

No. 746,887.

PATENTED DEC. 15, 1903.

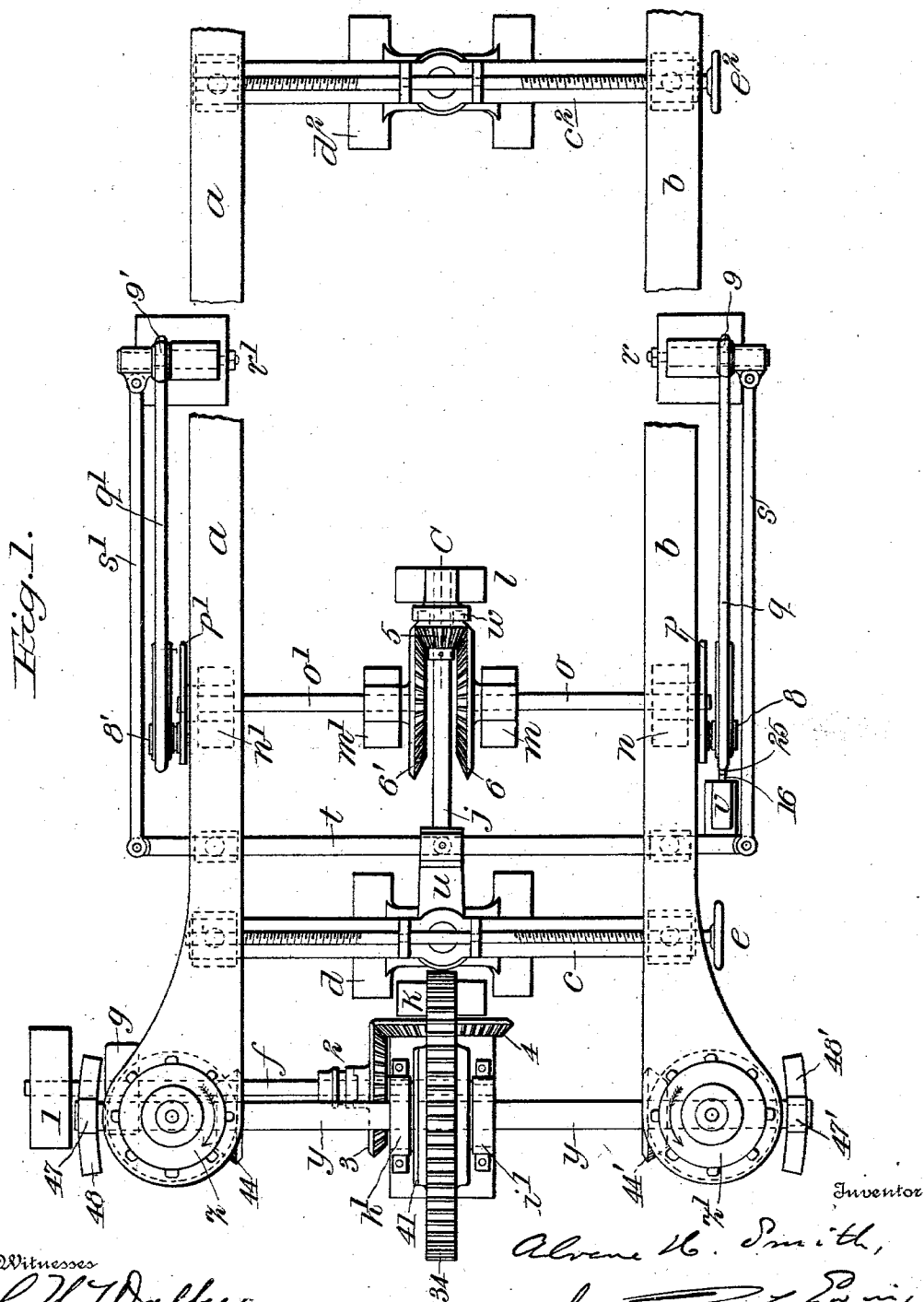
A. H. SMITH.

TENTERING MACHINE.

APPLICATION FILED MAR. 5, 1903.

