

S. A. MILLER.
 TYING AND TUFTING MACHINE.
 APPLICATION FILED FEB. 2, 1907.

986,019.

Patented Mar. 7, 1911.

3 SHEETS—SHEET 1.

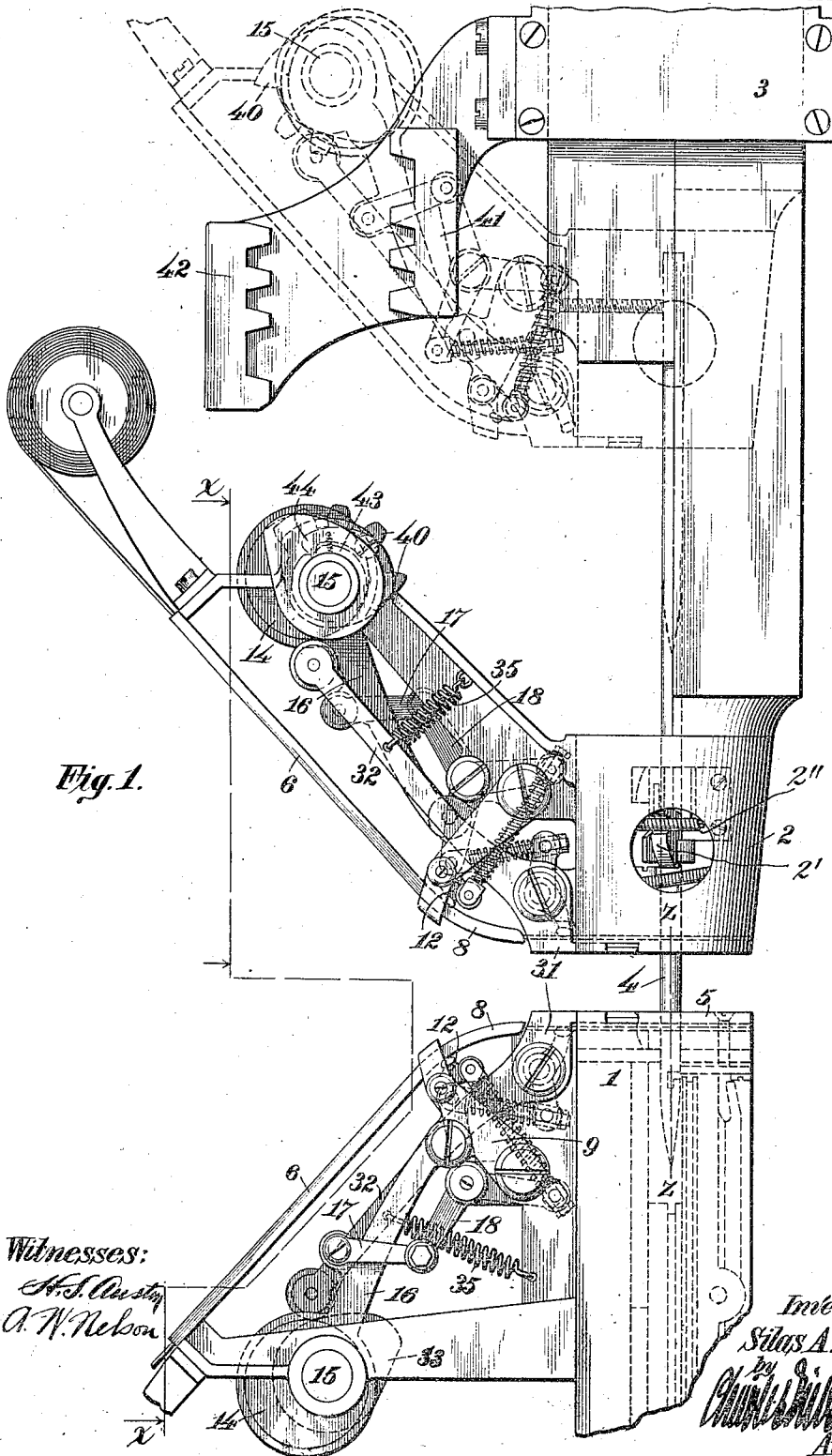


Fig. 1.

