

F. B. SITES.
CRATE MACHINE.

No. 586,671.

Patented July 20, 1897.

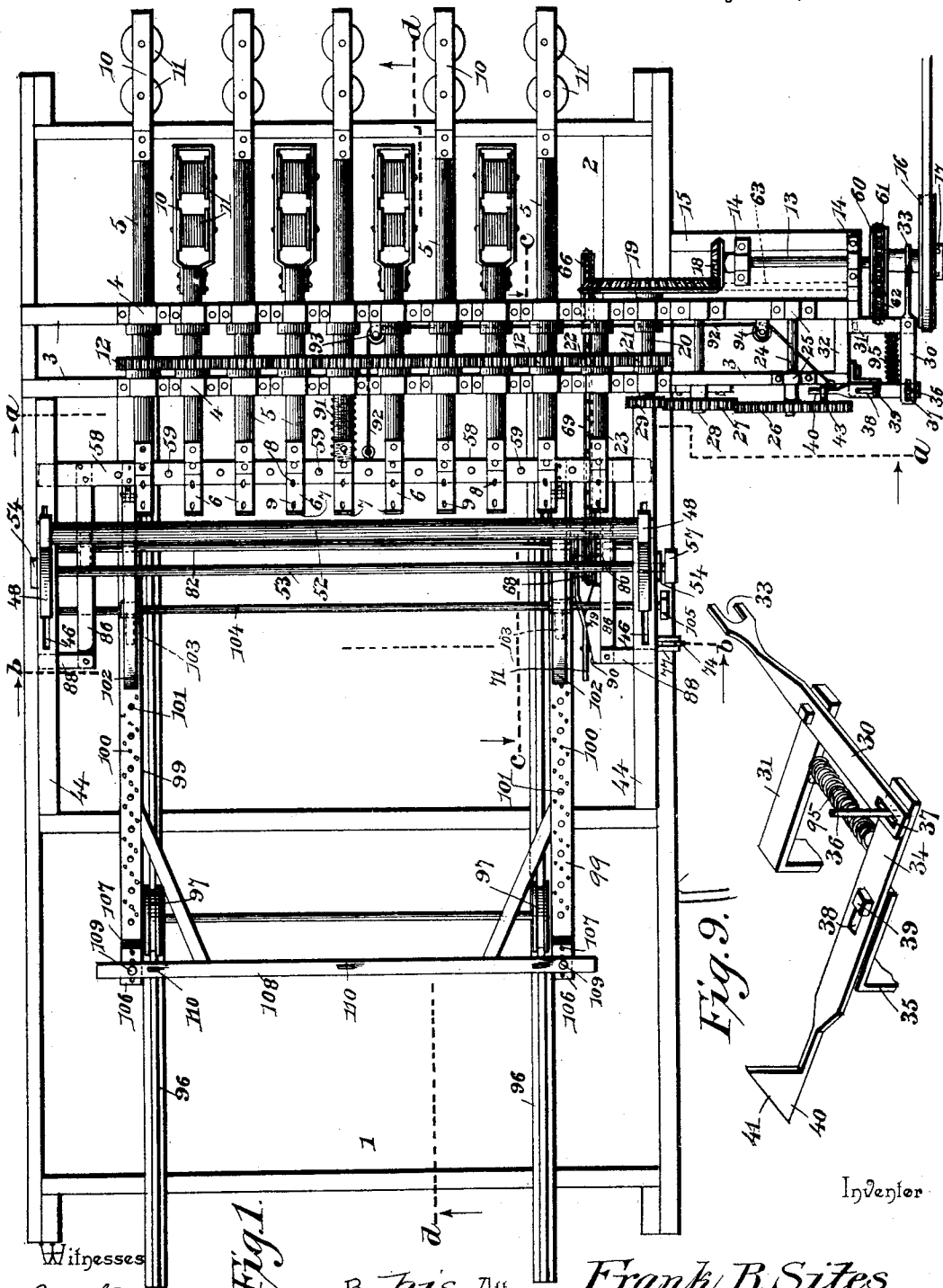


Fig. 1.

Fig. 9.

Inventor

Witnesses
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By His Attorneys, Frank B. Sites

Chas. Snow & Co.

