

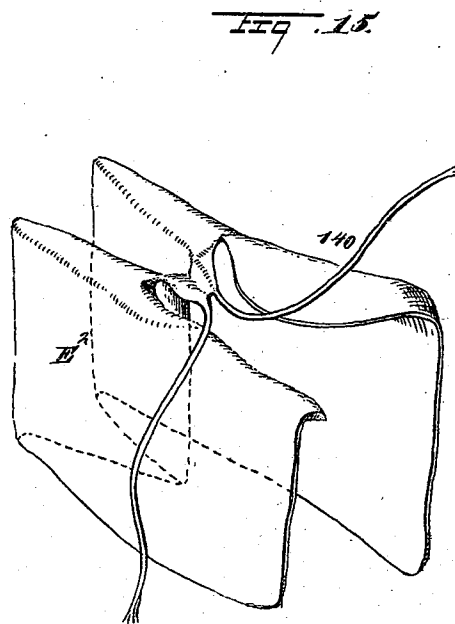
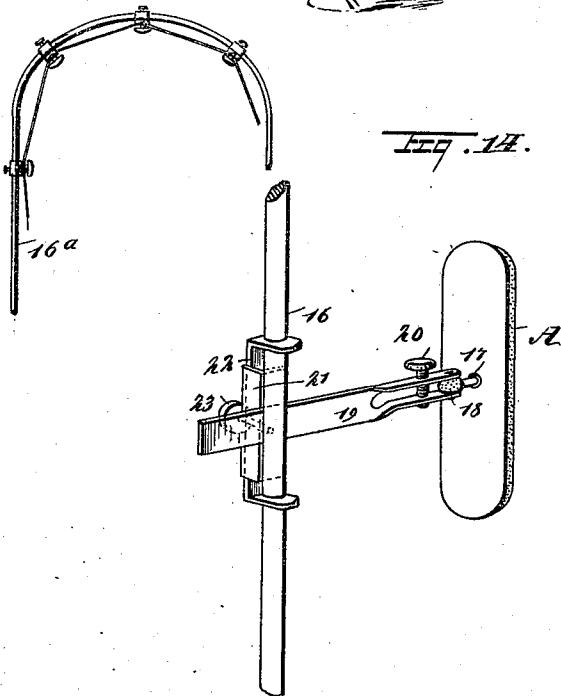
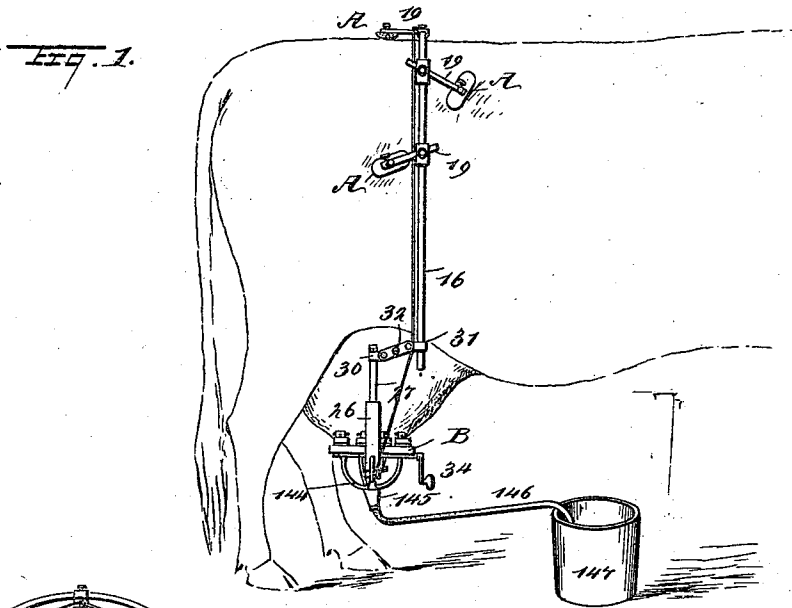
(No Model.)

5 Sheets—Sheet 1.

W. B. BLAND.
COW MILKING MACHINE.

No. 512,939.

Patented Jan. 16, 1894.



WITNESSES:

H. Walker
C. Sedgwick

INVENTOR

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BY

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(No Model.)

5 Sheets—Sheet 3.

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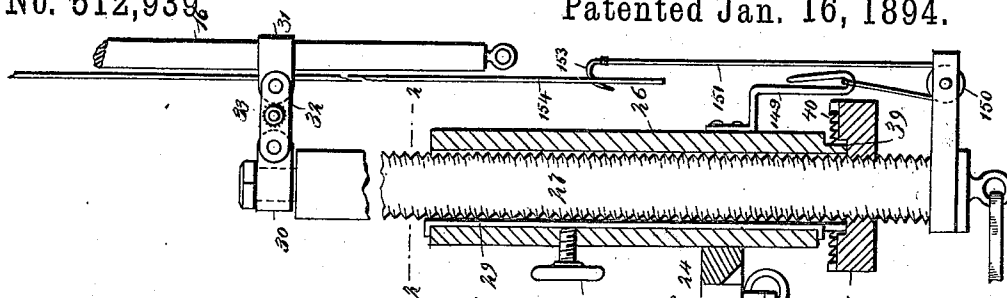


Fig. 13.

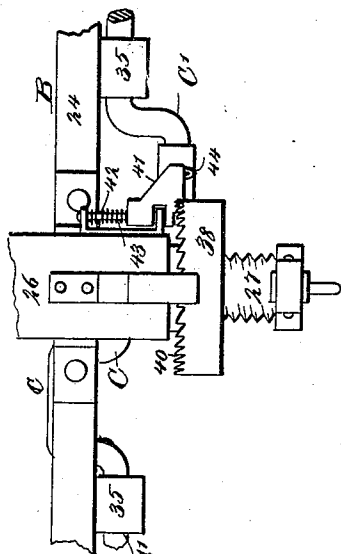
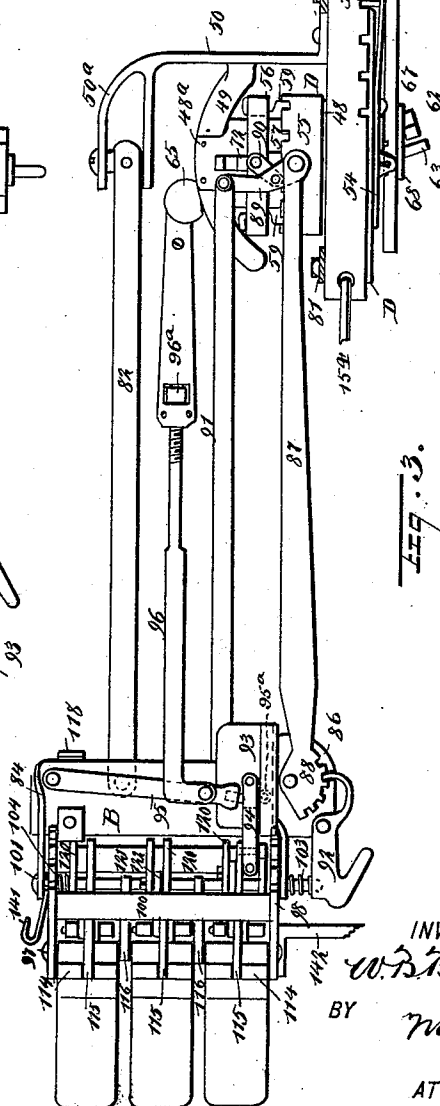


Fig. 12.

