

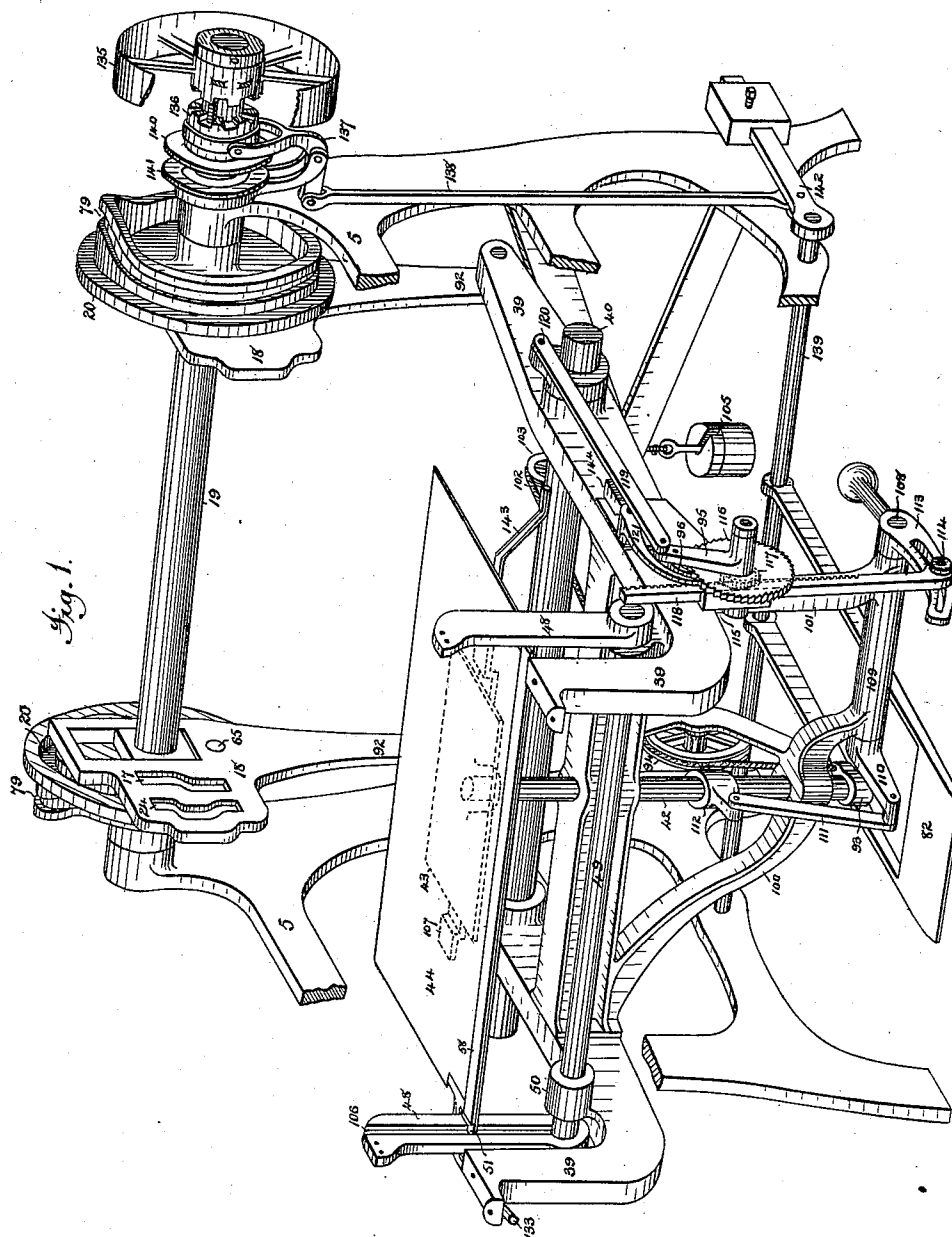
(No Model.)

5 Sheets—Sheet 1.

H. BREHMER.
BOOK SEWING MACHINE.

No. 466,554.

Patented Jan. 5, 1892.



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5 Sheets—Sheet 2.

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Fig. 2.

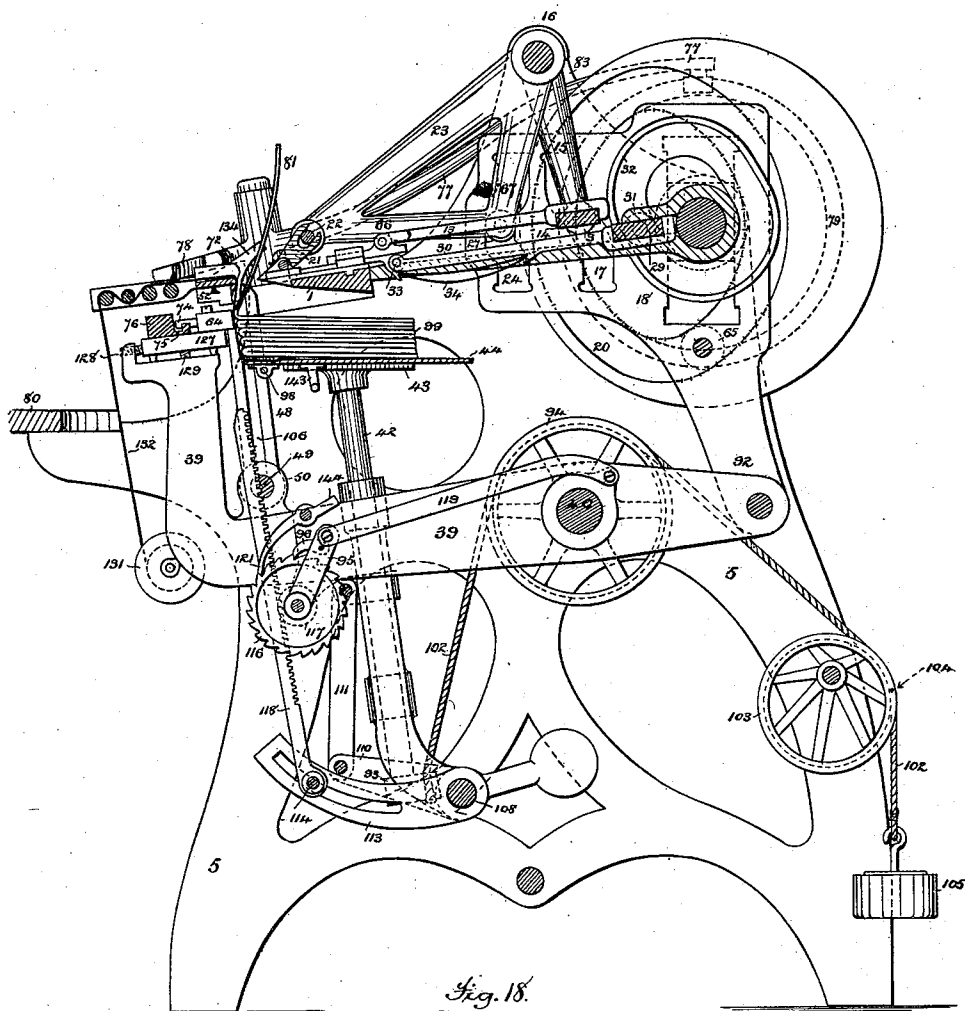
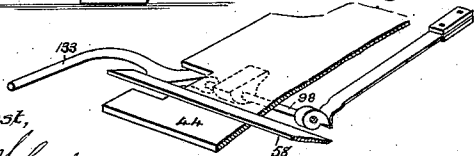