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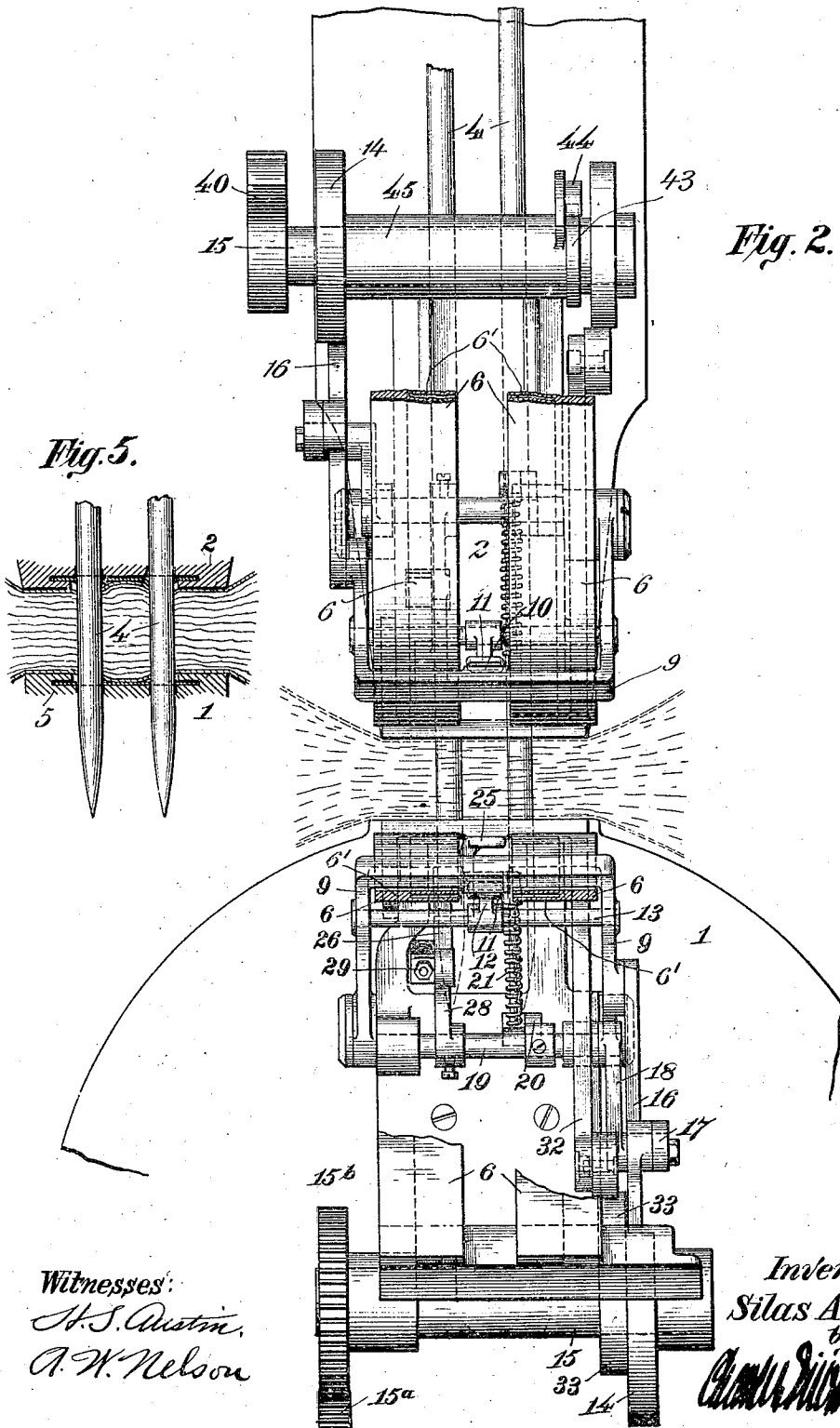
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3 SHEETS—SHEET 3.