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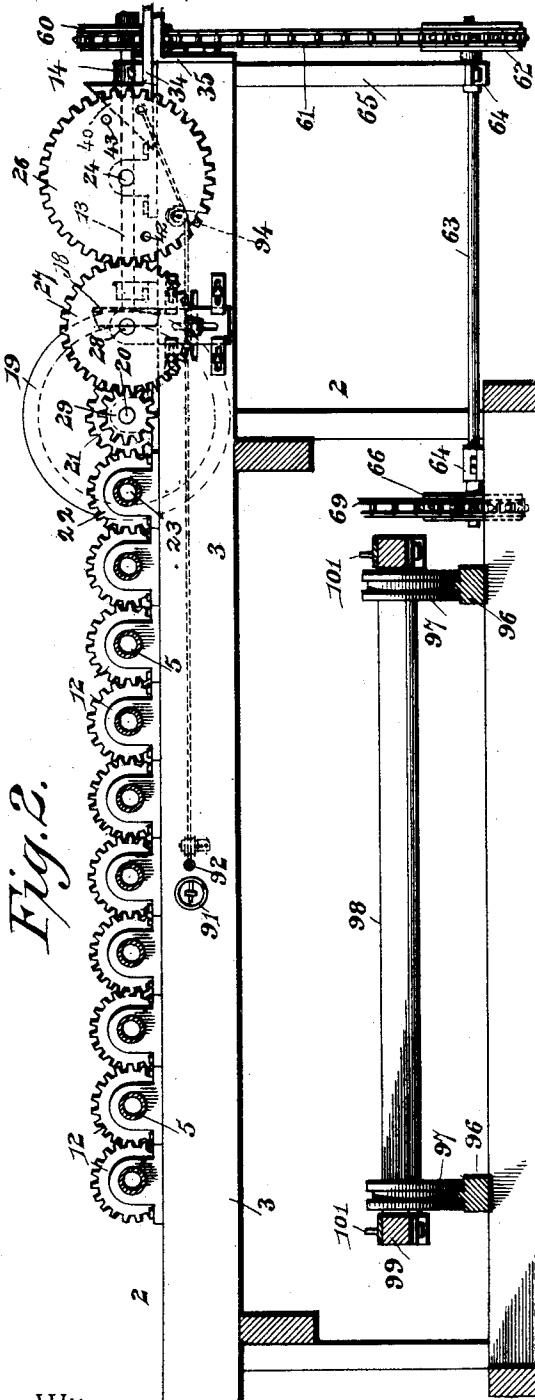


Fig. 2.

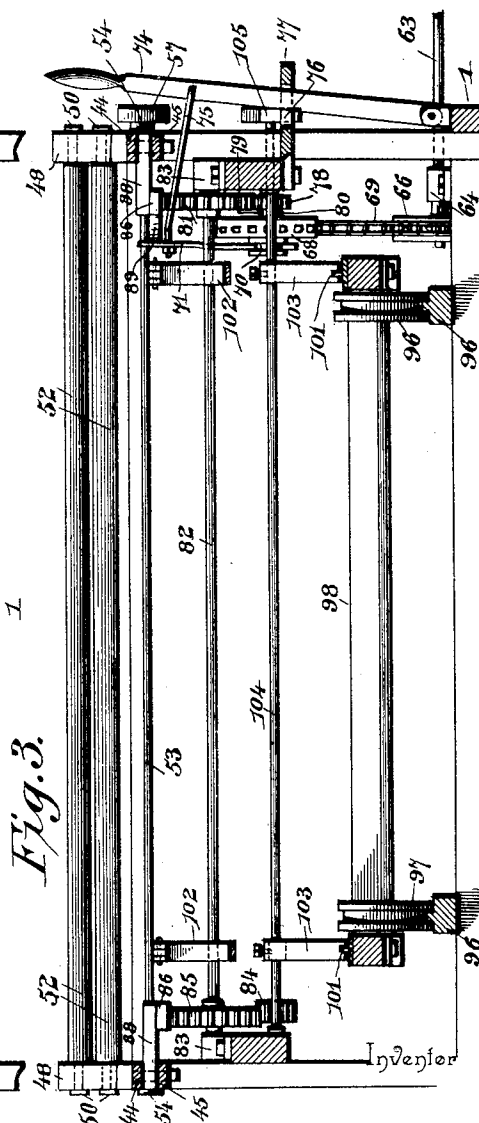


Fig. 3.

Witnesses

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(No Model.)

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Fig. 4.

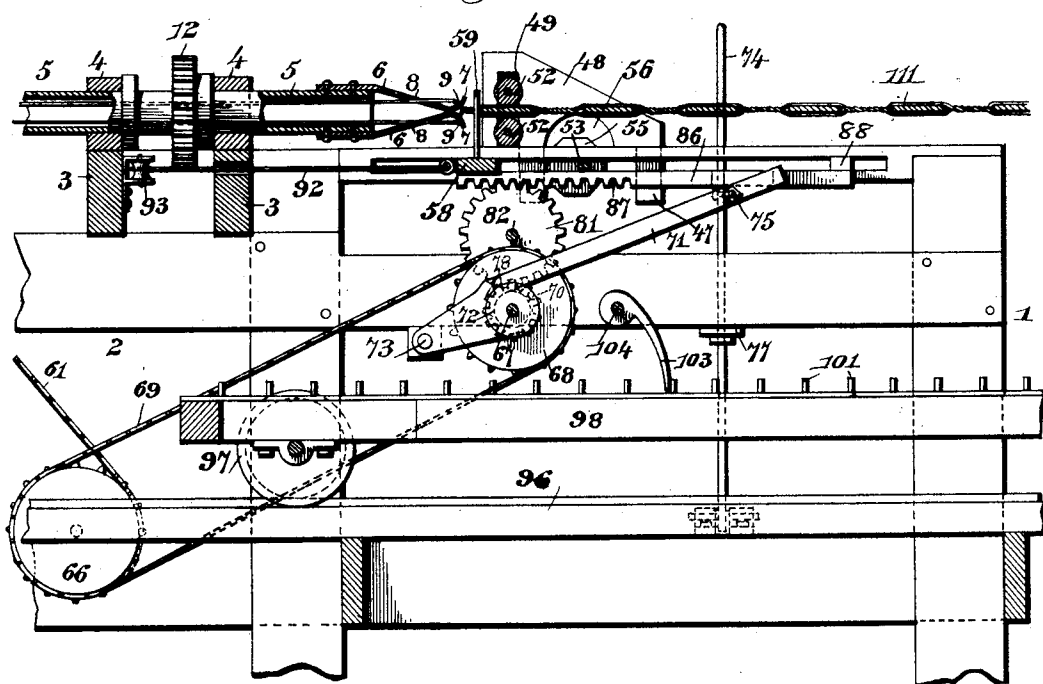


Fig. 6.