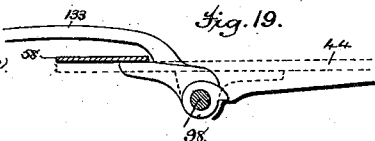
Fig. 18.



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Fig. 19.



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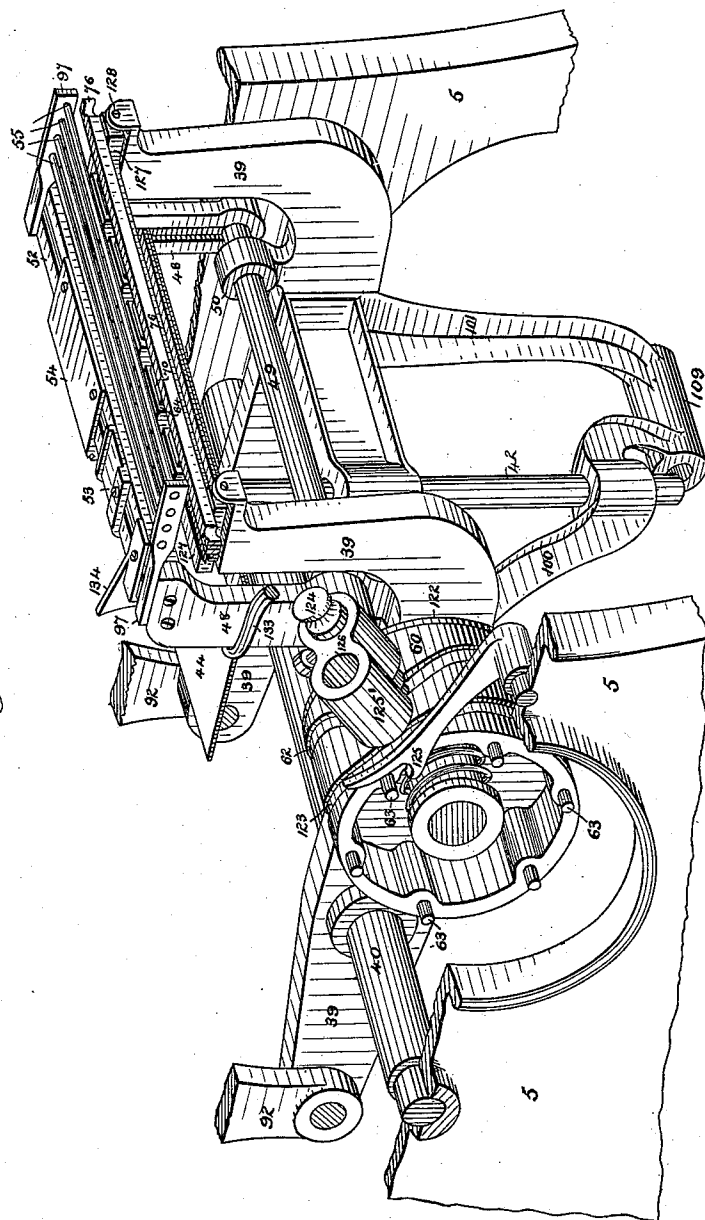
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Fig. 3.



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5 Sheets—Sheet 4.