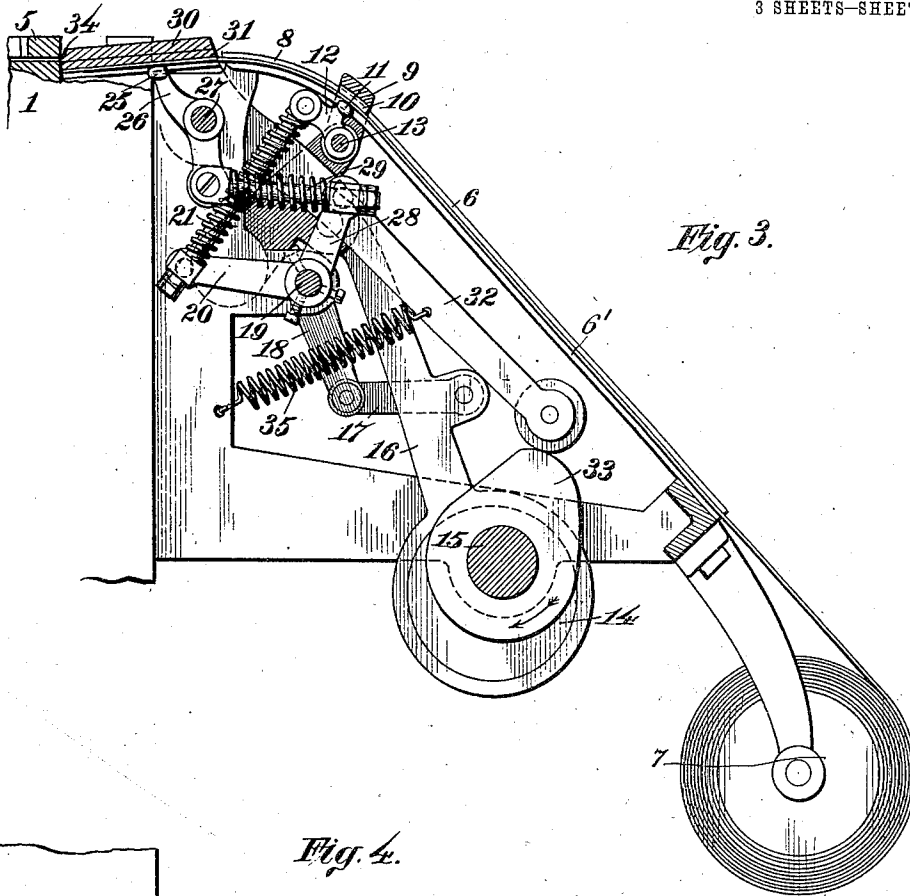


Fig. 3.