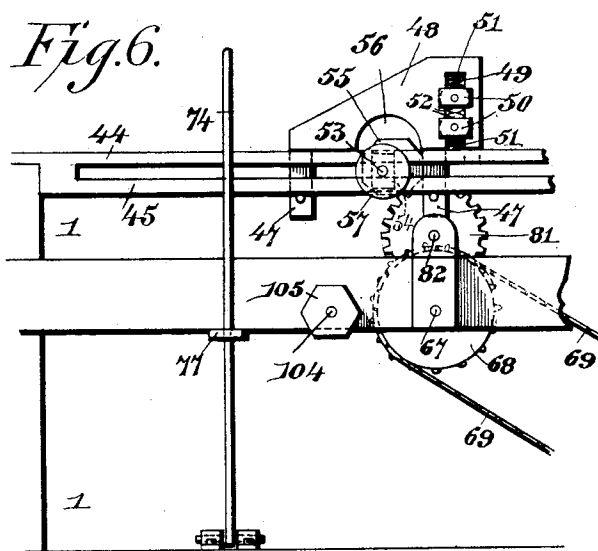


Fig. 7.

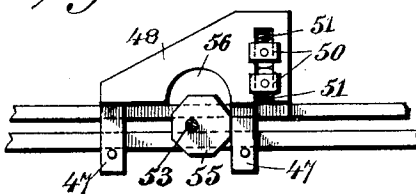
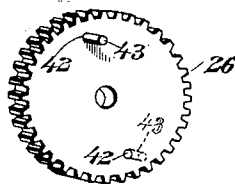


Fig. 8.



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(No Model.)

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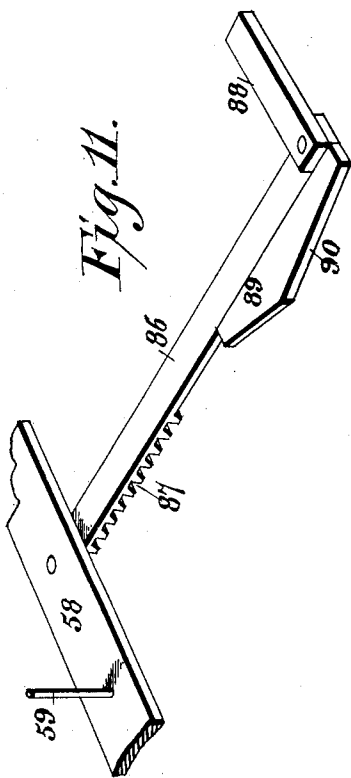


Fig. 11.

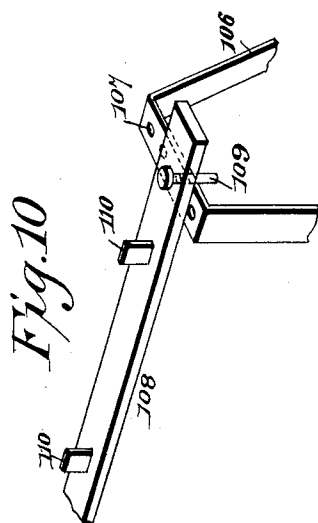


Fig. 10.