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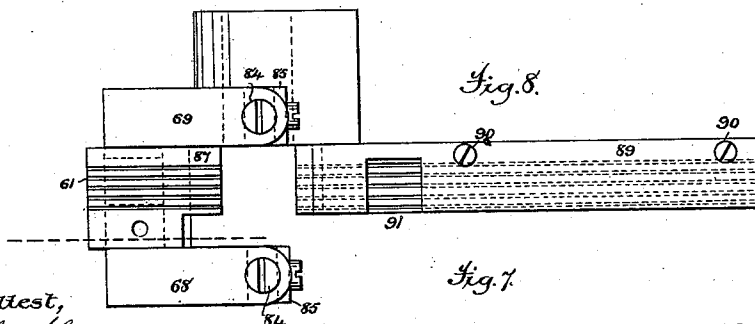
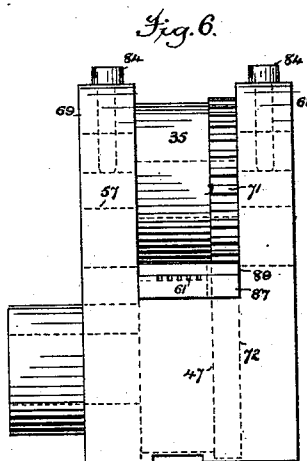
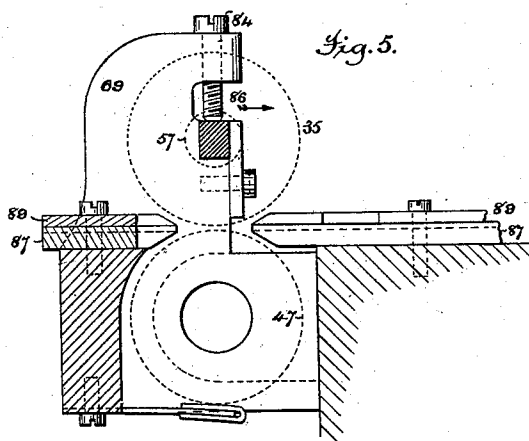
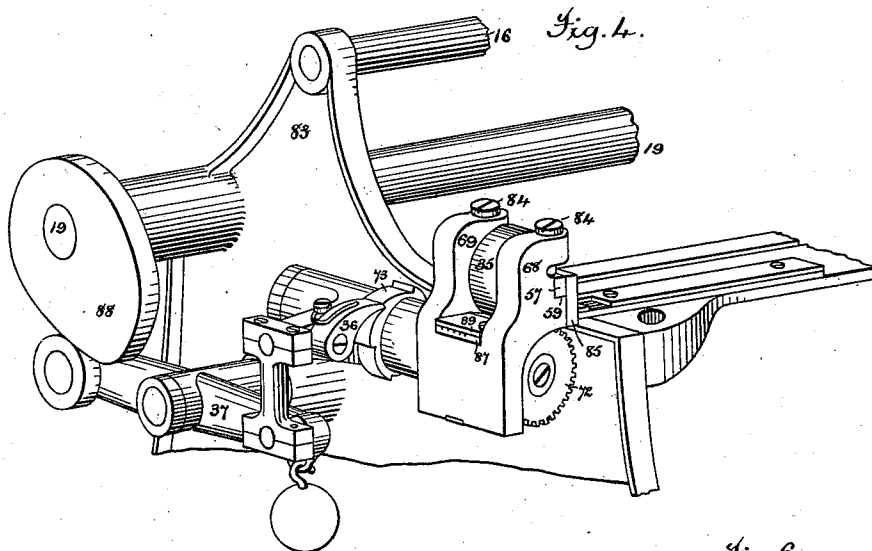


Fig. 7.



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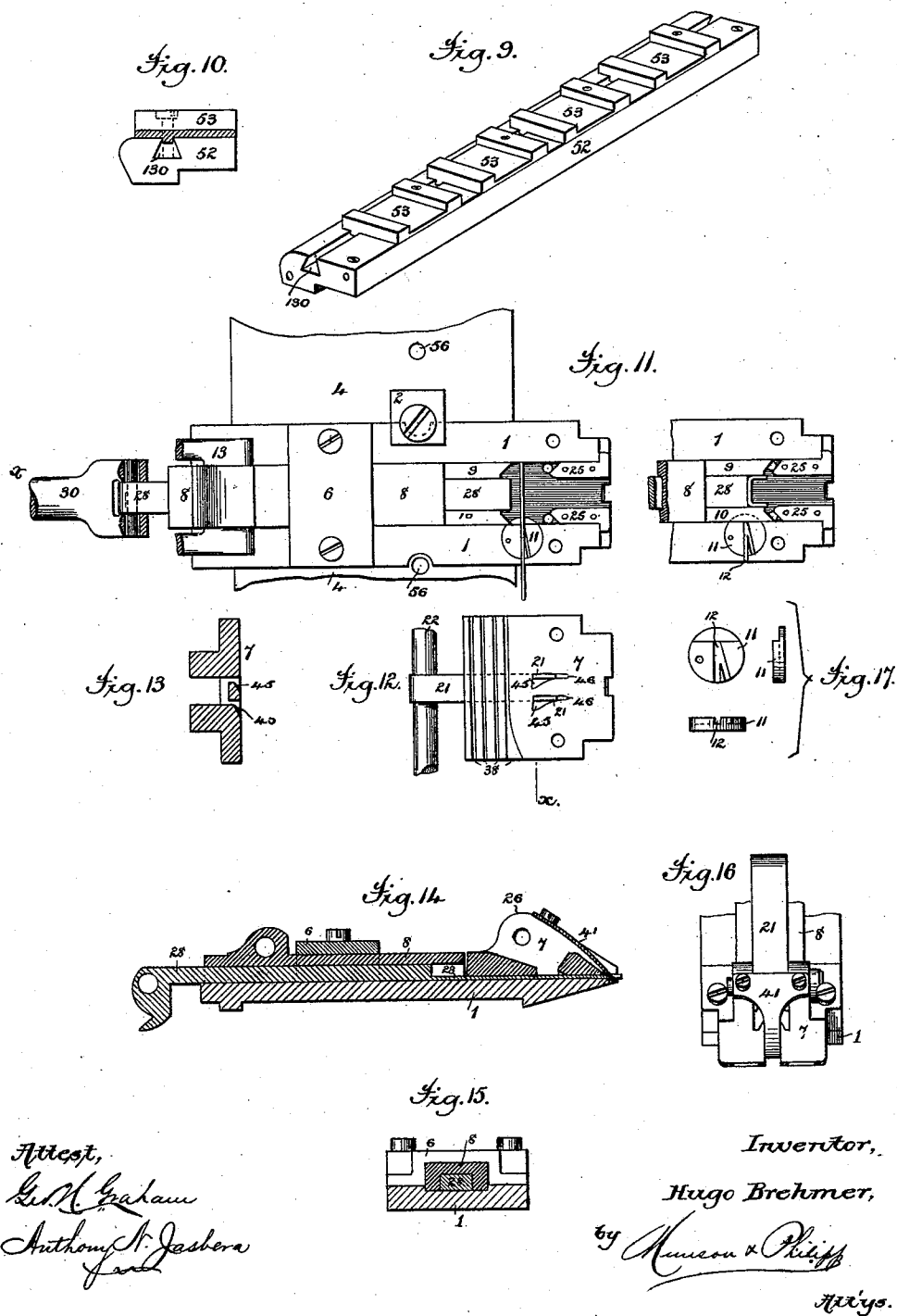
(No Model.)