NO MODEL

3 SHEETS—SHEET 1.



Witnesses

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Inventor

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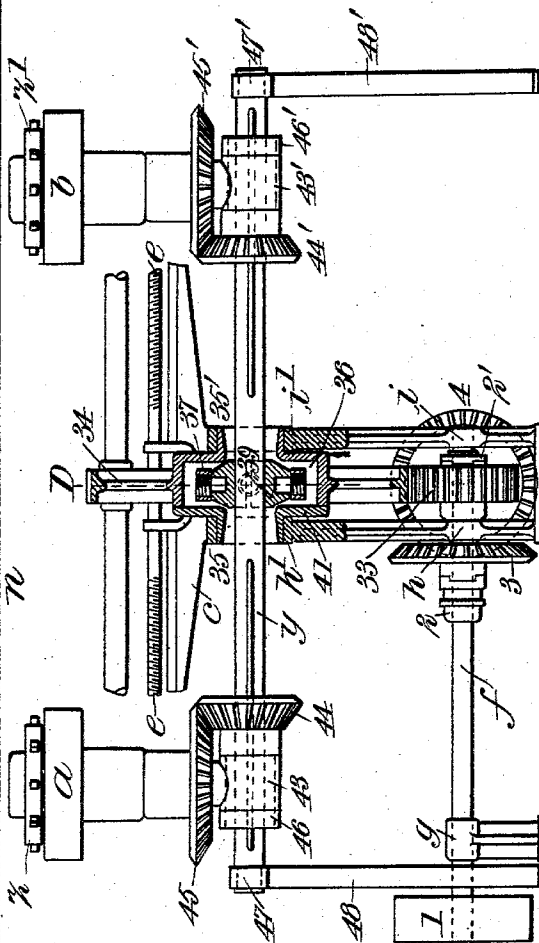
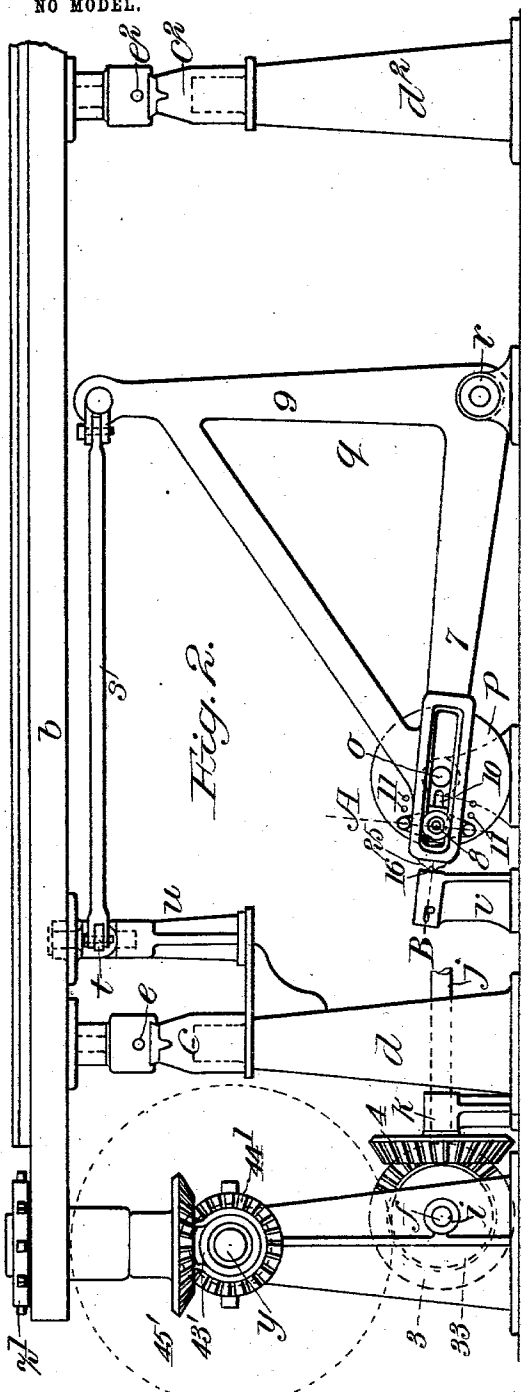
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3 SHEETS—SHEET 2.

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3 SHEETS—SHEET 3.

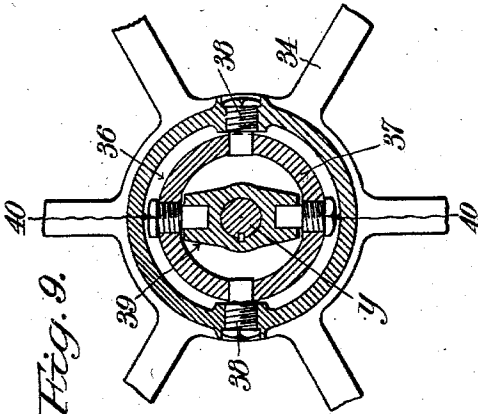


Fig. 9.

Fig. 8.

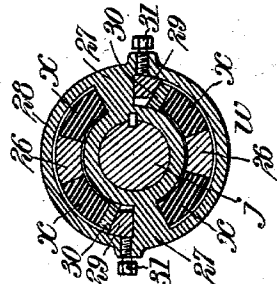


Fig. 7.

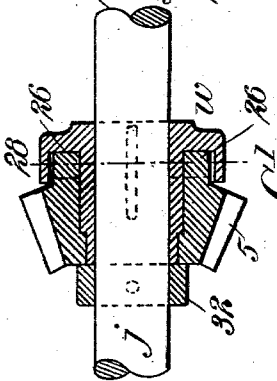


Fig. 10.

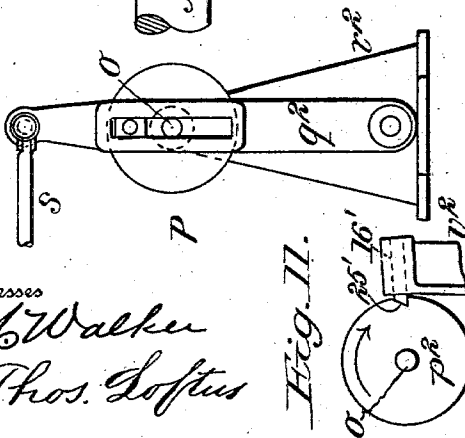


Fig. 11.

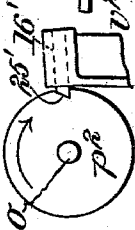


Fig. 4.

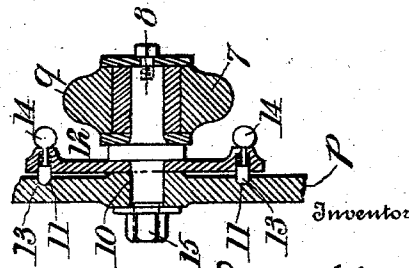


Fig. 5.

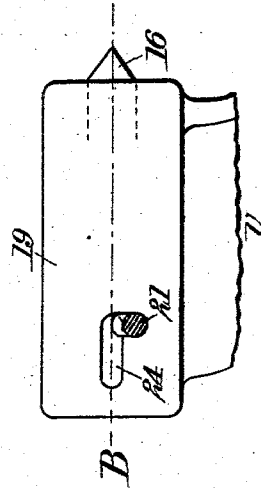
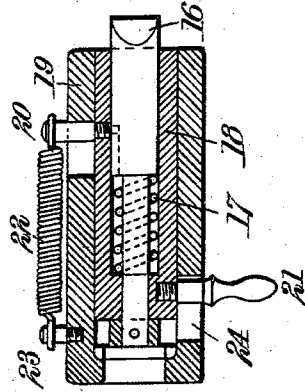


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALVENE H. SMITH, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO
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TENTERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 746,887, dated December 15, 1903.