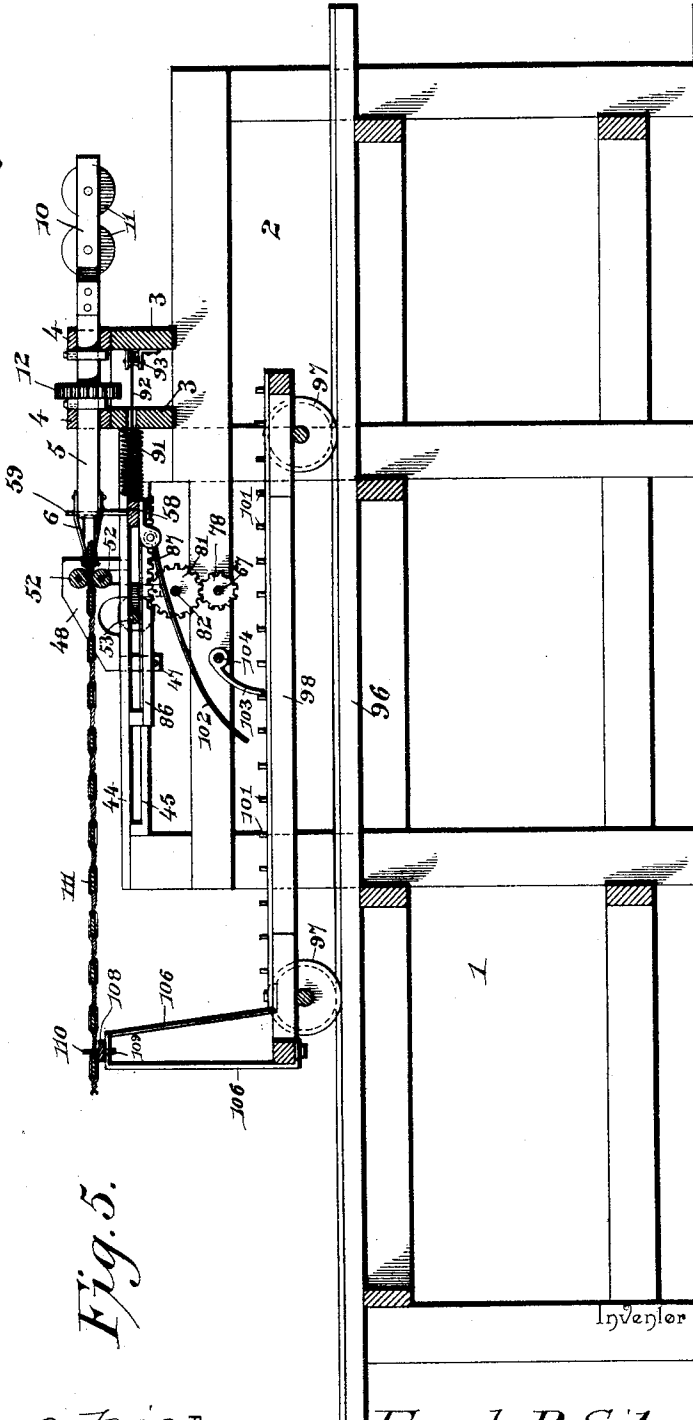


Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

FRANK B. SITES, OF DEFIANCE, OHIO.

CRATE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 586,671, dated July 20, 1897.

Application filed February 18, 1897. Serial No. 624,011. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. SITES, a citizen of the United States, residing at Defiance, in the county of Defiance and State of Ohio, have invented a new and useful Crate-Machine, of which the following is a specification.

This invention relates to crate-machines in which the slats are woven together by a series of strands consisting of double wires, which embrace the slats and are twisted together between the adjacent slats, some of its objects being to provide means whereby slats are so spaced during the operation of weaving them together that the distance between the rear edges of the adjacent slats will be uniform throughout the entire length of the web regardless of variations in the widths of the different slats, also to provide means whereby the feed may be adjusted to vary the distance between the slats of different webs, and also to provide means for varying the number of twists formed in the wires between the slats.

With these and other objects in view the invention consists in the novel details of construction and combination of parts hereinafter fully described, illustrated in the drawings, and particularly pointed out in the claims.

In the drawings, Figure 1 is a plan view of the machine. Fig. 2 is a vertical transverse section on the line *a a* of Fig. 1. Fig. 3 is a similar view on the line *b b* of Fig. 1. Fig. 4 is a longitudinal section of a portion of the machine on the line *c c* of Fig. 1, looking in the direction of the arrow. Fig. 5 is a vertical longitudinal section through a part of the machine on the line *d d* of Fig. 1, looking in the direction of the arrow. Fig. 6 is a side elevation of a part of the machine. Fig. 7 is a side elevation of a detached detail, partly in section. Figs. 8, 9, 10, and 11 are perspective views of detached details.

Similar reference-numerals indicate similar parts in the several figures.

The main frame of the machine is indicated at 1 and is rectangular in form. The rear portion of the machine is elevated above the front portion, and this elevated part of the frame is designated by 2.

3 3 represent bars supported on the top of the frame 2, extending transversely thereon,

and projecting beyond the frame at one end for a purpose to be hereinafter referred to. These bars carry a series of bearings, (indicated by 4,) in which are journaled the wire-twisters. These twisters are formed of metal tubes 5, provided at their front ends with spring-jaws 6, which are secured to the tube diametrically opposite each other, and their front end portions converge and are normally in engagement with each other, as shown in Fig. 4. The ends of the jaws are reversely curved, as indicated at 7, and each jaw is provided with two apertures, (indicated by 8 and 9, respectively,) the apertures 8 being in the converging portions of the jaws and the apertures 9 being in the curved ends.

The rear end of each tube carries a spring spool-holder 10, in which the spools of wire are supported. The spring-holders bear against the ends of the spools with sufficient force to prevent the wire running off the spools loosely, or, in other words, they regulate the tension of the wire as it is unwound from the spools. Each holder carries two spools of wire, and the wire from each spool is carried through the tube and passes out through the opening 8 in one of the jaws 6 and then through the opening 9 in said jaw, and these jaws effect the twisting of the wire adjacent to their ends when the machine is in operation.

As shown in Fig. 1, the tubes 5 vary in length, and the long and short tubes are arranged alternately across the machine, and the object of so arranging them is that they may be spaced closer together than they could be if they were of equal length, as sufficient room must be provided to permit the spool-carriers to revolve freely. Each of the tubes 5 is provided with a pinion 12, rigidly secured thereon. These pinions are of uniform size and mesh together, thereby transmitting uniform motion from one tube to the other throughout the series.

13 represents the main driving-shaft, journaled in suitable bearings 14, which are supported on a lateral extension 15 of the frame 2.