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(No Model.)

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W. B. BLAND.
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Fig. 4.

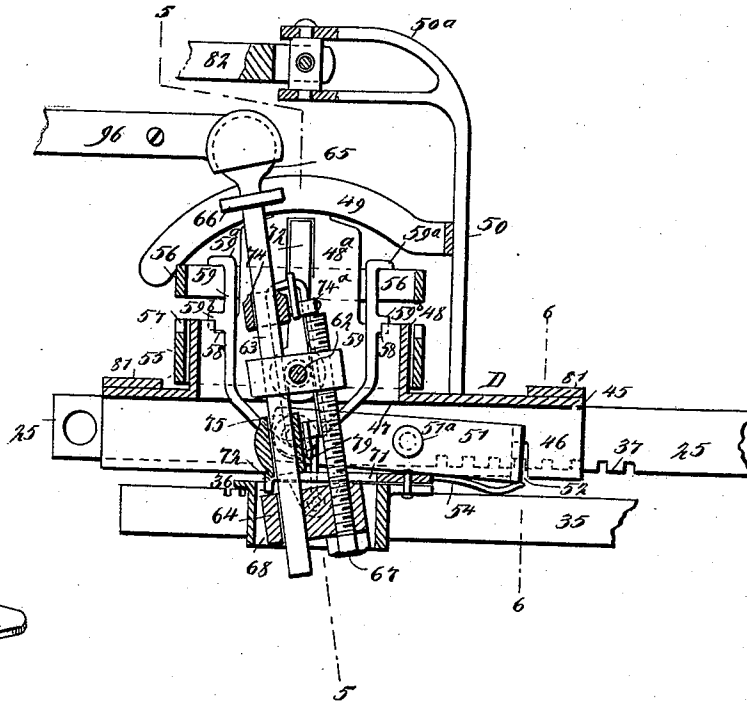


Fig. 7.

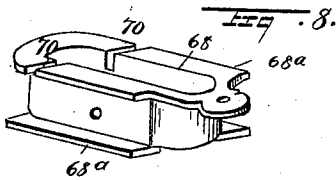
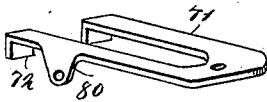


Fig. 6.

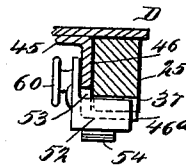
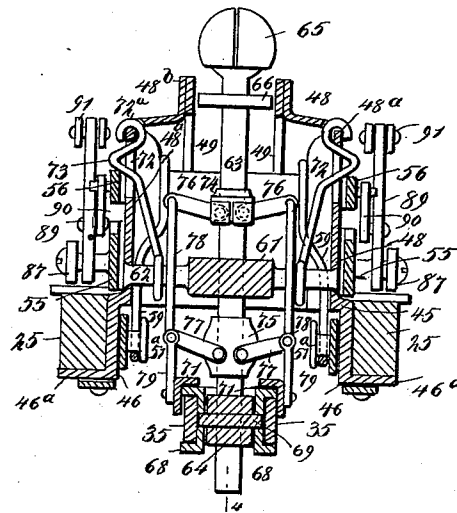


Fig. 5.



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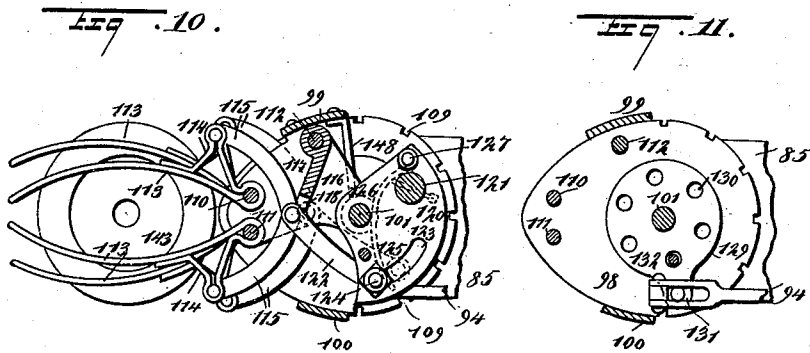
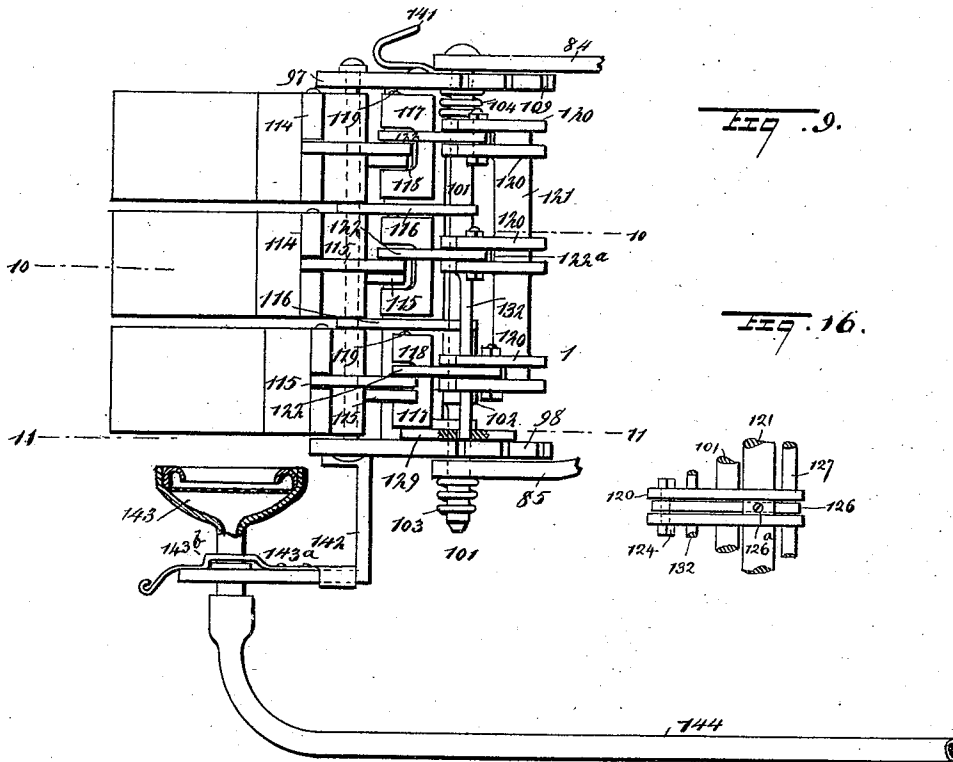
(No Model.)