Application filed March 5, 1903. Serial No. 146,334. (No model.)

To all whom it may concern:

Be it known that I, ALVENE H. SMITH, a citizen of the United States of America, and a resident of Providence, in the State of Rhode Island, have invented a new and useful Improvement in Tentering-Machines, of which the following is a specification.

This invention relates to power-driven machines for tentering textile fabrics by progressive treatment as they pass through the machine; and it consists in certain novel combinations of parts hereinafter set forth and claimed.

The first part of the invention relates to means for oscillating the side rails in subjecting the fabric to diagonal or zigzag tentering. The side rails of tentering-machines are usually from ninety to one hundred feet long and are supported by cross-heads ten feet apart, more or less, the same being pivoted at their centers to bases, which are bolted to the floor. When the rails are being oscillated, the strain due to overcoming the inertia of the long and heavy rails causes the bases to rock back and forth, and such strain is at times so great as to pull up the floor to which the bases are fastened. This trouble has been a great source of annoyance to parties running tentering-machines, for in many cases the machines are put in the second and third stories of wooden buildings, and when the tenters are swinging quite fast they not only jar the mechanism to such an extent that the nicely-adjusted chains will not work properly, but they also shake the buildings to such an extent as to endanger them and disturb the operatives. One object of said first part of the present invention is to reduce to the utmost such vibration and excessive strain. Another object is to insure imparting to each of the side rails exactly the same amount of power transmitted to the other rail, which is essential to a nice finish of the goods, as the modern clips are so sensitive that they cause the goods to show the least irregularity in the operation of the machine. Another object of this part of the invention is to oscillate the rails with the least practicable expenditure of power, and this not simply for economy, but

primarily with reference to reducing the strain of the swinging or zigzag motion. In other words, the objects of this part of my invention are to transmit motion to the chain-supporting rails in such a manner that the improved driving mechanism may be used on any floor and will run with a minimum of power and vibration and so that the movements of both rails shall be equal and uniform.

The second part of the invention relates to means for varying the amount of motion imparted to the rails in zigzag tentering. The leading object of this part of the invention is to provide for regulating said adjustment of the machine with facility and with nicety without departing from the commonly preferred crank-disk operating device. Other objects are to render such adjustment positive and to render the adjusting device simple, easily accessible, and renewable when worn or broken at trifling expense.

The third part of the invention relates to means for converting the machine at will for straight work. Nearly all tentering-machines are used with a "straightaway" motion, as well as with the swinging or zigzag motion; but in most of them there is nothing by which to center the machine in passing from the zigzag motion to the straight motion, and if the machine happens to stop on the bias or diagonal the operator has to straighten the machine by his eye the best he can. The objects of this part of the present invention are to automatically center the machine in passing from the zigzag motion to the straight motion and to accomplish this result by a simple and easily-controlled device preferably and conveniently retracted after so centering the machine by the foot of the operator.

The fourth part of the invention relates to the motion-transmitting mechanism, and its object is to protect the machine against all severe shocks—such as starting up the zigzag motion suddenly—and to reduce the noise of the machine. This last is especially important, owing to the fact that when the side rails change their direction of movement the noise while the crank-pins are passing their dead-

centers in machines heretofore in use is something very annoying.

The fifth part of the invention relates to the mechanism for transmitting motion to the revolving chains, and its leading objects are to provide for the employment for this purpose of ordinary spur-gearing and at the same time to permit the upper horizontal shaft, which has bearings carried by the side rails, to oscillate or swing freely with the rails. Another object of this part of the invention is to provide such mechanism in a thoroughly practical way with a universal joint, which will permit the horizontal shaft to rotate with uniform speed and power and at the same time to swing freely in accommodating itself to the zigzag motion.

The object of the invention as a whole may be said to be to impart the necessary double motion for bias or zigzag tentering with the least possible vibration or strain by a minimum of power and with absolutely equal motion at both edges of the fabric, to prevent the excessive noise and strain heretofore incident to swinging the long and heavy side rails back and forth, and to provide for transmitting motion to the chains with regularity and by means of ordinary spur-gearing protected against excessive strain.

Three sheets of drawings accompany this specification as part thereof.

Figure 1 is a top view of a portion of the delivery end of the tentering-machine embodying the several features of the present invention, known parts that are not considered necessary to an understanding of the invention being omitted. Fig. 2 is a side elevation of the same portion of the machine. Fig. 3 is an end elevation. Figs. 4 to 9, inclusive, are detail views on a larger scale, Fig. 4 being a section at A, Fig. 2, Fig. 5 a fragmentary side view, partly in section, Fig. 6 a longitudinal section on the line B, Figs. 2 and 5, Fig. 7 a longitudinal section at C, Fig. 1, Fig. 8 a cross-section on the line C', Fig. 7, and Fig. 9 a section at D, Fig. 3. Figs. 10 and 11 are fragmentary side views illustrating modifications.

Like letters and numbers refer to like parts in all the figures.

As is customary in machines adapted for bias or zigzag tentering, the improved machine comprises a pair of chain-supporting side rails *a* and *b*; a series of cross-heads *c* *c*², each of which is pivotally connected to the respective rails; central pivotal bases *d* *d*² beneath the respective cross-heads; width-regulating screws *e* *e*², mounted upon the respective cross-heads and serving to connect the pair of rails with each other and to determine their width apart; mechanism for transmitting motion to the side rails *a* and *b* for zigzag tentering; mechanism for transmitting motion to the endless tentering-chains, and a main driving-shaft *f* common to the mechanisms last named. Both of these transmitting mechanisms in the improved machine are of

novel construction and, beginning at the main driving-shaft, will now be more particularly described.