5 Sheets—Sheet 5.

H. BREHMER.
BOOK SEWING MACHINE.

No. 466,554.

Patented Jan. 5, 1892.



UNITED STATES PATENT OFFICE.

HUGO BREHMER, OF PHILADELPHIA, PENNSYLVANIA.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 466,554, dated January 5, 1892.

Application filed May 23, 1881. Serial No. 34,041. (No model.)

To all whom it may concern:

Be it known that I, HUGO BREHMER, of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Book-Sewing Machines; and I do hereby declare that the following specification, when taken in connection with the accompanying drawings, is such a full, clear, and exact description thereof as will enable others skilled in the art to make and use the same.

The present invention relates to improvements upon the machine embodied in Letters Patent of the United States No. 191,426, granted May 29, 1877, to Henry R. Heyl and Hugo Brehmer, assignors to The Novelty Paper Box Company; and said invention consists in the devices and their combinations, as hereinafter fully described and claimed.

In the drawings, Figure 1 represents by a perspective view a machine improved by my invention, the staple forming and inserting mechanisms being removed to more clearly show the parts this figure is designed to illustrate. Fig. 2 represents a cross-sectional elevation of the complete machine. Fig. 3 represents a perspective view of the swinging frame and the mechanisms it carries. Fig. 4 represents in perspective the wire-feeding mechanism, Figs. 5 and 6 being, respectively, a sectional elevation and a rear elevation of the feed-rolls and their supporting-bracket, and Fig. 7 a perspective view of the shaft of said rolls. Fig. 8 represents a plan view of the wire guide. Figs. 9 and 10 represent by perspective and sectional views the construction of the breast-bar and the mode of attaching thereto the guides for the backing material. Fig. 11 represents by plan views one of the head-blocks and the mechanisms it contains, the forward top plate being removed for this purpose. Fig. 12 illustrates said top plate by a bottom plan view, Fig. 13 being a section on the line *x* of Fig. 12. Fig. 14 represents a longitudinal sectional elevation of a head-block and its mechanisms, of which Fig. 15 represents a cross-section in advance of the top plate 6. (See Fig. 11.) Fig. 16 represents a front end elevation of a head-block. Fig. 17 represents by a plan and elevations the structure of the cut-

ting-plate. Figs. 18 and 19 illustrate the structure and operation of the table-clamp.

The staple forming and inserting mechanism, though improved in some of its details, is in its general structure, mounting, and operation substantially the same as that described in said patent. (See Sheet 4.) It is composed of a head-block 1, secured by clamps, as 2, or otherwise, to the cross-plate 4, that is fixed to the frame 5 and extends across the machine, upon which plate 4 one or more of said head-blocks are adjustable laterally by means of the screw-holes 56. This head-block has a longitudinal central groove, which is partially covered by top plates 6 and 7, and in which slides a bending-fork 8, the prongs 9 10 whereof have inwardly-beveled ends, which construction causes said prongs to bend the wire from its ends around a staple-forming mandrel 21, and enables one prong 10 to operate in connection with a die-plate 11 set in the head-block and constituting the end of the wire-feeding channel 12 as a cutter to sever the wire. These prongs 9 10 are provided with grooves in their inner surfaces to receive the prongs of the staple after it is formed. This bending-fork is connected at its rear end to a bar 14, Fig. 2, by a rod 13, that is adjustable longitudinally on said bar. This bar 14 is hung by journals 3 in arms 15, that swing upon a shaft 16, which is properly journaled in brackets 83, rising from the side frame 5, and said bar is vibrated to reciprocate the bending-fork 8 by means of studs on its ends, which enter cam-slots 17 in vertically-reciprocating cam-plates 18, that straddle the main shaft 19 and receive motion by means of studs 65, which run in the slotted cams 20 on the main shaft 19. The swinging staple-forming mandrel 21 is pivoted at 26 to the plate 7, and has its rear end bifurcated so as to loosely embrace a shaft 22, which is secured in the ends of arms 23, that are journaled upon the shaft 16. These arms 23 are vibrated to impart motion to the swinging mandrel 21 by means of studs 27, which project from their rearwardly-extending arms 66 67 and enter cam-slots 24 in the vertically-reciprocating cam-plates 18. The front end of the mandrel 21 is bifurcated, so as to form two arms

that project through two slots in the plate 7, whereby the greatest possible extent of plane surface upon the inner face of said plate is preserved to properly guide the wire. The longitudinal groove in the head-block 1 is partially closed at its mouth end by means of plates 25, that are fixed on opposite sides of this groove by means of dowel-pins and holes, and serve to reduce its width to suit the length of the formed staple, and the width of the staple-driver 28 and their faces have channels to receive and guide the legs of the staple and properly present the same for insertion. The staple-driver 28 is reciprocated within the bending-fork 8 by means of a bar 29, to which it is connected by a rod 30. This bar 29 slides in bearings 31 and receives its movements through studs on its ends that run in the grooves of cams 32 on the main shaft 19. The rod 30 has an elongated slot receiving the pin 33, as shown in Fig. 11, and the driver is seated upon a spring 34, whereby a too rigid pressure of the driver on the crown of the staple is provided against, and said driver is allowed to accommodate itself to the varying thicknesses of the paper being stapled, the spring 34 being stiff enough to overcome the pressure of the staple as it pierces the paper, and yet not so stiff as to embed the crown of the staple too deeply into the paper. The front ends of the head-block 1 and the plate 7 are cut away at an angle, (see Fig. 14,) so as to enter the fold of the signature and come close to the paper while the staple is being driven, and the plates 25 may project slightly beyond the head-block so as to more effectually accomplish this.