5 Sheets—Sheet 5.

W. B. BLAND.
COW MILKING MACHINE.

No. 512,939.

Patented Jan. 16, 1894.



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UNITED STATES PATENT OFFICE.

WILLIAM BURDINE BLAND, OF MAQUON, ILLINOIS.

COW-MILKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 512,939, dated January 16, 1894.

Application filed June 24, 1893. Serial No. 478,713. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BURDINE BLAND, of Maquon, in the county of Knox and State of Illinois, have invented a new and Improved Cow-Milking Machine, of which the following is a full, clear, and exact description.

My invention relates to a cow-milking machine, and it has for its object to provide a machine capable of being expeditiously and conveniently adjusted to the udder of a cow, which machine may be applied and used without causing irritation or discomfort.

A further object of the invention is to provide a means whereby the machine may be adjusted to carry the milking fingers in any direction that occasion may demand.

A further object of the invention is to provide a means whereby through the manipulation of a single lever all the parts of the machine may be so placed that various adjustments may be made, and whereby also the operative portions of the machine may be thrown out of gear with the driving mechanism at the same time.

Another feature of the invention consists in providing a means for throwing the operative mechanism into gear with the driving mechanism and locking all the parts of the machine in their adjusted positions by the manipulation of the same lever employed to release the parts.

Another feature of the invention is to provide a means whereby the machine may be conveniently manipulated, and whereby as the milk is withdrawn from the udder the machine will automatically adjust itself to the shrinkage thereof.

The invention consists in the novel construction and combination of these several parts, as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a side view of the machine, illustrated as applied to the udder of a cow. Fig. 2 is a plan view of the milking fingers and the frame upon which they have movement, and a sectional view of the frame support, which section is taken practically on the line

2—2 of Fig. 3. Fig. 3 is a side elevation of one set of milking fingers and its carriage, the frame upon which the carriage travels and the support for the frame being in vertical section, and the said section is taken practically on the line 3—3 of Fig. 2. Fig. 4 is a vertical section through the carriage of a set of milking fingers and through the frame upon which the carriage travels, said section being taken practically on the line 4—4 of Fig. 5. Fig. 5 is a vertical section through the carriage and the supporting frame shown in Fig. 4, the section being taken at a right angle to that illustrated in Fig. 4, practically on the line 5—5 of Fig. 4. Fig. 6 is a detail transverse section through a portion of the carriage and a portion of the carriage supporting frame, the section being taken essentially on the line 6—6 of Fig. 4. Fig. 7 is a detail perspective view of a portion of the locking mechanism contained in the carriage. Fig. 8 is a detail perspective view of a guide adapted for use in connection with the locking device shown in Fig. 7. Fig. 9 is a detail side elevation of a set of fingers and their directly connected actuating mechanism. Fig. 10 is a horizontal section taken practically on the line 10—10 of Fig. 9. Fig. 11 is a horizontal section taken essentially on the line 11—11 of Fig. 9. Fig. 12 is a detail view of the shifting lever, a portion of the connection of the lever with the main carriage of the machine, and the application of the lever to the frame in which the milking fingers are located, the fingers being removed. Fig. 13 is a detail side elevation of the elevating mechanism. Fig. 14 is a detail view of one of the supports for the machine adapted to be applied to the back of the animal. Fig. 15 is a detail view of a glove adapted to cover a set of fingers; and Fig. 16 is a detail view of a portion of the direct finger operating mechanism.

Before describing the body of the machine I will give in detail the construction of the suspension device, next the construction of the supporting frame or bed of the device, and then the connection between the bed and the suspension device. The suspension device consists primarily of a rod 16, the upper portion 16^a whereof is bent to crook form, the shape of the bent portion of the rod being

such that it will fit upon the back of the animal at the hind quarter, as shown in Fig. 1, the upper shorter member of the rod extending down at one side of the animal while the longer member extends perpendicularly downward at the opposite side and terminates adjacent to the udder, as shown also in Fig. 1. This rod may be made as light as possible consistent with strength. In order that the rod shall not chafe or unduly irritate the animal when fitted thereto, various pads A, are employed, three of them being illustrated as applied in Fig. 1, the application of a single one being shown in detail in Fig. 14. The pad has an inner face of leather, rubber or other soft pliable material, and is ordinarily made somewhat oblong; and in the central portion of the back a pin 17, is located, terminating in a head 18, of circular or ball shape, said head being roughened in any suitable or approved manner. The pad is connected by a universal joint with a supporting arm 19, adapted to stand at more or less of an angle to the suspension rod 16; and the universal connection is made by causing the outer end of the supporting arm 19, to be bifurcated, concaving or depressing opposite portions of the members at the bifurcated end of the arm and causing the cavities thus formed to receive the ball-like head of the pad; and the members of the arm are made to clamp the ball so tightly as to hold the pad in a predetermined position; or the contact between the arm and the ball may be made so light as to permit the pad being adjusted in any direction. This adjustment is effected preferably through the medium of a set screw 20, passed through the bifurcated portion of the arm. The pads are adjustable likewise upon the suspension rod. A U-clip 21, is made to bear against the arm 19 and tends to press the same against the rod 16, as shown in Fig. 14. The clip engages with a bracket 22, comprising a straight body and arms projected therefrom, which bracket is held to slide upon the rod, the arms of the body of the bracket being located one above and the other below the clip 21. The supporting arm of the pad is passed between the body portion of the bracket and the opposing surface of the clip, and the arm, bracket and clip are held in the desired position upon the rod by a set screw 23, passed through the bracket to an engagement with the clip 21, whereby the clip acts also as a wear plate and affords a wide bearing surface for the screw upon the arm 19.