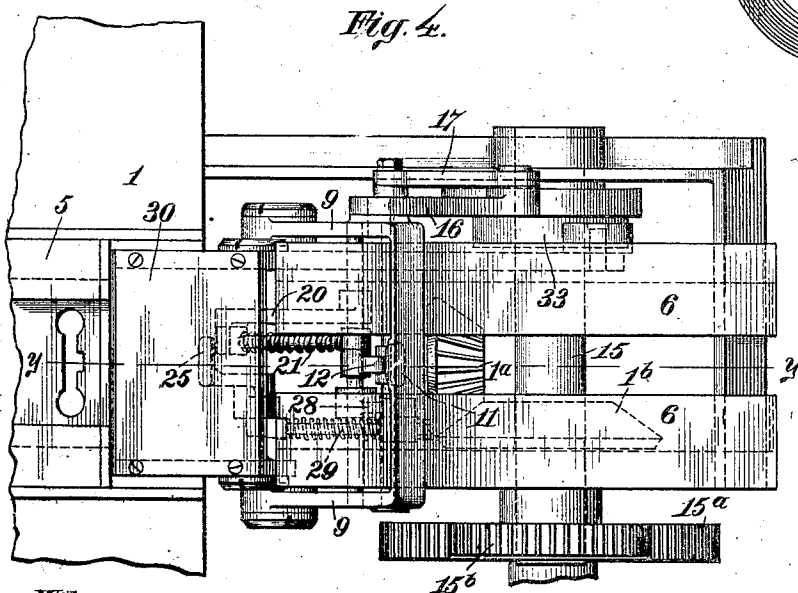


Fig. 4.

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UNITED STATES PATENT OFFICE.

SILAS A. MILLER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO JAMES P. WHEDON, OF CHICAGO, ILLINOIS.

TYING AND TUFTING MACHINE.

986,019.

Specification of Letters Patent.

Patented Mar. 7, 1911.

Application filed February 2, 1907. Serial No. 355,514.

To all whom it may concern:

Be it known that I, SILAS A. MILLER, of Chicago, Cook county, Illinois, have invented a certain new, useful, and Improved Tying and Tufting Machine, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in machines for tying and tufting mattresses, upholstery and various articles of the kind in which it is desirable or necessary to connect opposite sides of the work or article by a plurality of cross ties.

My invention further and particularly relates to an improved mechanism for automatically applying tufts to the articles as they are tied.

Further and particularly my invention relates to improvements upon the looping and tying machine, which is shown and described in United States Letters Patent, No. 784,749 granted March 14, 1905. The present invention being in the nature of an addition whereby tufts are made at the ends of the loops or cross ties formed in the operation of said patented machine.

The purpose of this invention is to provide a durable and efficient means or mechanism for simultaneously tying and tufting mattresses, pads, upholstery and the like. And a particular object of the invention is to provide a tuft feeding mechanism which shall be adapted for employment upon and in connection with not only the aforesaid patented machine, but other machines of the kind which are now in use or may be devised hereafter.

My invention consists generally in a complete mechanism adapted to loop or tie and tuft mattresses and the like in a rapid and efficient manner and at low cost.

Further my invention consists in a mechanism of the class named which comprises compression means in combination with sewing and tying or knotting means and a tuft feeding device or devices operable in connection therewith to apply tufts beneath the loops or knots of the cross ties of mattresses and the like.

My invention also consists in a mechanism for use upon or application to a tying and knotting machine, which mechanism is

adapted to supply tufting material to said machine in the form of a tape or ribbon, small portions of which being cut off form the desired tufts.

Further objects of my invention will appear hereinafter.

My invention will be more readily understood by reference to the accompanying drawings.

Figure 1 is a partial front view of a looping, tying and tufting machine embodying my invention; Fig. 2, is a side elevation thereof upon a somewhat enlarged scale, this view being taken substantially on the irregular line X—X of Fig. 1, viewed in the direction of the arrows; Fig. 3, is a vertical section of the mechanism for feeding the lower ribbon of tufting material; viewed from the rear of the machine, substantially on the line Y—Y of Fig. 4, with all of the internal operating devices retained; Fig. 4 is a plan view of the lower tuft and feeding mechanism; and Fig. 5, is a detail sectional view on the lines Z—Z of Fig. 1.

In setting forth my invention herein I have shown the same in the form which I prefer when applying it to the aforesaid patented machine; the co-acting parts of the latter being shown in their proper relations to the tuft feeding mechanisms.

Referring to the drawings, 1, represents a portion of the threader head or case of said patented mattress tying machine, and 2, the presser foot thereof, the latter containing the knotting mechanism, a portion, 2', of which shows through the opening, 2'', in the pressure foot.

3 is the presser foot guide, a part of the frame of the machine.