Two or any desired number of these head-blocks carrying staple forming and inserting mechanisms may be employed, all of which will be connected to the bars 14 29 and simultaneously operated, as has been explained with reference to the one set of mechanisms described, each head-block being adjustable and removable so that two or any number may be used and those in use may be operated to insert staples at appropriate points in the book-signature or material being stapled, as is fully described in the said patent.

The construction of the cutting mechanism which severs the proper length of wire to form a staple has been improved, as follows: The die-plate 11 has heretofore been a simple plate approximately rectangular in form and perforated with a wire-channel 12, against the face of which plate one prong 10 of the bending-fork operated to shear or cut the wire. In order that the wire may be fed accurately and the mechanisms truly and accurately operate to produce perfect staples, it is essential that the wire-channel through this plate 11 shall be at right angles to the groove in the head-block. It therefore becomes a difficult matter to nicely adjust a rectangular die-plate having such wire-channel with accuracy. To avoid this difficulty and enable such plate to be not only accurately but

speedily adjusted in place, I have constructed its seat in the head-block 1 circular in form, whereby the die-plate 11 may be made circular, or approximately so, in form and provided with a wire-channel without particular regard to the exact relation such passage bears to the fastening hole or holes in said plate. Such a plate may then be placed in its seat and slightly turned therein till its true position is found, when it may be quickly fastened accurately in place. In practice it has been frequently found that the resistance of the material into which the staple is being driven is such as to cause the crown of the staple to bend forward in its center, and thus when driven and clinched fail to lie snugly upon the surface of the material. In order, therefore, to adapt these machines to use, a staple of suitable dimensions of crown and of appropriate gage of wire, or, in other words, a long staple of light wire, I have provided the head-block 1 with a spring-finger 41, that is secured to the face of the plate 7 and extends within a central recess therein and in the base of the head-block 1, so that its lower end lies far enough in the rear of the front end of said plate 7 to engage the inner surface of the crown of the staple before the legs thereof protrude beyond the same. Thus as the staple-driver bearing against the outer surface of the staple forces the same forward, the inner surface of its crown will be engaged by the spring-finger, and the said crown thus be embraced between said driver and finger just before the staple-legs impinge upon the paper or other material being stapled. The staple-crown will thus be firmly grasped both in its front and rear, and will be sustained until after its legs are nearly through the material, the spring-finger being forced forward by the pressure of the driver until the staple-legs are through or nearly through the paper, and then, being forced upward far enough, will pass off from the staple-crown just immediately before it is forced home and its legs are clinched. The spring-finger thus acts to prevent the distortion of the crown of the staple.

It has been found in practice that if the slots in the plate 7, through which the arms of the swinging mandrel are protruded into the groove in the head-block, are made with right-angular walls, the end of the wire, as fed through the wire-channel in the head-block, is liable to abut against that wall of each slot that is opposed to the direction of the feed of the wire. When this occurs, the wire buckles up and clogs the machine. To prevent this occurrence, the sides of these slots are beveled or cut away, as at 45, whereby they become inclined guides, which will direct the end of the wire onward whenever it from any cause comes into contact with them. The forward ends or front walls of these slots are also beveled or cut away in like manner, as at 46, so that if one or both legs of the formed staple abut against these walls as said staple is being forced outward by the move-

ment of the staple-driver their beveled form will act as inclined guides to properly direct said staple-legs.

The wire is fed into the wire-channels in the head-blocks by means of a pair of feed-rolls 35 47, by which the wires directed to all of the head-blocks are simultaneously and uniformly fed forward. In order that these several wires may be properly directed and fed, the first head-block, or that nearest the feed-rolls 35, is provided not only with a wire-feeding channel 12 for the wire that is to be consumed by its mechanisms, but with as many more wire-channels 38 as there are additional head-blocks, which wire-channels 38 form free passages over the bending-fork and staple-driver. Each head-block is thus provided with as many more channels 38, Fig. 12, as there are additional head-blocks employed beyond it, so that the wire for the first head-block is directed into its feeding channel 12, while the additional wires for the other head-blocks are passed through and guided by its channels 38, the wire for the second head-block passing into its feeding-channel, as 12, while the wires for the additional head-blocks pass through its guide-channels, as 38, and so on. These feed-rolls 35 47 are geared together by toothed wheels 71 72, and the shaft of the lower one is provided with a ratchet-wheel 73, with which engages a pawl 36, that is intermittently vibrated by means of a weighted lever 37 and a cam 88 on the main shaft 19, said roller also having a friction-spring bearing on its under surface to prevent improper movement. It is requisite that these feed-rolls shall have their faces nicely adjusted, so as to properly bear upon all of the wires which they are to feed, which adjustment is in the ordinary construction and mounting of such rollers a most difficult operation, requiring mechanical skill not possessed by the ordinary operatives of such machines; and as this adjustment is frequently rendered necessary by the removal of the feed-rolls for cleaning and oiling, it becomes important that a ready means of adjustment shall be provided. To this end the upper roll 35 is mounted to turn freely upon its shaft 57, which latter is provided with squared ends, Fig. 7, which enter correspondingly-shaped seats 59, formed in the brackets 68 69, where said shaft is held in place by the screws 84 and front plates 85. These brackets are open on their front sides, Fig. 5, the plates 85 rising high enough to properly hold the shaft, and yet not obstruct its removal through the openings 86 above it. The ends of this shaft are constructed of such dimensions that when forced home upon the seats 59 by the screws 84 the periphery of the roller 35 will be correctly related to that of the roller 47 to properly impinge upon the wires and feed them uniformly. Upon raising the screws 84 the operative can lift the roller 35 and its shaft 57 and bodily remove the same from the machine, the squared ends

