cleaning a rotating toothed cylinder of a textile apparatus which comprises simultaneously stripping from the mat on the cylinder a plurality of equally spaced relatively narrow furrows of uniform width by applying suction to spaced areas of said cylinder for a plurality of revolutions of said cylinder, and successively repeating said stripping operation intermittently to like areas of said cylinder adjoining each preceding furrow and in direct sequence, each intermittent operation being

delayed a sufficient time to permit the necessary number of rotations of the cylinder to enable a reforming of the mat at the areas of the removed furrows.

10. The method of stripping the mat of accumulated material from a continuously rotating toothed cylinder of a textile machine which consists in simultaneously stripping equal divisional areas of the mat by a series of synchronized simultaneous operations each of which removes a corresponding furrow of each divided area of the mat, repeating the simultaneous stripping operation by stripping in direct sequence adjoining furrows in each group area until all of the divided areas are entirely stripped, and delaying the individual synchronized stripping operation between corresponding adjoining furrows of each group for a time interval sufficient to permit filling of the stripped furrow with carded material, whereby the stripped furrows are rebuilt before the following stripping operation.

11. The method of cleaning the continuously rotating carding cylinder of a carding machine having a licker-in for feeding a lap of fibrous stock to the carding cylinder and traveling flats cooperating with said cylinder, which comprises stripping within the space between the licker-in and the flats a plurality of equally spaced circumferential furrows of stock which define equal lineal areas of said cylinder, and intermittently repeating the stripping operation to remove from said cylinder in uniform and direct sequence additional furrows of said stock adjoining the first formed furrows, the period of time between each intermittent stripping operation being sufficient to permit filling of the stripped furrow with carded material, whereby the stripped furrows are rebuilt before the following stripping operation.

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