4—4 are the two thread drawing needles, of the patented machine, by which the thread, cord or a narrow tape is taken from the threader head and drawn up through the mattress to be knotted by the mechanism in the presser foot, 2. These several parts and mechanisms are of such well known construction, that it is deemed unnecessary to illustrate the same in detail and I have shown only so much thereof as is required to explain the relations and operations of the tufting mechanisms.

5 denotes the work plate upon the upper part of the threader case or head upon which the mattress or other article to be tied and

tufted is placed. Both the presser foot, 2, and the threader case are equipped with novel mechanisms for feeding tufting material, which material is in the form of a
 5 broad tape or ribbon. The ribbons are wound upon suitable reels on respective feeding mechanisms and the mechanisms operate to feed the ends of the ribbons to the work plates of the threader head and presser foot, *i. e.*,
 10 into the path of the needles. The mechanism further operates to sever the ends from the ribbons and thus form small pieces or tufts which are pierced by the needles and are fastened to the mattress by the knotted loops
 15 of thread formed by the needles and co-acting mechanisms.

The mechanisms, which as above stated are connected to or mounted upon the presser foot and the threader case respectively, are
 20 substantially identical in construction and in manner of operation, the only practical differences being in the members which I use for actuating them. The tuft feeder upon the presser foot will be hereinafter referred to as the upper mechanism, and that
 25 upon the threader case, as the lower mechanism. In operation, these mechanisms are so timed that during the up stroke of the presser foot, both the upper and the lower
 30 mechanisms feed the tufting material forward to the tying mechanism. The upper mechanism cuts off a small portion of the tufting material upon the first part of its down stroke; and the lower mechanism cuts
 35 off a like portion from its ribbon before the needles are retracted and before the presser foot rises.

The upper mechanism is attached to the presser foot, 2, and moves up and down
 40 therewith. The lower mechanism is attached to the threader head which is stationary. As clearly shown in the drawings, the two mechanisms occupy relatively angular, divergent positions, each being set
 45 at an angle of substantially 45 degrees to the part to which it is attached. The tuft feeding mechanisms thus positioned do not materially interfere with the compression of the mattress between the parts, 1 and 2,
 50 and permit the mattress to be moved or fed freely when the presser foot is in raised position.

Each tuft feeding mechanism comprises a tape or ribbon guide, a reciprocating gripper
 55 device for intermittently feeding said ribbon forwardly, a device for preventing back movement of the tufting strip during the retraction of the gripper, means for cutting the strip or ribbon into short lengths
 60 and suitable actuating means.

Referring to the lower mechanism, 6—6, indicate the ribbon guides mounted upon a suitable frame secured to the threader case; and 7, the reel of tufting material bracketed
 65 upon said frame in alinement with said

guides. The ribbon guides 6, comprise a pair of parallel strips each provided with a groove, 6', within which the edges of the strips are held. As stated, these grooved strips 6, occupy inclined or angular positions with respect to the threader head and their upper ends are curved, as at 8, to present the tufting material to the cutting and tying mechanism upon a horizontal plane. Continuations of the ribbon guides are
 75 formed on the presser foot and work plate as shown in Fig. 5. 9 indicates a reciprocating feed lever or yoke, mounted upon the frame astride of the curved upper ends of the guides 6. The guides 6 are spaced apart
 80 and the cross member of the yoke 9 is provided with a depending boss or lug 10, which forms one jaw of a clamp or gripper of which the foot, 11, upon a lever 12, forms the other jaw. The lever, 12, is mounted
 85 upon a rod 13, within the yoke 9, and is actuated by a suitable mechanism in such a manner that the presser foot, 11, is relieved from coöperation with the lug, 10, upon the back stroke of the yoke, but is
 90 firmly pressed into coöperation therewith, clamping the strip of material therebetween, during the forward stroke of said yoke. The yoke, 9, is reciprocated by means of an eccentric 14, mounted upon the shaft, 15,
 95 journaled in the frame and driven by suitable means. The shaft 15, is preferably driven from the same shaft which drives the mechanism of the threading case. Accordingly, the last mentioned shaft is extended
 100 through the case and is provided with a bevel gear, 1^a, which meshes with a similar gear, 1^b, mounted on a stud shaft journaled in the feed mechanism frame. The opposite end of the stud shaft is provided
 105 with a spur gear, 15^a which meshes with a pinion on the shaft, 15. An eccentric rod, 16, connects the eccentric, 14, with said yoke, and the same is operatively connected
 110 to the presser foot, 11.