The bed B, is of fork-like construction, and comprises a body bar 24, and a series of tines or branch bars 25, projecting parallel from one side of the body bar at right angles thereto, as is best shown in Fig. 2. The bed may be provided with any number of branch bars; ordinarily, however, five is the number employed. They are located at about equal distances apart, and the inner branch bars are wider than the outer ones. The entire bed in the operation of the machine is horizontally

located, and is held in a horizontal position by a connection with the suspension rod 16. This connection is accomplished in the following manner: A vertical sleeve 26, is secured to the central portion of the body bar of the bed, as shown in Fig. 2; and through the sleeve a standard 27, is passed, which standard is preferably threaded upon two opposite sides, as illustrated in Fig. 3; at least that portion of the rod which passes through the sleeve is threaded and likewise the portion just above and below the sleeve. The upper portion of the rod may be plain, and the said rod may be of any desired length. Thus virtually a connecting rod is provided which serves to unite the bed with the suspension mechanism. The sleeve is adjustably located upon the connecting rod 27, in order that the bed may be raised or lowered as occasion may demand; and therefore the sleeve is provided with a set screw 28, which is preferably passed through its front side, and in order that the thread of the connecting rod may not be damaged by the set screw a wear plate 29, is passed through the sleeve from top to bottom in engagement with the forward threaded surface of the connecting rod, as is likewise shown in Fig. 3, and the set screw engages with the said plate and by forcing the plate to an engagement with the connecting rod the sleeve and rod are held effectually united.

The connection between the suspension rod 16 and the upper end of the connecting rod 27, is adjustable in character and is preferably made in the following manner: A sleeve 30, is loosely mounted upon the upper end of the connecting rod 27, and a second sleeve 31, is loosely mounted upon the lower portion of the suspension rod 16. The two sleeves are pivotally connected by two side bars 32, only one of which is shown in the drawings, and this connection is best illustrated in Fig. 3. The ends of the sleeves 30 and 31, where they are pivoted to the side bars 32, are split, and the pivot pins of the side bars and sleeves are passed through the bars and the split portions of the sleeve, while a set screw 33 adapted to be hand operated is passed through the side bars 32 between their pivotal connection with the sleeves; and when the adjusting screw and nut are loosened the connecting rod may be turned in the sleeve 30, and the connecting rod may be turned in any direction upon the suspension rod, while through the medium of the pivotal connection of the two sleeves 30 and 31 the side bars 32, may be given any desired inclination; and when a proper adjustment is made by tightening up the adjusting screw and nut the sleeves 30 and 31, will be made to firmly clamp the parts with which they are connected.

The driving mechanism of the entire machine consists of a crank shaft C, which is journaled in suitable bearings on the under face of the bed, the shaft being located quite near the body bar of the bed, as shown in Fig. 2; and the said crank shaft is driven by an at-

tached crank arm 34, or the equivalent thereof. The crank shaft is provided with as many crank arms, designated C', as there are spaces between the members or extension bars 25 of the bed. In the drawings four crank arms are illustrated as being used, as ordinarily four sets of milking fingers to be hereinafter described, are carried by the bed, and one crank arm is adapted to impart movement to each set of fingers. The crank arms extend alternately in opposite directions. Each crank arm has pivotally connected with it the rear end of a pitman 35, and the forward portion of the said pitman, or each pitman from a point near its connection with a crank arm to its outer end is bifurcated, forming thereby two members 35^a and 35^b. In the upper edge of each member of each pitman a series of slots 36, is made for a purpose to be hereinafter described, and a similar series of slots or recesses 37, is produced in the under surface of each member or extension bar of the bed, the two sets of slots or recesses being best shown in Fig. 4.

It is necessary that as the milk is taken from the udder, the milking machine should be fed upward proportionately to the shrinkage of the udder, and this is accomplished by placing upon the lower end of the threaded portion of the connecting rod 27 a nut 38, as shown in Figs. 2, 3 and 13. The sleeve 26, is reduced at its lower end, and the nut is provided with a channel 39 in its upper face to receive the lower reduced portion of the sleeve, and the upper face of the nut is provided with ratchet teeth 40, circularly arranged thereon, and the said teeth are constantly engaged by a dog 41, pivoted upon a spindle 42, located at one side of the sleeve 26, as shown in Fig. 13, the dog being controlled by a spring 43 in such manner that the pawl will be normally forced by the spring over the surfaces of the teeth adjacent to it until it stands diagonally across the nut. The dog 41, is connected with one of the crank arms of the crank shaft by means of a link, cord or chain 44; thus at every revolution of the crank shaft the dog will be pulled forward and consequently the nut will be revolved a predetermined number of teeth, but as the nut is turned it will travel up the threaded surface of the connecting rod 27, and consequently will gradually raise the sleeve 26 and the bed connected with the sleeve. As soon as the crank arm of the crank shaft with which the dog is connected is upon its rearward throw, the spring 43 will force the dog over one, two or more teeth, and according to the number of teeth that the dog passes over in its rearward movement will be the degree to which the bed will be elevated at each revolution of the shaft.

I desire it to be understood that the interior of the sleeve 27, is made rectangular in cross section, and the connecting rod is given a similar cross sectional shape. As has heretofore been stated four sets of milking fin-

gers are usually carried by the bed, and each set of fingers is independently operated and is capable of independent adjustment. The construction of each set of fingers and the arm by means of which the fingers are connected with the carriage is the same, as is likewise the construction of the carriage; therefore in the description of these parts reference will be had to one set of fingers and the mechanism connected therewith.

The carriage D, for a set of milking fingers, usually consists of a plate provided with a horizontal upper surface 45 and angular side members 46, the angular side members being carried perpendicularly down from the edges of the upper surface and then horizontally outward, as shown in Fig. 5. The upper surface 45 of the carriage plate is provided at or near its center with an opening 47, which opening is preferably of a circular shape, or approximately so, and the opening 47, is surrounded by an upwardly-extending collar 48, two opposite sides of the collar, designated as 48^a, being carried upward to a greater extent than the other portions of the collar, and said collar extensions 48^a, are carried inward over the opening 47, as shown at 48^b in Fig. 5, and are secured to guide arms 49, which guide arms are curved over the collar some distance above the reduced portion of the collar; and the guide arms, as shown in Fig. 4, are curved from the rear in direction of the front, and the said arms back of the collar 48, are connected with an upright 50, said upright being secured permanently to the upper face of the carriage plate; and the upper portion of the upright extends some distance above the guide arms 49, and in a forward direction over said arms; the forwardly-extending portion 50^a of the upright is bifurcated forming two essentially parallel members, as shown in Fig. 4.