16 is the driving-pulley, loosely mounted on the shaft 13 and provided with a clutch member adapted to engage with the clutch member 17, which is rigid on the driving-shaft. The inner end of the driving-shaft

carries a beveled gear 18, which meshes with a beveled gear 19 on a shaft 20, which is journaled in suitable bearings on the cross-bars 3. The shaft 20 carries a pinion 21, which meshes with a pinion 22 on a shaft 23, which shaft is also supported in bearings on the cross-bars 3, and the pinion 22 meshes with the pinion 12 on the adjacent tube 5. Motion is therefore transmitted to the twisters from the driving-shaft 13 through the medium of the beveled gears 18 and 19 and the pinions 21 and 22, as will be clearly understood.

24 represents a shaft journaled in bearings 25 on the extended ends of the bars 3, and this shaft carries a gear 26, which will be termed the "governing-gear," as it regulates the number of twists formed in the wire between the slats. The gear 26 meshes with a gear 27, which runs as an idler and is carried on a stub-shaft 28, which may be vertically adjusted, for a purpose to be hereinafter explained. The shaft 20 carries on its end a pinion 29, which meshes with the idler-gear 27, and the gear 26 is driven through the medium of the pinion 29 and the gear 27.

30 represents a shipping-lever pivoted intermediate of its length on a bracket 31, secured to a cross-piece 32 at the ends of the bars 3, said lever being provided at one end with a fork 33, which engages an annular groove in the hub of the driving-pulley 16.

34 represents a sliding bar supported on a bracket 35, secured to the end of one of the bars 3 and having at its outer end an upwardly-projecting pin 36, which passes through a slot 37 in the end of the shipping-lever 30. The sliding bar 34 is provided intermediate of its ends with an elongated opening 38, through which a pin 39 extends and is rigidly secured in the horizontal member of the bracket 35. The sliding bar 34 is also provided at its end with an upwardly-extending plate portion 40, having an inclined end face 41. The gear 26 (see Fig. 8) is provided with two diametrically opposite holes, (indicated by 42,) into which pins 43 are inserted and during the course of the revolution of the gear 26 are adapted to engage the inclined face 41 of the sliding bar 34 and thereby move the bar endwise and operate the shipping-lever 30 to throw the pulley 16 out of engagement with the clutch 17. The end movement of the sliding bar 34 will be limited by the engagement of the pin 39 with the end of the elongated opening 38 nearest to the inclined face 41, and these parts will be so arranged that the lower end of the inclined face 41 will still be in engagement with the pin 43 after the end movement of the bar 34 has ceased, and it will thereby act as a stop for the gear 26 and stop the movement of the twisters simultaneously. The stopping of the gear 26 occurs almost simultaneously with the movement of the pulley 16 out of engagement with the clutch 17. Either one or both of the pins 43 may be inserted in the gear 26, as circum-

stances will demand, the second pin being indicated by dotted lines in Fig. 8.

The number of twists formed in the wire between the slats is regulated in the following manner: As shown in the drawings, the pinion 29 contains one-third the number of teeth in the gear 26, and only one pin 43 is carried by the gear 26. As the gear 26 derives its movement from the gear 29, it is obvious that the pinion 29 will make three complete revolutions while the gear 26 is making one revolution, and consequently the twisters will be given three complete revolutions while the gear 26 makes one revolution, and at the end of the revolution the twisting mechanism will be stopped by the stopping of the gear 26, as already described. The pinions 29 are intended to be changed, as desired, to increase or diminish the number of twists to be given to the wires between the slats—as, for instance, if two twists were to be given the pinion 29 would contain half the number of teeth that are on the gear 26, and if one twist only were required both pins 43 would be inserted in the gear 26 and the gear would therefore be stopped at the completion of a half of its revolution, which would result in stopping the pinion 29 at the end of the complete revolution. It is to accommodate the different sizes of the pinions 29 that the support which carries the stub-shaft 28, on which the idler 27 is journaled, is made vertically adjustable, as will be readily understood.

44 and 45 indicate spaced parallel bars suitably supported on the frame 2, a pair of these bars being arranged on opposite sides of the machine. These bars are vertically slotted, as indicated at 46, to receive the depending arms 47 of a plate 48. These plates are each provided with vertical slotted openings 49, in which spring-actuated bearings 50 are supported to have opposite vertical movement against the tension of the springs 51, which may be either in the form of rubber cushions or coiled metal springs, as preferred. In the bearings 50 are journaled upper and lower presser-rollers 52, which are arranged just in advance of the ends of the twisting-jaws 6.

53 represents a shaft extending transversely across the machine and supported in bearings 54, secured to the outer faces of the parallel bars 44 and 45, and this shaft carries at each end an octagonal disk 55, which disks are eccentrically mounted on the shaft 53. The disks 55 are arranged to work in an opening 56, formed in the plates 48, to engage the side walls of said openings when rotated, and by this means the plates 48 may be longitudinally adjusted on the bars 44 and 45, and thereby adjust the position of the presser-rollers 52 relative to the front end of the twisting-jaws, for a purpose which will be referred to hereinafter. The shaft 53 carries at one end a hand-wheel 57, by means of which the shaft may be turned in its bearings.