17, indicates a short link pivoted at one end to the eccentric rod, 16, and at the other to an arm, 18, rigidly mounted upon a rock shaft, 19, bracketed in the frame. The rock shaft, 19, also carries an arm, 20, adjustably
 115 secured thereto. The outer end of the arm, 20, and the end of the lever, 12, are connected by a pitman, 21, provided with a suitable lost motion device.

By referring to Fig. 3, it will be seen that
 120 as the eccentric turns in the direction of the arrow, the yoke 9, is reciprocated and that the gripper jaws 10, 11, open on the back stroke of said yoke and close on the forward stroke. To prevent backward
 125 movement of the strip of tufting material, I provide a clamp which holds the strip near its forward end during the retraction or back motion of the yoke, 9. This comprises a foot 22, formed upon one end of a short
 130

two armed rock lever, 26, pivoted upon a shaft, 27, mounted in the frame. This is actuated from the rock shaft, 19, through an arm 28, and a pitman, 29; the latter being equipped with a suitable lost motion device. During the back motion of the yoke, the foot, 25, is pressed upwardly against the strip of material, firmly holding the same against the bottom of a plate, 30.

The plate, 30, constitutes a part of the cutting device, whereof a portion of the work plate constitutes the other. The plate, 30, is mounted upon a frame, 31, pivoted upon the frame of the feed mechanism, coaxially with the rock lever, 26, and is provided with a rigid arm or lever, 32, which is actuated by a cam, 33, secured upon the shaft, 15. By actuating the lever, 32, the frame, 31 and plate, 30, are rocked, as shown in Fig. 3. The cam, 33, is so timed that the edge, 34 of plate 30, is depressed prior to the rising of the presser foot, 2. The forward edge, 34, of the plate, 30, and the adjacent edge of the work plate, 5, form coacting shearing edges which cut off a small portion of the tufting strip each time the edge, 34, is depressed. A spring, 35, maintains the plate, 30, in normal position except when actuated by the cam, 33.

The upper mechanism is in every way similar to the lower mechanism, with the exception of the means for driving the same. This mechanism, as a whole, is vertically reciprocated, hence it cannot well be driven from a fixed shaft, as in the case of the lower mechanism. I provide means whereby intermittent rotation is imparted to the shaft 15, by the vertical reciprocation of the mechanism. To this end I provide the shaft, 15, with a mutilated gear, 40, which meshes with and is operated by a pair of racks, 41-42, arranged upon a suitable bracket attached to the frame of the machine, in the path of said gear. The racks 41-42, are so arranged in relation to each other and to the gear, 40, that upon the upward travel of the mechanism, the rack, 41, imparts half a revolution to the shaft, 15, which actuates the mechanism to feed the tufting strip forward; and on the down stroke, the rack 42, imparts another half revolution to the shaft, which cuts off a small portion of the strip of material and returns the gear, 40, to its proper position to be engaged by the rack, 41, on the next succeeding upward stroke. To prevent less or more than a half revolution of the shaft, 15, I provide the same with a notched collar heart cam, 43, which is engaged by a spring pressed pawl or dog, 44, mounted upon a projection or lug formed upon the shaft bearing, 45.