The main driving-shaft *f* is arranged transversely in low-down fixed bearings *g*, *h*, and *i* at the delivery end of the machine and is provided with the customary belt-driven pulley 1 or its equivalent and with a splined clutch-slide 2 and a loose bevel-gear 3, clutched at will thereto by said slide. A bevel-gear 4 in constant mesh with said gear 3 transmits rotation to a central longitudinal shaft *j*, which may be of any desired length and carries at its other end a bevel-pinion 5. Said longitudinal shaft *j* is supported by low-down fixed bearings *k* and *l*, Fig. 1, and perpendicular thereto in like low-down bearings *m* *n* and *m'* *n'* a pair of laterally-extending horizontal shafts *o* and *o'* are mounted. Fast on the inner ends of said laterally-extending shafts *o* and *o'* are a pair of bevel-gears 6 and 6', Fig. 1, of one and the same diameter in constant mesh with said bevel-pinion 5, and their outer ends carry crank-disks *p* and *p'* subjacent to the respective rails *a* and *b*, which actuate a pair of upwardly-extending levers *q* and *q'* of equal leverage. These levers are preferably and conveniently in the form of bell-crank levers, having substantially horizontal and vertical arms and mounted in low-down pivotal bearings *r* and *r'* at their angles. The horizontal arms 7 and 7' are slotted longitudinally and preferably provided with the customary slides within their slots to engage with wrist-pins 8 and 8', carried by said disks. The levers *q* and *q'* or their said vertical arms 9 and 9', extending upwardly to substantially the plane of the side rails *a* and *b*, terminate immediately below said plane, where they are pivotally connected with horizontal connecting-rods *s* and *s'* and their appurtenances, forming connections between the levers and side rails of one and the same length at both sides of the machine. The remainder of such connections preferably comprises a cross-head *t* parallel with the cross-heads *c* *c*², pivotally connected to the other ends of said rods *s* and *s'* and to the side rails *a* and *b* and having, preferably and conveniently, a central pivotal support *u*, carried by one of the fixed bases *d* *d*². (Compare Figs. 2 and 3.)

The bell-crank levers *q* and *q'*, fulcrumed, operated, and connected with the side rails, as above described, contribute to the accomplishment of three important results, namely:

First. They facilitate forming effective connections in all respects equal between the driving main shaft *f* and the respective side rails *a* and *b*, so that each side rail has exactly the same amount of power transmitted to it as the other side rail, and the stretching of the fabric is alike at both selvages and uniform throughout.

Second. It follows that by so equalizing the power at each side rail said bell-crank levers materially reduce the strain on the cross-

head bases by substantially neutralizing such strain. Apart from this effect, however, each bell-crank lever operated and fulcrumed as above described serves to reduce the strain due to the zigzag operation by locating the shaft-bearings and its own pivotal support close to the floor, so that leverage on their fastenings is reduced to the minimum. Of still greater importance as a means for preventing damage or annoyance by vibration is the conversion of the principal strains due to the operation of the bell-crank lever by the corresponding crank-disk into an up-and-down force, which is resisted by the floor in a very advantageous manner. This effect is primarily due to the substantially horizontal arm 7 or 7' of the bell-crank. The strain incident to the transmission of the power from the upper end of the vertical arm 9 or 9' is also very effectively resisted, owing to the location of the fulcrum r or r' near the floor.

Third. The bell-crank arms being readily made, as shown in the drawings, of about equal length, it follows that only about one-half the force is required to operate a lever of this form as compared with a straight upwardly-extending lever, such as is shown in Fig. 10. This, in common with the advantages last stated, is an advantage belonging to each of the bell-crank levers q and q' or to a single bell-crank lever operated and fulcrumed as above described.

To provide for increasing or lessening the oscillating motion imparted to the side rails a and b in the manner and for the objects stated, the crank-disks p and p' are provided with radial slots 10, Figs. 2 and 4, to receive the shanks of the wrist-pins 8 and 8', and parallel therewith are provided in their outer faces with series of adjusting-holes 11, two of which are shown in the plane of section in Fig. 4, which see. To interlock with said adjusting-holes, a washer 12, carried by each wrist-pin, is provided with a pair of gage-pins 13, and these gage-pins are preferably spring-pressed, as in Fig. 4, and provided at their outer ends with retracting-knobs 14, so that they may be disengaged from the adjusting-holes without lengthwise movement of the wrist-pin. When the wrist-pin is adjusted by means of said washer 12 and its gage-pins 13 at the desired radial distance from the center of the crank-disk, the wrist-pin is fastened in position by means of a tightening-nut 15 at the back of the disk.

Provision is made for centering the machine, as in Fig. 1, in passing from zigzag tenting to straight-ahead tenting, as aforesaid, by a simple device. (Shown in Figs. 1, 2, 5, and 6.) A bolt 16, having a beveled nose and preferably and conveniently spring-pressed, as in Fig. 6, is inclosed, together with its spring 17, Fig. 6, in a sleeve-shaped casing 18, which is in turn inclosed within an outer shell 19, forming part of a fixed portion of the machine. This is preferably an attachment v , fastened to the floor, as in Fig.