58 represents a rake-bar extending across

the machine and supported at its ends between the parallel bars 44 and 45. The teeth 59 of the rake-bar project upwardly between the twist-ers, and the rake-bar is adapted to have intermittent reciprocating movement to and from the presser-rollers 52. This movement is imparted to the rake-bar by the following-described mechanism:

Rigidly secured to the hub of the driving-pulley 16 is a sprocket-wheel 60, which is connected by a chain 61 to a sprocket-wheel 62 on the end of a shaft 63. This shaft 63 is supported in bearings 64 on the frame 1 and a hanger 65, depending from the frame 2, and carries at its opposite end a sprocket-wheel 66. A shaft 67 is journaled in suitable bearings in the frame 2, and a sprocket-wheel 68 is loosely mounted on this shaft in alignment with the sprocket-wheel 66, and these sprocket-wheels are connected by a chain 69. The hub of the sprocket-wheel 68 is provided with an annular groove 70, with which the lever 71 engages, the lever being provided with a curved recess 72 for this purpose. The lever is loosely pivoted at one end to a stud 73, projecting inwardly from the frame 2, and is connected at its opposite end to a lever 74 by means of a link 75.

The lever 74 is pivoted at its lower end to the frame 1 and is confined intermediate of its ends in an elongated opening 76 in a plate 77, the latter being secured to the frame 2. The shaft 67 carries a pinion 78 rigidly secured thereon, and this pinion carries a clutch member 79 on its face, adapted to engage a clutch member 80 on the adjacent face of the sprocket-wheel 68. By moving the lever 71 the clutch members 79 and 80 are engaged or disengaged, and when engaged the pinion 78 will receive movement from the sprocket-wheel 68, which latter is always running when the belt-pulley 16 is running. The pinion 78 meshes with a gear 81 on a shaft 82, journaled in suitable bearings 83 on the frame 2. The shafts 67 and 82 carry, respectively, at their ends a pinion 84 and gear 85, similar to the pinion and gear 78 and 81 and moving uniformly with them.

86 represents rack-bars, one at each side of the frame, the teeth 87 of which engage the gears 81 and 85. These rack-bars are connected at one end to the rake-bar 58 and carry at their other ends lateral arms 88, the ends of which arms slide between the parallel bars 44 and 45. On the inner edge of one of the rack-bars a lateral projection 89 is formed, having the inclined side face 90, which as the rack moves forward engages the lever 71 and rocks it to disengage the clutch members 79 and 80 and stop the further movement of the pinions 78 and consequently of the rack-bars. As soon as the clutch members 79 and 80 are disengaged the rake-bar 58 is free to move back to its normal position, and this backward movement is caused by the spring 91, attached to the rake-bar 58 and to one of the transverse bars 3.

The forward movement of the rake-bar 58 serves to throw the twisting mechanism into gear in the following manner: Leading from the rear of the rake-bar 58 is a rope or flexible chain 92, which passes through the front bar 3 and around two pulleys 93 and 94, secured to the rear bar 3, and is then connected to the sliding bar 34 at a point between the pin 39 and the beveled end 40. The pin 39 serves as a pivot on which the slide-bar can oscillate, and therefore when the rake-bar 58 moves forward the cord 92 will pull the front end of the slide-bar 34 out of engagement with the pin 43 on the gear 26 and at the same time cause it to slide forwardly and thereby rock the shipping-lever 30 on its pivot and throw the pulley 16 into engagement with the clutch 17, when the twist-ers will begin to operate. The engagement of the pulley with the clutch will occur just as the rake-bar reaches the limit of its forward movement and is free to be retracted. The backward movement of the rake-bar will slacken the rope 92, and the spring 95 will rock the slide-bar in the opposite direction and bring its beveled face 41 again in position to be engaged by the pin 43.

96 represents track-rails secured to the frame 1, and on these rails the wheels 97 of the carriage 98 run. The side bars 99 of the carriage are provided with a series of holes 100, preferably arranged in a series of rows of three holes arranged diagonally across the bars, as clearly shown in Fig. 1, and these holes are for the reception of a series of pins 101, which are adapted to be engaged by the free ends of a pair of dogs 102, pivoted on the rake-bar 58.

When the rake-bar is in its retracted position, the dogs 102 are supported on the shaft 82 and their ends are out of engagement with the pins 101. The free ends of the dogs are downwardly curved, as clearly shown in Fig. 5, and as the rake-bar moves forward the curved ends of the dogs 102 will engage with two of the pins 101 and move the carriage forward.

103 represents locking-dogs carried on a shaft 104, journaled to revolve in suitable bearings in the frame 2. One end of this rod is provided with a hand-wheel 105, by means of which the dogs may be lifted out of engagement with the pins 101 with which they normally engage. The dogs 103 are for the purpose of preventing backward movement of the carriage. The extent of the forward movement of the rake-bar is always uniform, but the forward movement of the carriage 98 is always somewhat less than the movement of the carriage, this difference in the movement being in every case caused by the lost movement of the dogs 102 before they engage the pins, and the object of this lost movement is to provide for the shortening up of the wire as it is twisted. When the pins 101 are set to give the carriage its extreme movement, there will be no lost movement other than that already referred to, but when the

pins 101 are adjusted to still further lessen the movement of the carriage relative to the rake-bar the dogs 102 will slide forward a short distance on the side rails 99 before they engage with the pin. The purpose of adjusting the movement of the carriage is to regulate the number of twists which are formed in the wires between the slats, and of course the gearing which regulates the twisting mechanism will be properly adjusted to cooperate with the adjustment of the pins on the carriage.