A carriage is adapted to slide upon two opposing and parallel extension bars of the body, one of the bars being made to engage with the outer side surface of the body plate of the carriage, while the lower or flange portion of the side of the body of the carriage will extend beneath the under surfaces of the extension bars of the bed, as is best shown in Fig. 5, in which the flange portions of the carriage are designated by the reference numeral 46^a; a lock lever 51, is pivoted upon each inner side surface of the body plate of the carriage, and one end of said lever, that nearest to its fulcrum 51^a, is provided with a head 52, and this head is adapted to enter a recess 53, produced in the flange and side of the carriage upon which the lever is located, and is likewise adapted to enter one of the recesses 37, in the extension bar of the bed upon which the carriage rests, as shown in both Figs. 4 and 6. The levers are normally held with their heads entering the recesses 53 of the carriage and recesses 37 of the bed by means of springs 54, which springs are secured upon the under faces of the flange of the carriage

and have constant bearing at one of their ends against the head portions of the levers, forcing the said heads in an upward direction.

Two sleeves are loosely mounted upon the exterior of the collar portion 48 of the carriage; these sleeves comprise a lower sleeve 55, around the lower portion of the collar, and an upper sleeve 56, encircling the extensions 48^a of the collar, as shown best in Figs. 4 and 5. The lower sleeve 55, is provided with a number of recesses 57 in its upper edge, while in the upper edge of the reduced portion of the collar two recesses 58, are produced, one at each side of each extension 48^a of the collar, as best shown in Fig. 4. These sleeves are adapted to turn loosely upon the carriage collar when the fingers and arm connected with the fingers are to be laterally adjusted, and the sleeves are locked in their adjusted position by means of two practically U-shaped spring locking arms 59, and each member of each of the locking arms is provided at its upper extremity with a hook-section 59^a, adapted to extend over the upper surface of the upper sleeve 56, as shown in Fig. 4, and each member of each locking arm is provided below its hook-head 59^a, with an outwardly-extending spur 59^b, the said spur being adapted, when the arms are in locking position, to pass through the recesses 58 in the carriage collar, and likewise through one of the recesses 57 in the lower sleeve 55, as is likewise best shown in Fig. 4. The lower ends of the locking arms 59 are connected one locking arm with each lever 51, preferably through the medium of studs 60, located upon the levers near their forward ends, as illustrated in Figs. 4, 5 and 6; and it will be observed that in the event the upper sleeve 56 of the carriage is elevated the locking lugs of the locking arms will be carried out of engagement with the lower sleeve, and therefore admit of both of the sleeves 55 and 56 turning upon the carriage collar; at the same time the levers 51, will be forced downward at their rear ends, and the heads of the levers will be disengaged from the projecting bars of the bed and likewise will be carried downward out of the recesses 53 in the flange sides of the carriage plate; and the carriage may then be adjusted forward or backward upon the bed conveniently and expeditiously.

A block 61, is located within the carriage collar at its lower central portion, and the said block is provided with trunnions 62 projected from opposite sides, said trunnions being journaled in opposite faces of the carriage collar, as illustrated in Fig. 5. This block is provided with two apertures, one of which is threaded to receive the threaded adjusting shaft 62 and the other a plain shaft 63. Both the shafts 62 and 63 are likewise passed through a lower adjusting block 64, which block is located beneath the carriage and below the plane of the lower face of the bed, as shown in Figs. 4 and 5. The screw shaft 62, passes loosely through an aperture in the

lower block 64; the aperture in the said lower block receiving the plain shaft 63 is of slightly greater diameter than the diameter of the shaft, so that the shaft may be readily passed through the block. The plain shaft 63, which is really a driving shaft is much longer than the threaded shaft 62, and extends upward beyond the top of the highest point of the carriage collar. The said plain shaft at its upper end terminates in a ball 65, and is provided with a collar 66, below the ball, which collar engages with the guide arms 49, extending over the carriage collar. The shaft 63, is adapted to impart an opening and closing movement to the milking fingers to be hereinafter described, and the extent to which the fingers will be opened and closed will be more or less regulated by the position of the adjusting block 64.

It will be understood by reference to Fig. 4, that the screw shaft is at one side of the pivot point of the pivotal block 61, and the plain or driving shaft 63, is at the opposite side of the pivot, and that by manipulating the head 67, located upon the lower end of the threaded shaft the adjusting block 64, may be raised or lowered; and as this adjusting block is adapted to impart to the finger driving shaft 63 a rocking motion, according to the distance that the adjusting block is carried upward or downward upon the shaft will the throw of the shaft be increased or diminished.

The adjusting block 64, is located within a casing or shell 68, shown in detail in Fig. 8. The shell or casing is usually made with straight sides and circular ends and is open at top and bottom. The shell or casing is horizontally located, and is pivotally connected with the block by means of a pivot pin 69. The casing is provided at its sides with top and bottom flanges 68^a, and in what may be termed the forward end of the casing transverse recesses 70, are produced in the flanges and in the sides of the casing. The casing or shell is adapted as a medium for connecting the pitman of the driving crank shaft with the adjusting block, and likewise acts as a guide for the pitman, and the members of the pitman are passed one in engagement with each outer face of the casing between the upper and lower flanges of the latter; and the recesses 36 in the top edge of the members of the pitman may be readily brought to registry with the recesses 70 in the casing.

A locking engagement is effected between the casing 68, the block and the pitman through the medium of an essentially U-shaped pawl 71, which is horizontally located upon the top of the casing, resting upon the flanges thereof; and the members of the dog or pawl 71, at their forward ends, are provided with downwardly-extending lugs 72, and these lugs are adapted to enter the recesses 70 in the casing and likewise registering recesses 36 in the pitman. The dog may be pivotally connected at its rear end with

the casing, or it may not be attached thereto. The dog is made of a light spring metal, in order that its locking end may be carried upward out of engagement with the casing, and thus free the adjusting block from the action of the pitman, the pitman being then left to slide freely in the casing, not operating the adjusting block. Therefore, by this means, the driving mechanism of the machine may be thrown out of gear with the driving shaft. The driving mechanism is thrown out of gear when the upper sleeve 56, located around the carriage collar is elevated; therefore, when the carriage is released so that it may be adjusted upon the bed and the sleeves of the carriage adjusted upon its body, the carriage may likewise be adjusted upon its pitman, and at the same time the mechanism be thrown out of gear with the driving shaft.