of the shaft passing out through the openings 86, as indicated by the arrow in Fig. 5. Upon returning said roller to its place it may be held to its seat 59 by turning the screws 84 until the shaft is snugly seated. Thus neither skill nor judgment is required in regulating the exact distance between the feed-rollers, as the same is arbitrarily determined by the structure of the shaft and its seat. When a different gage of wire is to be used in the machine, it is only necessary to remove the roll 35, insert an appropriate shaft through it, and introduce the same into the machine, as before, whereupon, without the necessity of attention to the adjustment of the feed-rollers, they are in condition to correctly operate to uniformly and properly feed such wire. The several wires are directed to these rolls 35 47, and from them to the head-blocks 1 by means of guides, which consist of bed-plates 87, in which proper wire-channels 61 are cut that are covered by top plates 89. The top and bed plates of these wire-guides are attached together by screws, as 90, or some other appropriate fastening, so that the top plate may be readily removed to facilitate cleaning—an operation rendered frequently necessary by reason of the accumulation of dust and other extraneous matter carried by the wires into the wire-channels. The top plate 89 is provided at some convenient point with a recess 91, which enables the operative in threading the machine with a number of wires to inspect the same and determine whether each wire is entered into its appropriate channel.

The work or signature receiving and presenting table, tape-holding mechanism, and the staple-clinching mechanisms are supported on a swinging bracket that is mainly composed of two side levers 39, that are journaled on a shaft 40, and automatically vibrated at each revolution of the main shaft 19 by means of the cams 20 through depending arms 92 of the cam-plates 18, that are pivoted to the rearward extending arms of said levers 39. This swinging frame is thus vibrated forward and downward into a convenient position for a signature, as 81, to be taken from the feed-table 80 and laid upon the table 44, and is then moved upward, so that the bend or fold of said signature is presented to the ends of the head-blocks 1 in position to receive a staple, which is clinched by the clinching mechanism, as will yet appear. The signature-receiving table 44 is supported by means of a standard 42, that is arranged to vertically reciprocate in suitable bearings in the cross-frame 100 101 of this bracket 39. This standard 42 is provided at its lower end with an arm 93, to which is attached a cord 102, that runs over pulleys 94 and 103 and carries at its end a suitable weight 105, the cord being secured to the pulley 103 by a pin 104, and said pulley hung eccentrically for a purpose that will presently be explained. At its upper end a plate 43 is

fixed to the standard 42, upon which plate the signature-receiving table 44 is supported, said table being provided with lugs entering slots in said plate 43, or a brace-bar, as 107, embracing the same, the structure being such that the table 44 may move longitudinally upon said plate 43. The forward ends of this table are provided with projecting ears 51, which enter slots 106 of standards 48, which are fast upon and project upward from a shaft 49, that is journaled in the journals 50 of the swinging frame 39, so as to be capable of moving longitudinally therein.

The vertical movement of the table 44 in the swinging frame is accomplished as follows: A cross-shaft 108, mounted so as to rock in a journal 109, supported by the arms 100 101, is provided with a rock-arm 110 at one end, that is connected by a rod 111 with a collar 112, fast upon this standard 42, and at the other with a weighted rock-arm 113, in the curved slot of which the pivot 114 is adjustable. In an arm 115 depending from one of the levers 39 is journaled a ratchet-wheel 116, that carries on one face a pinion 117, which engages a rack-bar 118, whose lower end is hung upon the pivot 114. The journal of the ratchet-wheel 116 supports a rock-arm 95, that is pivoted to a rod 119, which rocks on the pivot 120, carried by a crank-arm fast on the shaft 40. The rock-arm 95 carries a pawl 96, engaging the teeth of this ratchet-wheel, and a second pawl 121, pivoted on the lever 39, also engages this ratchet-wheel. As the frame 39 is swung upward to carry the signature into position to be stapled, the rod 119 slightly rocks the arm 95, thus causing the dog 96 to turn the ratchet-wheel one tooth and impart a slight downward movement to the rack-bar 118, which in turn rocking the shaft 108 draws down the standard 42, and thus depresses the table correspondingly.

The longitudinal movement of the signature or work supporting table 44 is effected by means of a slotted cam 60, Fig. 3, that is journaled on a stud projecting from one arm 39 of the swinging frame and runs against the face of a stationary plate 122, in frictional contact with which it is held by a spring pressing against its face and a collar on its stud. This cam 60 is provided with cam-slots 62 123 in its face, in which slots runs a pin 124, projecting from a socket-head 125', that is fast upon one end of the shaft 49. This cam 60 is provided at one end with sprockets 63, that are periodically engaged by the bifurcated end of a pawl 125, that is pivoted to the frame 5. As the swinging frame 60 is rising to present the work on its table 44 to the heads 1 and carries with it the cam 60 the pawl 125 drags over the sprockets 63, and when said swinging frame moves forward and downward to receive a new signature upon its table 44, one of the sprockets 63 on the cam 60 engages the bifurcated end of the pawl 125, and is thereby forced to ro-

tate a short distance, thus causing the pin 124 to travel correspondingly in the cam-groove 62 and the work-supporting mechanisms to be moved longitudinally, so that when the swinging frame again rises the work will be so related to the stapling mechanisms as to receive the staple then set in it a slight distance out of line with that previously set. The cam-slot 62 is so shaped that when the cam 60 is partially rotated it will, through the pin 124, move the shaft 49 a short distance and carry with it the standards 48 and the mechanisms connected with said standards, and when the cam is again partially rotated it will impart a contrary motion to said shaft, standards, and mechanisms. The cam-slot 123 is so shaped that it will impart three longitudinal movements to said shaft, standards, and mechanisms, to accomplish which the pin 124 is removed from the one socket and placed in the other socket 126, whereby it will run in said cam-slot 123. This cam 60 may thus be provided with any number of cam-slots, as 62 123, varying in form so as to impart any desired number of longitudinal movements to the work-supporting mechanisms and set the staples therein in as many rows as may be expedient or desirable.