At the front ends of the side bars 99 are secured two vertical standards 106, and these standards are provided at their upper ends with a series of holes 107. (See Fig. 10.)

108 represents a cross-bar supported on the upper ends of the standards 106 and adjustably secured in position by means of pins 109, which pass through the bar into one of the openings 107. The bar 108 is provided with a series of vertical projections 110, and these projections are adapted to engage the edge of one of the slats 111 to carry the web forward as it is formed. When the carriage reaches the limit of its forward movement, the web is disengaged from the projections 110 and the dogs 103 are lifted out of engagement with the pins 101, when the carriage may be pushed back to again engage with one of the slats of the web, the intention being that the webs shall be continuous and afterward cut up into the desired lengths to form the crates.

At certain intervals in the web—for instance, where it is intended to sever the different lengths—it will be sometimes necessary to form additional twists in the wire between the slats, and this may be accomplished by the operator grasping the pin 36 and rocking the slide-bar 34 in its pivot 39 to move the beveled end 40 out of the path of travel of the pin 43 on the gear, and it may be held out of position until the desired number of twists are formed in the wire.

In operation the series of jaws 6 are arranged so that the openings between them will be in horizontal alinement in order that a slat may be passed through them from one side of the machine. The ends of each pair of wires in each twister are twisted by hand at the beginning of the operation, and the gear 26 is set so that the pin 43 will be in engagement with the end of the beveled face 41, and the sliding bar 34 will therefore be at the extreme of its backward movement and the pulley 16 will consequently be out of engagement with the clutch 17. The pulley will then be started and the attendant will operate the lever 74 to throw the clutch members 79 and 80 into engagement, when the rake-bar 58 will be moved forward and carry the slat in between the rollers, and as the rake-bar reaches the extent of its forward movement the pulley 16 will be moved into engagement with the clutch 17, as heretofore described, and at the same time the beveled end of the slide-bar 34 will be moved out of

engagement with the pin 43. The twisting devices will then begin to operate and continue until again stopped by the pin 43 coming in engagement with the beveled end of the slide-bar 34, which in the meantime has been returned to the position to be so engaged. The twisters will then stop and the attendant will again operate the lever 74 to cause the rake-bar to again move forward to carry another slat, which has in the meantime been placed in the jaws, forward between the presser-rollers 52, and the operation will continue in this manner, if necessary, all day. The front end of the carriage will approach within about twelve inches of the presser-rollers and five or six slats will have to be weaved together before the front slats can be engaged with the projections 110 on the bar 108, but after being once engaged with the carriage the carriage will carry the web forward as it is formed and keep it in a taut position during the entire operation. The presser-rollers 52 will, by reason of their spring-actuated bearings, press the wire firmly down upon the slat and also hold the slat firmly in position during the twisting operation. It will be apparent that as the rake-bar always moves a uniform distance forwardly and it always engages the rear edge of the slats the distance between the rear edges of the adjacent slats will be uniform throughout the web regardless of any variations in the widths of the slats. It is also obvious that by changing the extent of the forward movement of the carriage the distance between the several slats may be varied at pleasure, and as the pressure-rollers are adjustable laterally they may be moved into position to cooperate with the carriage at all times to regulate the distance between the slats. It will also be observed that the twisters are intermittently operated, and also that the rake-bar reciprocates intermittently, and that the movements of the twisters and the rake-bar alternate.

It will be understood that changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim is—

1. In a crate-machine, the combination of a series of wire-twisters, a pair of presser-rollers extending across the machine in advance of the twisters, means to adjust the rollers toward or away from the twisters, a rake-bar to carry the slats successively to the presser-rollers, and mechanism to operate the twisters and rake-bar intermittently and alternately, substantially as described.

2. In a crate-machine, the combination of a series of wire-twisters, a pair of presser-rollers, a rake-bar to carry the slats successively to the presser-rollers, mechanisms to operate the twisters and the rake-bar, and means connected to the rake-bar to automat-

ically control the twister-operating mechanism, substantially as described.

3. In a crate-machine, the combination of a series of wire-twisters, and mechanism to rotate them, of a governing-gear to actuate a clutch mechanism to stop the twister-operating mechanism, substantially as described.

4. In a crate-machine, the combination with the driving-shaft, a driving-pulley loosely mounted thereon and having a clutch member, and a clutch member rigid on the shaft, of a pivoted shipping-lever engaging the pulley, a sliding bar connected to the shipping-lever, a series of wire-twisters operatively connected to the driving-shaft, a pair of presser-rollers, a reciprocating rake-bar to carry the slats successively to the rollers, and a rope connected to the rake-bar and the sliding bar to operate the latter to cause the engagement of said clutch members, substantially as described.

5. In a crate-machine, the combination with the driving-shaft, the driving-pulley loosely mounted thereon and having a clutch member, and a clutch member rigid on the shaft, of a series of wire-twisters operatively connected to the driving-shaft, a governing-gear to control the movement of the twisters, said gear having a projection on one of its faces, a pivoted sliding bar having an inclined face at one end arranged in the path of travel of said projection, a pivoted shipping-lever connected to the other end of the sliding bar and engaging the driving-pulley, a pair of presser-rollers, a reciprocating rake-bar to carry the slats to the rollers, and a cord connecting the rake-bar and the sliding bar to rock the latter and slide it endwise, substantially as and for the purpose specified.