The means by which the pawl or dog 71 is elevated are substantially as follows: An opening 72, is made in the upper end of each of the collar extensions 48^a, and a spring arm 72^a, is hooked around the top central portion of each collar extension, as shown in Fig. 5, and each arm is loosely mounted at its lower end upon a trunnion 62 of the pivotal block 61; while near the upper end of each arm a lip 73, is formed, of somewhat angular shape, and the lips are adapted to normally extend through the slots 72 in the carriage collar extension. A sleeve 74, is loosely mounted upon the finger driving shaft 63, above the pivotal block, being supported by an extension 74^a resting on the screw shaft 62, and a second sleeve 75, is likewise mounted loosely upon the said shaft below the pivotal block, as is likewise shown in Fig. 5. From the upper sleeve two oppositely disposed links 76, are projected, being pivoted to the sleeve, and similar links 77 are projected from the lower sleeve 75. The upper and lower links are connected by vertically disposed links 78, which pass close to the trunnions of the pivotal block 61, and are in the inward path of the spring arms 72 above referred to. The lower links 77, are connected by short vertical links 79, with opposite sides of the spring pawl 71, ears 80, being produced upon the sides of the pawl to facilitate such connection. Therefore it will be observed that as the collar sleeve 56 of the carriage is raised, it being normally below the lips of the spring arm 72^a, the said lips by the upward movement of the sleeve will be forced inward, and therefore the lower loosely mounted ends of the spring arms will be carried in the same direction, and the vertical links 78, will be forced inward by the spring arms and the shorter sleeve links 76 and 77, will be given an upward inclination, exerting therefore a lifting action upon the lower short links 79, and the latter links serve to elevate the pawl, carrying it out of engagement with the pitman with which it was connected.

In order that the carriage may be securely clamped upon the bed, cross bars 81, are at-

tached to the upper portion of the carriage and extend over the extension bars or tines of the bed, and each cross bar 81, is provided with a set screw 82' to engage with the upper surfaces of the bed, as shown best in Fig. 2. The upper horizontal arm 82 has a universal connection with the bifurcated end 50^a of the carriage upright 50. The forward end of the upper arm 82, is pivotally connected with a second frame B, which frame, as is best shown in Fig. 12, consists of a standard 83 and a head and foot section designated respectively as 84 and 85, these two sections being projected forwardly at right angles from the standard, and ordinarily the head and foot sections of the frame B, are given a somewhat circular shape. The standard section 83 of the frame B, extends downward lower than its foot 85, and this lower projecting portion is designated as 86, and upon it the lower end of a lever arm 87 is pivoted. This portion of the lever arm is made somewhat semi-circular or segmental, and the lower convex surface is provided with a series of teeth 88. The lever arm 87, is bifurcated at its rear end, and one member is carried at each side of the lower carriage sleeve 55. The rear end of each member of the lever arm 87 has pivoted to it the lower end of a link 89, and the link extends upward beyond the upper loose ring 56 of the carriage. A second and shorter link 90, is pivotally connected with the upper loose carriage ring 56 and with the longer link 89 near its connection with the lever arm. It will be understood that this construction is duplicated at each side of the carriage, and furthermore, by reference to Fig. 3 it will be observed that the short link 90, stands at an angle to the longer link 89.

The lever arm 87 has parallel movement with the upper arm 82 connecting the carriage with the forward frame B, and the lever arm 87, has located above it a correspondingly shaped arm 91, and this arm is therefore bifurcated at its rear end and its members are pivotally connected with the upper ends of the longer links 89, while the forward end of the arm 91, as shown in Fig. 12, is connected with the vertical member of an angle releasing lever 92, which lever is fulcrumed upon the lower portion of the lower extension 86 of the forward frame B, and extends forward of said frame and beneath it; and the rear end of the horizontal member of the lever is provided with an upwardly-curved finger 93, which may be made to enter a slot in the extension 86 of the forward frame B, and likewise enter a space between two opposing teeth 88 in the lower lever arm 87, and at this point it may be stated that the forward end of the lower lever arm is bifurcated in order that a segmental head portion may be located at each side of the frame B. Thus it will be observed that when the forward end of the releasing lever 92, is pressed upward, its upper member will be given a rearward inclination, and the horizontal lever 91, will

be carried in a rearward direction and will operate upon the link 89 in such manner as to cause the connected shorter link 90, to elevate the upper loose carriage ring 56, and produce an uncoupling action heretofore referred to with reference to the carriage, the bed and the actuating mechanism.

Upon the reverse side of the frame B, which is shown in Fig. 3, a shoe 93, is located near the lower portion of the frame B, and a slide 94, is capable of horizontal movement in the said shoe, which slide is connected with a link 95, provided with a friction roller traveling in the shoe 93, the upper end of the link being pivotally connected with the upper portion of the said frame. Thus by swinging the link forward and rearward the slide 94 will be given a corresponding movement.

The slide is adapted to operate the milking fingers to be hereinafter described, and it is connected by means of a rod 96, with the upper end of the finger drive shaft 63 heretofore described. The connecting rod 96, is preferably provided with a turn-buckle, and has a universal connection with the link 95, which is likewise shown best in Fig. 3. Thus the rod 96 may be adjusted as to length by manipulating the nut 96^a of the turn-buckle and the milking fingers to be hereinafter described will be made to open and close to a greater or less degree.

The connecting rod 96, the levers 87 and 91 and the upper frame connecting rod or arm 82, are all essentially parallel, and are so pivoted that they will move upward or downward in parallel directions upon their pivots when it is desired to elevate the frame B with reference to the carriage or to restore the frame to its lower or normal position.

A finger-carrying frame E, is pivoted in the forward frame B. The finger-carrying frame comprises a horizontal cap plate 97, a lower cap plate 98 and two side stays 99 and 100, which serve to connect the cap and bottom plates.

A pivotal connection is effected between the frames B and E by means of a pivot pin or shaft 101, which extends through the top and bottom portions of the frame B and corresponding portions of the frame E. The shaft is capable of upward movement in both frames, and is provided within the finger frame with a collar 102. The lower end of the shaft or pivot pin 101 extends below the frame B, and is adapted to be engaged by the lower end of the shifting lever 92, as shown in Fig. 12. A spring 103, is coiled around the lower end of the pivot shaft or pin 101, to hold lever 92, and parts adjusted by it in position, and a second spring 104, is coiled around the upper portion of it within the finger-carrying frame. The spring 104 is adapted to hold cams (to be hereinafter described and designated as 120) in adjusted position.

The finger-carrying frame is locked in whatever position it may be placed by means of

a lock lever 105. This lever is shown best in Fig. 12, and is pivoted at its lower end preferably upon the shifting lever 92, and it is operated by passing a pin 106, located upon the upper end of the shaft lever through a slot 107, made in an extension formed upon the rear edge of the lock lever. The upper or head portion of the lock lever moves in a guide strap 108, secured upon the standard section of the frame B, and the said head is adapted to enter a recess made in the upper or cap section of the frame B, and in one of a series of recesses 108^a, produced in the cap 97 of the finger carrying frame E. It will thus be observed that when the shifting lever 92 is operating to uncouple the driving mechanism of the machine and permit of the adjustment of the carriage bed and pitman connection with the carriage, the lock lever 105, will be also manipulated in a manner to release the finger-carrying frame and permit of its being turned.