The operation of the machine herewith shown is as follows: The reels of tufting material being placed upon the machine, the ribbons are threaded through the guide, 6,

until their free ends lie in the horizontal extension guides or receivers upon the stationary or movable members, to-wit, the threader case and the presser foot. The machine is thus prepared for operation. The mattress, piece of upholstery or other article to be tied and tufted, is placed upon the threader head, after which the presser foot is permitted to descend and compress the mattress between the two members. The tufting material having been previously positioned upon said mattress is at this moment ready to receive the needles and the thread. The needles, descending, pierce the upper tuft and passing downward through the compressed mattress, pierce the lower tuft. The mechanism within the head, 1, threads the needles and the needles, upon ascending, draw the thread upward through the tufts and mattress, the knot being tied by the mechanism in the presser foot. The latter operation having been accomplished, the presser foot rises to free the mattress or other article.

During the normal operation of the machine, the sequence of operation is as follows, it being assumed that the presser foot is in its elevated position, shown by dotted lines in Fig. 1; the first movement will be the beginning of the downward stroke of the presser foot. This carries the mutilated gear into engagement with the rack, 42, causing, a half revolution of the shaft, 15, which causes the cam, 33, to actuate the lever, 32, to cut off the portion of the tufting ribbon, previously positioned within the horizontal extension of the tufting strip guide, i. e. the tuft receiver on the presser foot. The presser foot continues to descend and compresses the mattress tightly between the same and the threader head, after which the needles descend piercing the mattress and the tufts thereon. Inasmuch as the end of the upper tufting strip has been cut off, the needles in pressing the same have no tendency to drag upon the strip of material and overfeeding thereof is avoided. During the descent of the presser foot both end levers, 9, are retracted ready to feed the strip of material forward again upon the upstroke of the presser foot. The needles continue to descend until they pass into the threading case or head, where they receive the thread. In rising, the mutilated gear, 40, engages the rack, 15, which actuates the feed lever, 9, together with the gripping jaws, 10 and 11, to feed forward the strip into proper position to be pierced by the needles in the next down stroke. The lower mechanism is so timed that during the period of the upstroke of the presser foot the lower lever, 9, and its gripper are actuated to feed the lower strip forward. The mattress is then shifted and the process repeated as just described.

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

1. The herein described improvements, comprising relatively movable compression members, containing coacting sewing mechanisms, in combination with a tuft mechanism on each said member, each said tuft mechanism comprising a flat ribbon guide and ribbon feeding and cutting mechanism, the ends of said guides forming means for severing sections of ribbon, substantially as described.
2. The herein described improvements, comprising relatively movable compression members, containing a sewing mechanism, in combination with flat grooved ribbon guides thereon, intermittent ribbon feeding mechanisms and suitable ribbon cutters co-acting with said feeding mechanism to restrain the ribbon; together adapted to compress, tuft, and tie a mattress or the like, said ribbon guides forming members of said ribbon cutters to cut the ribbon in advance of the tying operation, substantially as described.
3. The improvements herein described, comprising relatively movable compression members having ribbon grooves, in combination with co-acting threading and tying means, provided in and operable between said members, relatively convergent flat ribbon guides upon said members, intermittent ribbon feeding mechanisms and ribbon end

cutters upon said members, said ribbon guides forming parts of said ribbon cutters to cut sections of ribbon in advance of the operation of said threading and tying means, substantially as described.

4. The improvements herein described, comprising relatively movable compression members, in combination with co-acting threading and tying means, provided in and operable between said members, relatively convergent flat ribbon guides upon respective members, respective intermittent ribbon feeding mechanisms and ribbon cutters interposed in respective guides and successively operable, said ribbon guides forming members of said ribbon cutters, substantially as described.

5. The improvements herein described comprising relatively movable compression members, in combination with co-acting threading and tying means provided in said members, flat ribbon guides upon respective members, the ends of said ribbon guides forming means for severing a section of ribbon from the main body, as and for the purpose specified.

In testimony whereof, I have hereunto set my hand, this 24th day of January, 1907, in the presence of two subscribing witnesses.

SILAS A. MILLER.

Witnesses:

A. W. NELSON,
M. SIMON.