The clincher-stocks 64, of which there are as many in number as there are head-blocks 1, are constructed so as to be longitudinally adjustable to fixed positions upon a cross-plate 127, that is secured to the side levers 39 of the swinging bracket, and this adjustable plate 127 is both laterally and vertically adjustable by means of the screws 128 129. (See Figs. 2 and 3.) Each clincher-stock is furnished with clincher-plates that are pivoted to a slide 70. These slides 70 are provided with tenons 74, Fig. 2, that fit in a mortise 75 in a bar 76, that is capable of sliding laterally upon the cross-plate 127, which sliding movement is imparted to said bar by means of levers 77, Fig. 2, that are vibrated by the cams 79, the bifurcated ends 78 of which levers 77 engage with the ends of the bar 76 and slide it forward when the bracket 39 has been swung upward to present the signature to the head-blocks. The forward movement of the bar 76 actuates the clinching-plates to clinch the legs of the staple formed and inserted in the signature by the mechanisms of the head-blocks, and after the clinching is completed the levers 77 accomplish the return movement of the clinching-plates and then become disengaged from the bar 76, when the swinging bracket is free to move rearward and downward to receive a new signature, all of which is fully shown and described in the aforesaid patent.

The holding mechanism for the backing material is constructed as follows: The brackets 48 are connected by a breast-bar 52, Figs. 2, 3, and 9, that is provided with a longitudinal dovetailed slot 130, in which guide-plates for supporting and guiding the backing material, to which the signatures are stapled, are

secured, lugs fitting the slot 130 furnishing the means of securement. These guides may have the form of narrow guide-plates, as 53, when narrow tapes are used, or may be a long continuous plate, as 54, when a wide band is to be used. This breast-bar is also capable of use as the guide for the backing material, whether in the form of narrow tapes or one wide tape. When so employed, the guide-plates 53 54 are omitted and the backing is led over its smooth face and rounded front edge. Thus employed, the longitudinal slot 130 may provide for the reception of a knife in severing the backing material. Projecting rearward from this breast-bar 52 are side plates 97, to which a number of parallel bars 55 are secured, over and under which bars the tapes or band of backing material 132, led from a drum or drums 131, may be interlaced, and thereby held under sufficient tension to remain stretched smooth as said material is drawn forward and consumed or while being cut. The table 44 is provided at its front edge with a swinging clamp-plate 58, (see Figs. 18 and 19,) that is hinged to the surface of the table 44 by shaft 98 and capable of being swung up and down to release or clamp the forward end of the backing material by means of a hand-lever 133, a suitable spring holding it down when clamping said backing material. At one end of the breast-bar 52 is provided an end guide 134 for the signatures, which end guide has a lug filling the slot 130 in said bar, by which it may be adjusted to the proper position relative to the stapling mechanisms to act as a head-gage for the signatures and insure their being evenly fastened together. All of the mechanisms attached to the brackets 48 are moved endwise with said brackets by the action of the cam 60—viz., the table 44 and its backing material, clamp-plate 58, the breast-bar 52 and its backing material, guide or guides 53 54, and bars 55—so that the staples may be set in one or more rows, as may be desired.

In order to render the machine readily controllable by the attendant, it is provided with an improved clutch, whereby the driven loose pulley 135 on its main shaft 19 is clutched to said shaft to drive the machine and unclutched to suspend its movements. The clutch 136 is splined on the shaft 19 in the usual manner, and is caused to slide on said shaft by means of bell-crank 137, a connecting-rod 138, a rock-shaft 139, and a treadle 82. Said clutch is, however, provided with a friction-disk 140, that is moved into contact with a stationary friction-disk 141 when the clutch 136 is uncoupled and it is desired to stop the machine, which disk 140 is moved out of contact with said stationary disk 141 when the clutch is to be coupled and the machine set in motion, and the rock-shaft 139 is provided with a weighted arm 142, which operates to hold the clutch uncoupled and the friction-disks in contact with each other. This mechanism is a simple and effective contrivance, insures

the safe operation of the machine, and prevents the untimely and dangerous action of it.

Operation: Assuming the swinging frame 39 to have been rocked forward and downward toward the feed-board 80, upon which the stock of signatures to be stapled are piled, in which position it is permitted to remain by reason of the clutch 136 being uncoupled, the operative having raised the clamp 58 and placed the front end of the backing material under it, then places an open signature, as 81, Fig. 2, upon the table and depresses the treadle 82. As the main shaft 19 is revolved the staple-forming mechanisms are set in operation and the swinging frame 39 is vibrated upward simultaneously by the action of the cam 20, which depresses the cam-plate 18. The cam-slots 24 vibrate the swinging mandrel 21, thereby moving its arms through the slots in plate 7 and in front of the wire previously fed across the groove in the head-block 1. The cam-slots 17 cause the bending-fork 8 and its prongs 9 10 to advance to sever the wire and bend its ends over the arms of said mandrel and toward the center until said prongs come into proximity with the inner ends of the plates 25, where the formed staple lies within the grooves in the prongs 9 10. The cam-slots 24 then operate to so vibrate the mandrel 21 as to carry its arms out of the slots in the head-block and out of the path of the staple-driver 28. At this time the swinging frame 39 will have been so far vibrated upward as to carry the fold of the signature lying upon the table 44 snugly against the ends of the head-blocks 1 and present the clinching mechanism in proper position before said head-blocks. The staple-driver is then caused to advance by the action of the cams 32 to force the formed staple from the grooves in the inner faces of the prongs 9 10 of the bending-fork 8 into the grooves in the inner faces of the plates 25, and thence through the signature 81 and the backing material 132 behind it, whereupon the levers 77, having under the action of the cams 79 engaged the ends of the bar 76, operate to move the same forward to actuate the clinchers and clinch the staple-legs down onto the backing material. As the swinging frame 39 vibrated upward, as just described, the pivoted rod 119 caused the rock-arm 95 to swing forward, carrying with it the pawl 96, which engages with the ratchet-wheel 116, rotated the same sufficiently to cause the pinion 117 to move the rack-bar 118 downward, and thereby rock the arm 113, and, through the shaft 108, rock-arm 93, and rod 111, depress the table 44 to an appropriate extent to bring the fold of the signature 81 into the proper position to be entered upon the head-blocks 1 and receive the staples, the standard 42 drawing upon the cord 102 and raising the weight 105 and the pawl 121 dragging over the ratchet-teeth and engaging the same to prevent the said weight 105 from forcing the table upward. As the swinging frame again