In the forward portion of the finger-carrying frame E, at each side of the center thereof, two posts 110 and 111 are erected, and at one side of the frame adjacent to the side piece 99, a third post 112, is located. The posts 110 and 111 are adapted to serve as pin-les for a series of fingers E'. The fingers are arranged in pairs, one pair below the other, and ordinarily three pairs of fingers are employed. The fingers are individually designated as 113, and are curved in direction of each other; therefore their inner faces are concave. An eye is formed at the inner end of each finger, and the posts 110 and 111 pass through the eyes of the fingers. Each finger near its pivot point is provided with a bracket 114, formed upon its outer face. The outer end of each bracket is shaped as an eye, and a pintle is passed through each eye, the pintles being adapted to pivotally connect the forward ends of curved arms 115 with the central portion of the brackets. The curved arms 115 of each set of fingers are carried inward to the central forward portion of the frame E, one over the other, and the two curved arms of each set of fingers form substantially a semi-circle. A partition plate 116, is secured at its inner end to both the forward posts 110 and 111, one plate being located beneath each set of fingers, and the plates extend horizontally rearward, and the pivot pin or shaft 101, is made to pass through the rear ends of the said plates. Wings 117 are secured upon the side posts 112, and one of these pins extends in a forward direction from the post in the rear of each set of fingers, one of the wings being therefore located between the top and bottom of the frame and the opposing partition plates and between the partition plates themselves. The number of wings 117 corresponds to the number of fingers employed, and said wings have recesses 118 produced in their inner ends, as shown in Fig. 9, and the said forward ends are shaped to form eyes. The arms 115, connected with the fingers have their inner

ends located in the recesses 118 of the wings 117; and a pintle 119, is passed through the eye of each wing and down through openings in the finger arms 115, as is shown in both Figs. 9 and 10. Thus each set of fingers is provided with an independent set of operating arms 115, and each set of said arms is guided by an independent wing 117. It will thus be observed that when the inner or rear pivoted ends of a set of finger arms 115 are drawn forwardly the set of fingers connected therewith will be closed, and when the arms are carried in an opposite direction the fingers will be opened.

A number of horizontally located cams 120, are used, the number corresponding to the number of sets of fingers. The cams are more or less triangularly shaped, and are pivoted at their angular forward ends upon the pivot pin or pivot shaft 101, as shown in Figs. 9 and 10. The cams are both spaced and connected by means of a pillar 121, as shown in Fig. 9, extending from the lower to the uppermost cam; and each cam is provided with a horizontal chamber 122^a, and a segmental slot 123, which extends through from the upper to the lower face. Each cam is connected with a set of finger operating arms 115, by a connecting arm 122, the latter arm being curved slightly, and its forward end is pivotally connected with the operating arms where the latter are pivotally united, while the rear end of each connecting arm 122, is provided with a pin 124, and the pins are adapted to pass upward through the slots 123 in the cams and are provided with suitable lock nuts 125. It is preferable that the upper set of fingers should close first, the next set almost immediately after, and the third set of fingers last; therefore it is necessary that the operating arms of the fingers should be adjusted properly with respect to the cams 120, and the pin 124 of the upper connecting arm 122 will therefore be located nearer the forward end of the slot in its cam than the connecting arm of the next set of fingers, while the connecting arm of the last set of fingers is carried out farther in direction of the rear wall of its cam slot. Such adjustment is accomplished by springs 126, which are secured to a post 127, passing through all the cams, and these springs are located within the cam chambers 122^a, and have constant bearing against the pins 124 of the finger-connecting arms 122, as shown in dotted lines in Fig. 10. The pins 124 are simply intended to guide the rear ends of the operating arms 122 to the springs 126. The tension of the springs 126 is preferably regulated by set screws 126^a located in the rear portion of the pillar 121 on a line with the chamber 122^a, as shown in Fig. 16.

By regulating the springs 126 and adapting them in the manner described, the top pair of fingers will be closed first and will be held closed until all the lower pairs have closed likewise without subjecting the teat to

undue pressure. The fingers will all open at once, when the cams 120 are drawn backward until the pins 124 strike the front ends of the slots 123.

It has been heretofore stated that the connecting rod or bar 96 and the slide 94 operate to impart movement to the fingers; this is accomplished in the following manner: A disk 129, is loosely mounted upon the lower end of the pivot pin or shaft 101 within the frame E, as shown in Figs. 9, 11 and 12; this disk is provided with a series of apertures 130, circularly arranged, and is likewise provided with an extension 131, located at one side, the extension being connected with the slide 94 in such manner that when the slide is laterally reciprocated the disk 129 will be given a like movement. A pin 132, is secured preferably to the lower and intermediate cams 120, and the said pin normally extends downward in one of the apertures 130 of the disk. Thus when the disk is operated by the slide the cams are rocked in a lateral direction, and consequently the fingers are alternately opened and closed. When the shifting lever 92, is operated to disconnect or shift the parts heretofore referred to, it will likewise disconnect the fingers from the driving disk 129, as when the handle or forward end of the shifting lever is pressed upward it will press upward the pivot pin or shaft 101 against the tension of the springs 103 and 104, and as the shaft cannot slip through the cams, it will consequently raise the cams 120, and the cams will carry the locking pin 132 upward with them out of engagement with the disk 129, and at this time the entire frame E, may be revolved in the supporting frame B, and the fingers themselves may be given any desired inclination in an outward or inward direction. After the adjustment of all the parts has been made, by permitting the shifting lever 92 to enter the space between the teeth 88 of the lever arm 87, the various parts will be locked in position, and likewise the parts will be thrown in gear with the driving shaft.

In order that the fingers shall not injure the udder or the teat, all the fingers are inclosed in a glove E², shown in detail in Fig. 15, which glove is secured upon the frame B preferably by means of strings 140, secured to a hook 141, or its equivalent, located upon the frame. The glove may be made also to cover a bracket 142, which extends downward from the lower portion of the frame E. This bracket carries a cup 143, adapted to receive the milk from the teat being operated on and strain the same, being provided with a strainer, and the cup has attached to it a tube 144. The bracket 142 is bifurcated to receive the shank of the cup which shank is tubular and receives the tube 144. The cup shank is provided with a collar 143^a which rests upon the bracket being held stationary by a spring 143^b. The tubes of all the cups employed in the machine are led to a common cup 145,

centrally located, and the said cup 145, has connected with it a tube 146, which may be led to a milk pail 147 conveniently located.

A stay 148 is attached to one side wall 99 of the frame and extends around the shaft 101. This stay is adapted to hold the disk 129 down upon the bottom of the frame E in order that it will not be lifted out of place when the shaft 101 is forced upward by the lever 93.