2, and said shell 19 is formed in line with the horizontal arm 7 of one of the bell-crank levers q q' in the centered position of the latter. The respective sides of said shell 19 are slotted, as in Fig. 6, and a retracting-pin 20 and a handle 21 project through the respective slots from the bolt-casing. A retracting-spring 22, Fig. 6, is stretched from said retracting-pin 20 to a fixed stud 23 on the shell, and the slot 24, through which the handle 21 projects, is constructed as a bayonet-slot, with its notch, in which the handle 21 is shown in Fig. 6, arranged to interlock with said handle when the bolt is projected. The handle 21 is readily disengaged from said notch by the foot of the operative to permit the spring 22 to retract the bolt and its casing, which occupy their retracted positions during the zigzag operation. When it is desired to pass from the zigzag operation to the straight-ahead operation, the bolt 16 and its casing 18 are projected by means of the handle 21, and the beveled nose of the bolt 16 projects in the path of a counterpart catch 25, carried by the adjacent extremity of said horizontal arm 7 of the bell-crank lever q . As long as the bell-crank levers oscillate the bolt 16 and catch 25 automatically interlock and disengage themselves, owing to the spring 17 behind the bolt and the bevels on the bolt and catch. As the oscillating motion ceases the resistance to disengagement afforded by said spring 17 becomes sufficient to keep the bolt 16 and projection 25 interlocked, and thus to fasten the lever q in central position, and therewith to center the pair of side rails. Should the oscillating mechanism be started without retracting the bolt 16, no harm would follow beyond unnecessary wear and the clicking noise of the centering device.

For cushioning the oscillating mechanism, so as to reduce the noise and strain at each change of motion, a cushioning device is introduced between two of the moving parts. Such device is preferably and conveniently introduced between the central shaft j and the bevel-pinion 5, carried thereby, and is preferably of the construction shown in Figs. 7 and 8, which see. The larger end of the pinion 5 is constructed with a pair of diametrically opposite horns 26, and a collar w , fast on the shaft j , is constructed with abutments 27, opposed to said horns, and with a rim 28, which forms an outer wall, partly inclosing the spaces between the horns and abutments, within which spaces are the cushioning-springs x , preferably of elastic rubber. To provide for regulating the cushioning device, radial wedges 29 and metallic followers 30, Fig. 8, are interposed between the abutments of the collar w on the respective sides of the collar, and inwardly-extending screws 31, Fig. 8, press against said followers to tighten the springs when they become loosened by wear. A collar 32, fast on the shaft j at the small end of the pinion 5, keeps its horns interlocked with the cushioning-springs

within the collar *w*. As all motion is transmitted to the oscillating mechanism through the pinion 5, it will be apparent that this is a very advantageous point at which to apply such device and that a single cushioning device of simple construction at this point serves to reduce the noise and strain throughout the machine due to the zigzag operation.

The mechanism for transmitting motion to the chains is shown in Figs. 1, 2, 3, and 9. For this purpose a pinion 33 is carried by the main driving-shaft *f* between its said bearings *h* and *i*. A clutch 2', Fig. 3, may be interposed between the shaft *f* and pinion 33 to provide for stopping the chains without stopping the shaft *f*; but said pinion 33 is practically in continuous rotation. It meshes with and drives a spur-wheel 34, and the train of gearing thus formed may be and is preferably of the ordinary spur-gear type. A substantial stationary frame, forming said fixed bearings *h* and *i* of the shaft *f* and extending upward therefrom, forms like bearings *h'* and *i'* on both sides of the spur-wheel 34. The wheel 34 is constructed with large hollow trunnions 35 and 35' to occupy the bearings *h'* and *i'*, respectively, and with a hollow hub affording a sufficient central space 36, within which a universal joint, Fig. 9, is located, this joint comprising, preferably, a gimbal-ring 37, connected with the wheel 34 within said central space by diametrically opposite pivots 38, and a hub 39, connected with said ring 37 by diametrically opposite pivots 40 and keyed fast on a horizontal shaft *y*. The hollow trunnion 35 of the wheel 34 is integral with a side plate 41, Figs. 1 and 3, that is removable to give access to the central space 36 for installing the universal joint and for its lubrication and repair. The shaft *y* is thus continuously rotated with the spur-gearing 33 and 34 and is at the same time free to move horizontally with the side rails *a* and *b*, with which it is connected by sleeves 43 and 43', carried beneath the lower ends of the customary short vertical sleeve-shafts, the upper ends of which carry the chain-wheels *z* and *z'*. Bevel-gears 44 and 44', the hubs of which extend through said sleeves 43 and 43', are meshed by bevel-gears 45 and 45', fast on said sleeve-shafts of the chain-wheels, and are kept in mesh by collars 46 and 46' on their hubs contacting with said sleeves 43 and 43' and are splined to the shaft *y*, so as to be adjustable with the side rails *a* and *b* as to distance apart. The outer ends of the shaft *y* rotate in the customary sliding bearings 47 and 47', movable back and forth upon curved supports 48 and 48'.

The modification represented by Fig. 10 consists in substituting straight vertical levers *q*² of equal leverage for the bell-crank levers *q* and *q'* for actuation by the crank-disks *p* and *p'* in the oscillation of the side rails *a* and *b*. A suitable fixed bearing *r*² may support each lever, and the outer end of the laterally-extending shaft *o* or *o'* in this

arrangement and the horizontal connecting-rods *s* and *s'* of one and the same length immediately below the plane of the side rails may be retained with most of the advantages hereinbefore set forth with reference to this combination of parts.

The centering device, Figs. 5 and 6, may be combined with each of the bell-crank levers or like moving parts of the oscillating mechanism. In Fig. 11 it is shown applied to a rotary disk *p*², carried by one or each of the shafts *o* or *o'*. Such disk may conveniently be the crank-disk of such shaft. As thus applied a single bevel suffices for the nose of the centering-bolt and the recess of the counterpart catch, as shown, respectively, at 16' and 25' in Fig. 11. As applied to an oscillating part the bolt and catch must be double beveled, as in Figs. 2 and 5. The cushioning device, Figs. 7 and 8, may be applied elsewhere at one or more points, and other like modifications will suggest themselves to those skilled in the art.