vibrates downward the pawl 96 drags over the ratchet-teeth, ready to repeat the operation of moving the ratchet-wheel, while the pawl 121 prevents its rearward rotation. Successive signatures 99 are thus laid upon the table 44 and stapled to the backing material 132, and as each signature is thus stapled to form a pack or book the said table 44 is automatically depressed an appropriate distance corresponding to the thickness of each signature by properly adjusting the pivot 114 in the slot of arm 113, so that its throw is increased or diminished, as is required. When the whole number of signatures that compose the book have been stapled, the backing material is severed by a knife guided in the edge slot 146 of the guides 54 or the slot 130 of the breast-bar 52, and the pawls 121 96 are disengaged by hand, whereupon the weight 105 will, through the cord 102, arm 93, and rod 111, raise the table 44 to its uppermost position, ready to receive the first signature of a new pack or book. In order to compensate for the increasing weight due to the accumulating signatures upon the table 44 and render the weight 105 powerful enough to raise the table when a book is complete, the pulley 103, over which the cord 102 runs, is hung eccentrically upon its pivot and said cord is pinned to the pulley at 104. Now as the weight of signatures accumulates upon the table 44 and it is automatically depressed step by step as each signature is added to it, and the weight 105 is in like manner raised, the pulley 103 is correspondingly rotated and so as to bring its eccentric portion more and more upward, whereby the leverage, and consequently the power exerted by the weight 105, is increased. By this means the power of said weight is increased as the weight of material it has to raise is increased, so that when the pawls 96 121 are released said weight will readily raise the table and the stapled signatures upon it. In order that the table 44 may not be depressed far enough to injure its moving mechanism, which may happen through the carelessness of the operator, it is provided at one side with an arm 143, properly positioned to strike the tail 144 of the pawl 121 and release the pawl 121, so that the weight 105 may raise the said table. The feeding-rolls 35 47 are rotated to feed the wire during the forward and downward movement of the swinging frame, and the longitudinal movement of the work is accomplished at the same time, as has been described.

Having described my improvements, what is claimed is—

1. The die-plate 11, constructed with a circular periphery or part periphery, and combined with a circular seat in the head-block 1, substantially as described.

2. The combination, with the staple-driver 28 and the head-block 1, having a recess intersecting the recess in the head-block where-

in the staple is formed and guided, of the spring-finger 41, substantially as described.

3. The combination, with the head-block 1, having a wire-feeding channel 12, of the top plate 7, having guiding-slots for the mandrel 21, whose sides opposed to the direction in which the wire is fed are beveled, as at 45, substantially as described.

4. The combination, with the staple-driver 28, of the top plate 7, having guiding-slots for the mandrel, the forward end or ends of which slots are beveled, as at 46, substantially as described.

5. The combination, with the wire-feeding rolls 35 47, the roll, as 35, being adapted to receive shafts having polygonal ends of different sizes, of the fixed seats 59 and holding screws 84, substantially as described.

6. The combination, with the wire-feeding rolls 35 47, one of which is adapted to receive shafts having polygonal ends of different sizes, such as the shaft 57, of the brackets 68 69, having polygonal seats and an opening 86, whereby said shaft is held in a fixed condition and removable therefrom, substantially as described.

7. A wire-guide consisting of a bed-plate 87, provided with a plurality of guiding-channels, and a top plate 89, the latter being constructed so as to be readily removable, substantially as described.

8. The combination, with the grooved bed-plate 87 and the wire-guide, of a top plate 89, having an opening 91 therein, substantially as described.

9. The combination, with the table 44, of the hinged or pivoted backing material clamping-plate 58, substantially as described.

10. In a book-sewing machine, the combination, with the staple setting and clinching mechanisms, of a work-supporting table provided with a depressing mechanism automatically operated by the movement of the mechanisms that carry the work to and from the staple-setting mechanisms, all substantially as described.

11. The combination, with the swinging frame 39, the table 44, and means, substantially as described, for forcing it upward, of a rock-arm 113, combined with the standard 42, the rack 118, spur-wheel 117, ratchet-wheel 116, pawls 96 121, rock-arm 95, and rod 119, substantially as described.

12. The combination, with the table 44, its standard 42, and means connecting it with the slotted rock-arm 113, of the adjustable rack-bar 118 and means connected with the swinging frame 39 for automatically moving said bar 118, all substantially as described.

13. The combination, with the table 44 and mechanism for automatically depressing the same at each movement of the swinging frame 39, of a cord 102 and weight 105, arranged to lift the said table, all substantially as described.

14. The combination, with the table 44, weight 105, and cord or chain 102, of the eccentric-pulley 103, said cord or chain being secured to said pulley, substantially as described.

15. The combination, with the table 44 and its automatic depressing mechanism, of the arm 143 and the tail 144 of the pawl 121, all substantially as described.

16. The combination, with the table 44, of the head-gage 134, substantially as described.

17. The combination, with the swinging frame 39, the table 44, and backing-material-supporting devices, of the socket-head 126, its

adjustable pin 124, and the cam 60 and the pawl 125, substantially as described.

18. The combination, with the main shaft 19, provided with means for driving the stapling mechanism, of the loose belt-pulley 135, the clutch 136, and friction-disks 140 141, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUGO BREHMER.

Witnesses:

A. WASSNER,
G. GROTE.