In operation the suspension rod 16, is placed upon the cow substantially as shown in Fig. 1, the pads A bearing against the sides and back of the animal. In Fig. 3 it will be observed that a hook 149 is secured to the lower end of the bed sleeve 26, and that an arm is projected from the lower end of the connecting rod that passes through the sleeve, said arm being provided with a friction pulley

150. These parts are adapted for the attachment of a harness which consists of a strap 151, having a loop 152 at one end and a hook 153 at the opposite end. The loop is passed over the hook 149, the strap is carried around the pulley 150, and the hook end of the strap is adjustably connected with a second strap 154. This latter strap is passed upward around the animal's body following the suspension rod 16, being passed over the arms 19 of the pads A and after leaving the suspension rod, the strap 154 is carried downward and secured to one of the tines or arms 25 of the body B. Thus, when the body sleeve 26 is forced upward the end of the strap 151 connected with it will be carried upward also. One end of the strap 154 will therefore be drawn downward while the opposite end connected with the body tines will be drawn upward, insuring an even and guided upward movement of the bed in direction of the udder. The bed is adjusted so as to bring the several connected sets of milking fingers in position to operate upon the several teats. The crankshaft may now be manipulated in any suitable manner and the fingers will be engaged with the teats, compressing them from the top gradually to the bottom, producing thereby the same action in milking as is produced with the hand.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a cow milking machine, the combination of a series of fingers arranged in sets, a bed, a carriage having adjustable movement upon the bed, a driving connection between the carriage and the fingers, a drive shaft carried by the bed and connected with the driving mechanism of the carriage, and a harness connected with the bed and adapted to support the bed adjacent to the udder of a cow, as and for the purpose set forth.

2. In a cow-milking machine, the combination of fingers arranged in sets and having timed movement with reference to one another, a bed, a carriage having adjustable con-

nection upon the bed, a driving mechanism carried by the bed and connected with the carriage, and a mechanism connecting the driving mechanism of the carriage with that of the fingers, as and for the purposes set forth.

3. In a milking machine, the combination, with a bed, a carriage having adjustable movement upon the bed, arms projected from the carriage, and milking fingers carried by the arms, of a driving shaft located upon the bed, a driving shaft located in the carriage, an adjustable connection between the driving shaft of the bed and the driving shaft of the carriage, an actuating mechanism connecting the driving shaft of the carriage with the fingers, and a shifting lever having shifting connection with the carriage, the bed and the fingers, substantially as and for the purpose set forth.

4. In a milking machine, the combination, with a bed, a carriage having adjustable locking connection with the bed, a crank shaft carried by the bed, a driven shaft located within the carriage, and an adjustable pitman connection between the carriage shaft and the bed shaft, of a series of milking fingers arranged in sets, each set having timed movement, a series of connected cams, an adjustable connection between the cams and the sets of fingers, a driving mechanism connecting the carriage shaft with the cams, and a shifting lever having shifting connection with the fingers, the carriage and the bed, substantially as and for the purpose specified.

5. In a milking machine, the combination, with a milking apparatus, of a harness adapted to be adjusted upon an animal, a sleeve connected with the milking apparatus, a screw adjustably located within the sleeve and connected with the harness, a nut located upon the screw having ratchet teeth formed upon one of its faces, a dog carried by the sleeve and engaging with the rack surface of the nut, and a connection between the dog and the driving mechanism of the machine, whereby the milking device will be elevated during the operation of the machine, as and for the purpose set forth.

6. In a cow-milking machine, the combination, with a bed, a harness, an adjustable connection between the harness and the bed, a drive shaft carried by the bed, and a pitman connected with the drive shaft, of carriages having sliding movement upon the bed, a pivot block located in the carriage and an adjusting block located beneath the pivot block, a driven shaft carried by the pivot and adjusting blocks, an adjusting screw shaft likewise carried by the adjusting and pivot blocks, slide-ways connected with the adjusting blocks receiving the pitmen, a shifting lever, pawls normally engaging with the adjusting blocks and pitmen, and a connection between the pawls and the shifting levers, as and for the purpose specified.

7. In a cow-milking machine, the combina-

tion, with the bed, a harness, an adjustable connection between the harness and the bed, a crank shaft carried by the bed, pitmen connected with the cranks of the shaft, and carriages having sliding movement upon the bed, of lock levers carried by the carriages and locking normally with the bed, a driven shaft, pivots and adjusting blocks journaling the shafts, adjusting shafts likewise carried by the pivot and adjusting blocks, pawls normally held in locking engagement with the pitmen and the adjusting blocks, shifting levers connected one with each carriage, a connection between the shifting levers, the pawls and the levers locking with the bed, milking fingers connected with each carriage, and a driving mechanism connecting the milking fingers of each carriage with the driven shaft of the carriage, as and for the purpose specified.

8. In a cow-milking machine, the combination, with a bed, a harness, an adjustable connection between the bed and the harness, and a carriage having sliding movement upon the bed, of a frame constructed of a series of pivoted sections connected with the carriage, a second frame adjustably connected with the frame of sections, milking fingers located in the latter frame, a drive shaft carried by the bed, a driven shaft located in the carriage, and a connection between the driven and drive shafts, an adjustable connection between the driven shaft and the fingers, and a shifting lever having connection with the fingers and likewise with the locking mechanism of the carriage, and a locking mechanism connecting the driving shaft with the carriage, whereby through the manipulation of the shifting shaft all parts of the machine may

be adjusted simultaneously or consecutively, as and for the purpose set forth.

9. In a cow-milking machine, the combination, with a bed, a harness, adjustable pads located upon the harness and an adjustable connection between the harness and the bed, the connection between the harness and the bed comprising a series of adjustable parts, an elevating mechanism forming a portion of the connecting medium between the frame and the harness, a drive shaft carried by the bed, a dog engaging with the said elevating mechanism and driven from the drive shaft, a carriage having sliding movement upon the bed, a driven shaft supported by the carriage, a pivot and an adjusting block journaling the driven shaft, a pitman connection between the drive shaft and the adjusting block of the driven shaft, an adjusting shaft carried by the adjusting block, and a locking lever located upon the carriage and engaging with the bed, of a pawl carried by the adjusting block locking said block to the pitman, a shifting lever connected with the carriage, a connection between the shifting lever, the lock lever of the carriage and the pawl of the adjusting block, cam-controlled milking fingers having timed movement, located in advance of the carriage and having pivotal connection therewith, a driving connection between the fingers and the driven shaft of the carriage, and an adjustable connection between the shifting shaft, the finger-driving mechanism and the supports for the fingers, as and for the purpose specified.

WILLIAM BURDINE BLAND.

Witnesses:

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ANN ELIZA HOUSH.