The term "crank-disks" as herein used is not intended to exclude known equivalents, such as eccentrics, where these are applicable. The crank form is preferred, owing to the facility it affords for confining the wear to parts of small size, which can be renewed quickly and at little expense. The term "pivotal" is intended to include any construction of joint, bearing, or support that provides for an oscillating or pivotal movement of either or both of the parts so connected or supported.

Having thus described said improvement, I claim as my invention and desire to patent under this specification—

1. In a centering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag centering, comprising a central shaft, bevel-gearing driven by said shaft, a pair of laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by the outer ends of said laterally-extending shafts subjacent to the respective rails, and connections of one and the same length between said disks and the rails.

2. In a centering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag centering, comprising a central shaft, bevel-gearing driven by said shaft, a pair of laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by the outer ends of said laterally-extending shafts subjacent to the respective rails, upwardly-extending levers of equal leverage actuated by said disks, connecting-rods of one and the same length coupled to the upper ends of said levers, and pivotal connections between said rods and the rails.

3. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a central shaft, bevel-gearing driven by said shaft, a pair of laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by the outer ends of said laterally-extending shafts subjacent to the respective rails, upwardly-extending levers of equal leverage actuated by said disks, connecting-rods of one and the same length coupled to the upper ends of said levers, and a cross-head, parallel to the cross-heads first named, to the ends of which said rods are pivotally connected, and which is pivotally connected to the respective rails.

4. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a central shaft, bevel-gearing driven by said shaft, a pair of laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by the outer ends of said laterally-extending shafts subjacent to the respective rails, upwardly-extending levers of equal leverage actuated by said disks, connecting-rods of one and the same length coupled to the upper ends of said levers, a cross-head, parallel to the cross-heads first named, to the ends of which said rods are pivotally connected, and which is pivotally connected to the respective rails, and a central pivotal support beneath the cross-head last named.

5. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a transverse horizontal shaft having low-down bearings, a crank-disk rotated by said shaft, a wrist-pin carried by said crank-disk, a bell-crank lever having a low-down pivotal bearing at its angle and substantially horizontal and vertical arms, the former engaged by said wrist-pin, and the vertical arm extending upwardly toward the plane of the rails, and connections between said vertical arm and the rails.

6. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a transverse horizontal shaft having low-down bearings, a crank-disk rotated by said shaft, a wrist-pin carried by said crank-disk, a bell-crank lever having a low-down pivotal bearing at its angle and substantially horizontal and vertical arms, the former engaged by said wrist-pin and the vertical arm extending upwardly to

substantially the plane of the rails, and pivotal connections between said vertical arm and the rails, comprising a horizontal connecting-rod in substantially said plane of the rails.

7. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts having low-down bearings, a pair of crank-disks carried by said shafts respectively, wrist-pins carried by said crank-disks respectively, a pair of bell-crank levers of equal leverage having low-down pivotal bearings at their angles and substantially horizontal and vertical arms, the former engaged by said wrist-pins and the vertical arms extending upwardly to substantially the plane of the rails, and connections of one and the same length between said vertical arms and the rails.

8. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts having low-down bearings, a pair of crank-disks carried by said shafts respectively, wrist-pins carried by said crank-disks respectively, a pair of bell-crank levers of equal leverage having low-down pivotal bearings at their angles and substantially horizontal and vertical arms, the former engaged by said wrist-pins and the vertical arms extending upwardly to substantially the plane of the rails, connecting-rods of one and the same length coupled to the upper ends of said vertical arms, and a pivotal connection between said rods and the rails.

9. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts having low-down bearings, a pair of crank-disks carried by said shafts respectively, wrist-pins carried by said crank-disks respectively, a pair of bell-crank levers of equal leverage having low-down pivotal bearings at their angles and substantially horizontal and vertical arms, the former engaged by said wrist-pins and the vertical arms extending upwardly to substantially the plane of the rails, connecting-rods of one and the same length coupled to the upper ends of said vertical arms, and a cross-head, parallel to the cross-heads first named, and to the ends of which said rods are pivotally connected, and which is pivotally connected to the respective rails.

10. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating
5 said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts having low-down bearings, a pair of crank-disks carried by said shafts respectively,
10 wrist-pins carried by said crank-disks respectively, a pair of bell-crank levers having low-down pivotal bearings at their angles and substantially horizontal and vertical arms, the former engaged by said wrist-
15 pins and the vertical arms extending upwardly to substantially the plane of the rails, connecting-rods of one and the same length coupled to the upper ends of said vertical arms, a cross-head, parallel to the cross-heads
20 first named, to the ends of which said rods are pivotally connected, and which is pivotally connected to the respective rails, and a central pivotal support beneath the cross-head last named.

25 11. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating
30 said rails, for zigzag tentering, comprising a transverse horizontal shaft having stationary bearings, a crank-disk rotated by said shaft and having a radial slot and adjusting-holes, a wrist-pin radially adjustable in said slot, a
35 washer movable with said wrist-pin and provided with a gage-pin arranged to interlock with said holes respectively in the respective positions of the wrist-pin, means for fastening the wrist-pin in its respective positions,
40 a lever actuated by said wrist-pin, and connections between said lever and the rails.

12. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary
45 bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a transverse horizontal shaft having stationary bearings, a crank-disk rotated by said shaft
50 and having a radial slot and adjusting-holes, a wrist-pin radially adjustable in said slot, a washer movable with said wrist-pin and provided with a spring-projected gage-pin arranged to interlock with said holes respectively
55 in the respective positions of the wrist-pin and provided with a disengaging knob, means for fastening the wrist-pin in its respective positions, a lever actuated by said wrist-pin, and connections between said lever
60 and the rails.

13. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary
65 bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a transverse horizontal shaft having stationary bear-

ings, a crank-disk rotated by said shaft and having a radial slot and two series of adjusting-holes parallel with said slot, a wrist-pin
70 radially adjustable in said slot, a washer movable with said wrist-pin and provided with gage-pins arranged to interlock with the respective series of holes, means for fastening the wrist-pin in its respective positions, a lever
75 actuated by said wrist-pin, and connections between said lever and the rails.

14. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary
80 bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts, a pair of crank-disks carried by said
85 shafts respectively and each having a radial slot and adjusting-holes, a wrist-pin radially adjustable in the slot of each disk, a washer movable with each wrist-pin and provided with a gage-pin arranged to interlock with
90 said holes respectively in the respective positions of the wrist-pin, means for fastening the wrist-pin in its respective positions, a pair of levers of equal leverage actuated by the respective wrist-pins, and connections of
95 one and the same length between said levers and the rails.

15. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary
100 bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts, a pair of crank-disks carried by said
105 shafts respectively and each having a radial slot and adjusting-holes, a wrist-pin radially adjustable in the slot of each disk, a washer movable with each wrist-pin and provided with a gage-pin arranged to interlock with
110 said holes respectively in the respective positions of the wrist-pin, means for fastening the wrist-pin in its respective positions, a pair of upwardly-extending levers of equal leverage actuated by said wrist-pins, horizontal
115 connecting-rods coupled to the upper ends of said levers, and pivotal connections between said rods and the rails.

16. In a tentering-machine, the combination with side rails, horizontal cross-heads
120 supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal
125 shafts, a pair of crank-disks carried by said shafts respectively and each having a radial slot and adjusting-holes, a wrist-pin radially adjustable in the slot of each disk, a washer movable with each wrist-pin, and provided
130 with a gage-pin arranged to interlock with said holes respectively in the respective positions of the wrist-pin, means for fastening the wrist-pin in its respective positions,

a pair of upwardly-extending levers of equal leverage actuated by said wrist-pins, horizontal connecting-rods of one and the same length, coupled to the upper ends of said levers, and a cross-head, parallel to the cross-heads first named, to the ends of which said rods are pivotally connected, and which is pivotally connected to the respective rails.

17. In a tentering-machine, the combination with side rails, horizontal cross-heads supporting said rails and central stationary bases upon which said cross-heads are pivoted, of improved mechanism for oscillating said rails, for zigzag tentering, comprising a pair of oppositely-rotated transverse horizontal shafts, a pair of crank-disks carried by said shafts respectively and each having a radial slot and adjusting-holes, a wrist-pin radially adjustable in the slot of each disk, a washer movable with each wrist-pin, and provided with a gage-pin arranged to interlock with said holes respectively in the respective positions of the wrist-pin, means for fastening the wrist-pin in its respective positions, a pair of upwardly-extending levers of equal leverage actuated by said wrist-pins, horizontal connecting-rods of one and the same length, coupled to the upper ends of said levers, a cross-head, parallel to the cross-heads first named, to the ends of which said rods are pivotally connected and which is pivotally connected to the respective rails, and a central pivotal support beneath the cross-heads last named.

18. In a tentering-machine adapted for both zigzag and straight-ahead tentering, the combination with the rails and their oscillating mechanism of a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a bolt having its nose beveled, and a counterpart catch arranged to interlock with said bolt when the machine is centered, said catch and bolt being carried respectively by a moving part of the oscillating mechanism and by a relatively fixed part of the machine, and one of them being spring-pressed to render it yielding but with sufficient resistance to adapt the centering device to determine the stopping-point of the rails.

19. In a tentering-machine adapted for both zigzag and straight-ahead tentering, the combination with the rails and their oscillating mechanism of a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a bolt having its nose double-beveled and a counterpart catch arranged to interlock with said bolt when the machine is centered, said catch and bolt being carried respectively by a lever forming part of the oscillating mechanism and by a relatively fixed part of the machine, and one of them being spring-pressed to render it yielding but with sufficient resistance to adapt the centering device to determine the stopping-point of the rails.

20. In a tentering-machine adapted for

both zigzag and straight-ahead tentering, the combination with the rails and their oscillating mechanism of a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a spring-projected bolt having its nose beveled and a counterpart catch arranged to interlock with said bolt when the machine is centered, said catch and bolt being carried respectively by a moving part of the oscillating mechanism and by a relatively fixed part of the machine.

21. In a tentering-machine adapted for both zigzag and straight-ahead tentering, the combination with the rails and their oscillating mechanism of a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a spring-projected bolt having its nose beveled and a counterpart catch arranged to interlock with said bolt when the machine is centered, said catch and bolt being carried respectively by a moving part of the oscillating mechanism and by a relatively fixed part of the machine, a normally retracted casing for said bolt and its spring, and means for projecting said casing to render the bolt effective.

22. In a tentering-machine adapted for both zigzag and straight-ahead tentering, a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a spring-projected bolt having its nose beveled, a spring-retracted sleeve-shaped casing for said bolt and its spring provided with a laterally-projecting handle, and an outer shell formed on a fixed part of the machine inclosing said casing and provided with a bayonet-slot arranged to interlock with said handle when the bolt and its casing are projected, in combination with a moving part of the oscillating mechanism, provided with a counterpart catch arranged to interlock with the projected bolt when the machine is centered.

23. In a tentering-machine adapted for both zigzag and straight-ahead tentering, a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a spring-projected bolt having its nose double-beveled, a spring-retracted sleeve-shaped casing for said bolt and its spring provided with a laterally-projecting handle, and an outer shell formed on a fixed part of the machine inclosing said casing and provided with a bayonet-slot arranged to interlock with said handle when the bolt and its casing are projected, in combination with a lever, forming part of the oscillating mechanism, provided with a counterpart catch arranged to interlock with the projected bolt when the machine is centered.