6. In a crate-machine, the combination of a series of wire-twisters, a pair of presser-rollers, a reciprocating rake-bar to carry the slats successively to the presser-rollers, a carriage movable on the frame of the machine and adapted to engage the web to carry it forward as it is formed, devices connected to the rake-bar to intermittently move the carriage, and mechanism to intermittently and alternately move the twisters and the rake-bar, substantially as described.

7. In a crate-machine, the combination of a carriage to engage and carry forward the web, said carriage having a series of adjustable pins, a reciprocating rake-bar, dogs pivoted to the rake-bar to engage said pins, and means to intermittently reciprocate the rake-bar, substantially as described.

8. In a crate-machine, the combination of a carriage movable on the frame of the machine and adapted to engage and carry forward the web and having a series of holes formed in its side bars, a series of pins movably inserted in said holes, a reciprocating rake-bar supported on the machine-frame, dogs pivotally connected to the rake-bar with their ends downwardly curved and normally supported out of engagement with said pins

but adapted to engage them when the rake-bar is moved forwardly, whereby the carriage moves a less distance than the rake-bar, and locking-dogs pivoted on the frame and engaging said pins to prevent back movement of the carriage, substantially as described.

9. In a crate-machine, the combination with the twisting mechanism, the presser-rollers, and the reciprocating rake-bar, of a carriage provided at its front end with vertical standards, a cross-bar adjustably connected to said standards, vertical projections on said bar adapted to engage one of the slats of the web, whereby the web is carried forward from the twisting devices and maintained in a taut position, substantially as described.

10. In a crate-machine, the combination with a series of wire-twisters, a pair of presser-rollers, a driving-shaft operatively connected to the wire-twisters, and a driving-pulley loosely mounted on the driving-shaft, of a reciprocating rake-bar to carry the slats to the presser-rollers, a sprocket-wheel attached to the driving-pulley to move with it, rack-bars connected to the rake-bar, gears engaging the rack-bars, and gearing interposed between said gears and the sprocket-wheel to transmit movement from the latter to the former, substantially as described.

11. In a crate-machine, the combination with a series of wire-twisters and a pair of presser-rollers, a driving-shaft operatively connected to the wire-twisters, and a driving-pulley loosely mounted on the driving-shaft, of a reciprocating rake-bar to carry the slats to the presser-rollers, a sprocket-wheel attached to the driving-pulley to move with it, rack-bars connected to the rake-bar, the gears engaging the rack-bars, gearing interposed between said gears and the sprocket-wheel to transmit movement from the latter to the former to move the rake-bar forward, and a spring connected to the rake-bar and a fixed part of the frame to move the rake-bar backward, substantially as described.

12. In a crate-machine, the combination with a reciprocating rake-bar, rack-bars connected to said rake-bar and operatively engaged with a revoluble gear, a pinion rigidly mounted on a shaft to engage said gear, a sprocket-wheel loosely mounted on said shaft, said sprocket-wheel and pinion each having a clutch member adapted to engage with each other, gearing connecting said sprocket-wheel and the main driving-shaft to transmit movement from one to the other, a pivoted shipping-lever engaging said sprocket-wheel, an operating-lever connected to said pivoted lever to throw the clutch members of the sprocket-wheel and pinion into engagement, and a device carried by the rack-bar to engage the shipping-lever to operate it to disengage the clutch members, substantially as described.

13. In a crate-machine, a wire-twister consisting of a tube through which the wires pass, spring-jaws secured at opposite points at one

end of said tube, the free end portions of the jaws converging and normally engaging each other, the ends of said jaws being reversely curved, and each jaw provided with two openings for the passage of the wire, one of the openings being in the converging portion of the jaw and the other opening in the curved end, substantially as described.

14. In a crate-machine, a wire-twister consisting of a tube, spring-jaws secured at one end of the tube and each jaw provided with two openings for the passage of the wire, and a spring spool-holder at the other end of the tube in which the spools of wire are journaled and frictionally engaged by the sides of the spool-holder, for the purpose specified.

15. In a crate-machine, the combination with a series of wire-twisters, of a pair of presser-rollers journaled in bearings on slidable supports, said rollers being adjacent to and in advance of the ends of the twisters, means to adjust the slidable supports to move the rollers relatively to the twisters, and a reciprocating rake to carry the slats from the twisters to the presser-rollers, substantially as described.

16. In a crate-machine, the combination with a series of wire-twisters, of plates slid-

ably supported on the frame, said plates having vertical slotted openings, spring-actuated bearings in said slots, presser-rollers journaled in said bearings, cams mounted to work in openings in the plates to adjust said plates longitudinally to vary the distance between the presser-rollers and the wire-twisters, and a reciprocating rake to carry the slats from the twisters to the rollers, substantially as described.

17. In a crate-machine, the combination with the wire-twisters and presser-rollers, of a reciprocating rake-bar to move the slats from the twisters to the rollers, a carriage to support and carry the web from the rollers as it is formed, devices interposed between the rake-bar and the carriage, whereby the latter is moved a less distance than the former, and means to adjust the extent of movement of the carriage, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANK B. SITES.

Witnesses:

JNO. P. CAMERON,
HENRY B. HARRIS.