24. In a tentering-machine adapted for both zigzag and straight-ahead tentering, a centering device for use in passing from the zigzag operation to the straight-ahead operation, comprising a spring-projected bolt having its nose double-beveled, a spring-retracted sleeve-shaped casing for said bolt and its

spring provided with a laterally-projecting handle, and an outer shell formed on a fixed part of the machine and provided with a bayonet-slot arranged to interlock with said handle when the bolt and its casing are projected, in combination with a bell-crank lever, forming part of the oscillating mechanism, one extremity of which is provided with a counterpart catch arranged to interlock with the projected bolt when the machine is centered.

25. In a tentering-machine, the combination with side rails, movable horizontally for zigzag tentering, of mechanism for oscillating said rails comprising a rotary shaft, means for transmitting motion therefrom including a crank-disk, a lever actuated by said disk, connections between said lever and the rails, and a cushioning device interposed between two of the moving parts of said mechanism to lessen the noise and strain when the motion of the rails is reversed.

26. In a tentering-machine, the combination with side rails, movable horizontally for zigzag tentering, of mechanism for oscillating said rails comprising a rotary shaft, means for transmitting motion therefrom including gearing driven by said shaft, a crank-disk rotated by said gearing, a lever actuated by said disk, pivotal connections between said lever and the rails, and a cushioning device interposed between said shaft and said gearing to lessen the noise and strain when the motion of the rails is reversed.

27. In a tentering-machine, the combination with side rails, movable horizontally for zigzag tentering, of a central rotary shaft, bevel-gearing driven by said shaft, laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by said laterally-extending shafts subjacent to the respective rails, a pair of levers actuated by said disks, connections between said levers and the respective rails, and a cushioning device interposed between said central shaft and the bevel-gear carried thereby to lessen the noise and strain when the motion of the rails is reversed.

28. In a tentering-machine, the combination with side rails, movable horizontally for zigzag tentering, of a central rotary shaft, bevel-gearing driven by said shaft, laterally-extending shafts oppositely rotated by said gearing, a pair of crank-disks carried by said laterally-extending shafts subjacent to the respective rails, a pair of levers actuated by said disks, connections between said levers and the respective rails, a cushioning device interposed between said central shaft and the bevel-gear carried thereby to lessen the noise and strain when the rails are reversed, and means for regulating the tension of said cushioning device.

29. In a tentering-machine, the combination with side rails movable horizontally for zigzag tentering, and with the chain-wheels and a main driving-shaft, of mechanism for oscillating said rails and devices for continu-

ously rotating said chain-wheels, such devices comprising a wheel rotated by said shaft and constructed with a central space, fixed bearings supporting said wheel, and a universal joint within said space composed of a gimbal-ring, diametrically opposite pivots connecting said ring with said wheel, a hub and diametrically opposite pivots connecting said ring with said hub, a rotary shaft fast within said hub, connected with said wheels by said universal joint and movable horizontally with the rails, and means for transmitting rotation from the shaft last named to said chain-wheels.

30. In a tentering-machine, the combination with side rails movable horizontally for zigzag tentering, and with the chain-wheels and a main driving-shaft, of mechanism for oscillating said rails and devices for continuously rotating said chain-wheels, such devices comprising a wheel rotated by said shaft and constructed with a central space, fixed bearings supporting said wheel, a universal joint within said space composed of a gimbal-ring, diametrically opposite pivots connecting said ring with said wheel, a hub and diametrically opposite pivots connecting said ring with said hub, a rotary shaft fast within said hub, connected with said wheel by said universal joint and movable horizontally with the rails, and means for transmitting rotation from the shaft last named to said chain-wheels, the means last named consisting of bevel-gears splined to said shaft, bevel-gears fast on the shafts of said chain-wheels and means for keeping said bevel-gears in mesh with each other.

31. In a tentering-machine, the combination with side rails movable horizontally for zigzag tentering, and with the chain-wheels and a main driving-shaft, of mechanism for oscillating said rails and devices for continuously rotating said chain-wheels, such devices comprising a wheel rotated by said shaft and constructed with a chambered hub affording a sufficient central space and having hollow trunnions, fixed bearings for said trunnions, a universal joint within said space, a rotary shaft connected with said wheel by said joint and movable horizontally with the rails, and means for transmitting rotation from the shaft last named to said chain-wheels, whereby the latter are driven with equal facility in all positions of the rails.

32. In a tentering-machine, the combination with side rails movable horizontally for zigzag tentering, and with the chain-wheels and a main driving-shaft, of mechanism for oscillating said rails and devices for continuously rotating said chain-wheels, such devices comprising a wheel rotated by said shaft and constructed with a chambered hub affording a sufficient central space and having a hollow trunnion, a removable side plate attached to said hub and having a hollow trunnion in line with the trunnion first named, fixed bearings for said trunnions, a universal joint within said space, a rotary shaft connected with

said wheel by said joint and movable horizontally with the rails, and means for transmitting rotation from the shaft last named to said chain-wheels, whereby the latter are
5 driven with equal facility in all positions of the rails.

33. In a tentering-machine, the combination with side rails movable horizontally for zigzag tentering, and with the chain-wheels
10 and a main driving-shaft, of means for oscillating said rails and devices for continuously rotating said chain-wheels, such devices comprising a pinion carried by said shaft, a spur-wheel rotated by said pinion and constructed
15 with a chambered hub affording a sufficient central space and having a hollow trunnion, a removable side plate attached to said hub and

having a hollow trunnion in line with the trunnion first named, fixed bearings supporting the whole of such spur-gearing, a universal joint within said space, a rotary shaft
20 connected with said wheel by said joint and movable horizontally with the rails, and means for transmitting rotation from the shaft last named to said chain-wheels, the means
25 last named consisting of bevel-gears splined to said shaft, bevel-gears fast on the shafts of said chain-wheels and means for keeping said bevel-gears in mesh with each other, substantially as hereinbefore specified.

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