No. 820,244. PATENTED MAY 8, 1906.

W. McMURRAY.

BOX HINGING MACHINE.

APPLICATION FILED AUG. 20, 1903.

6 SHEETS—SHEET 1.

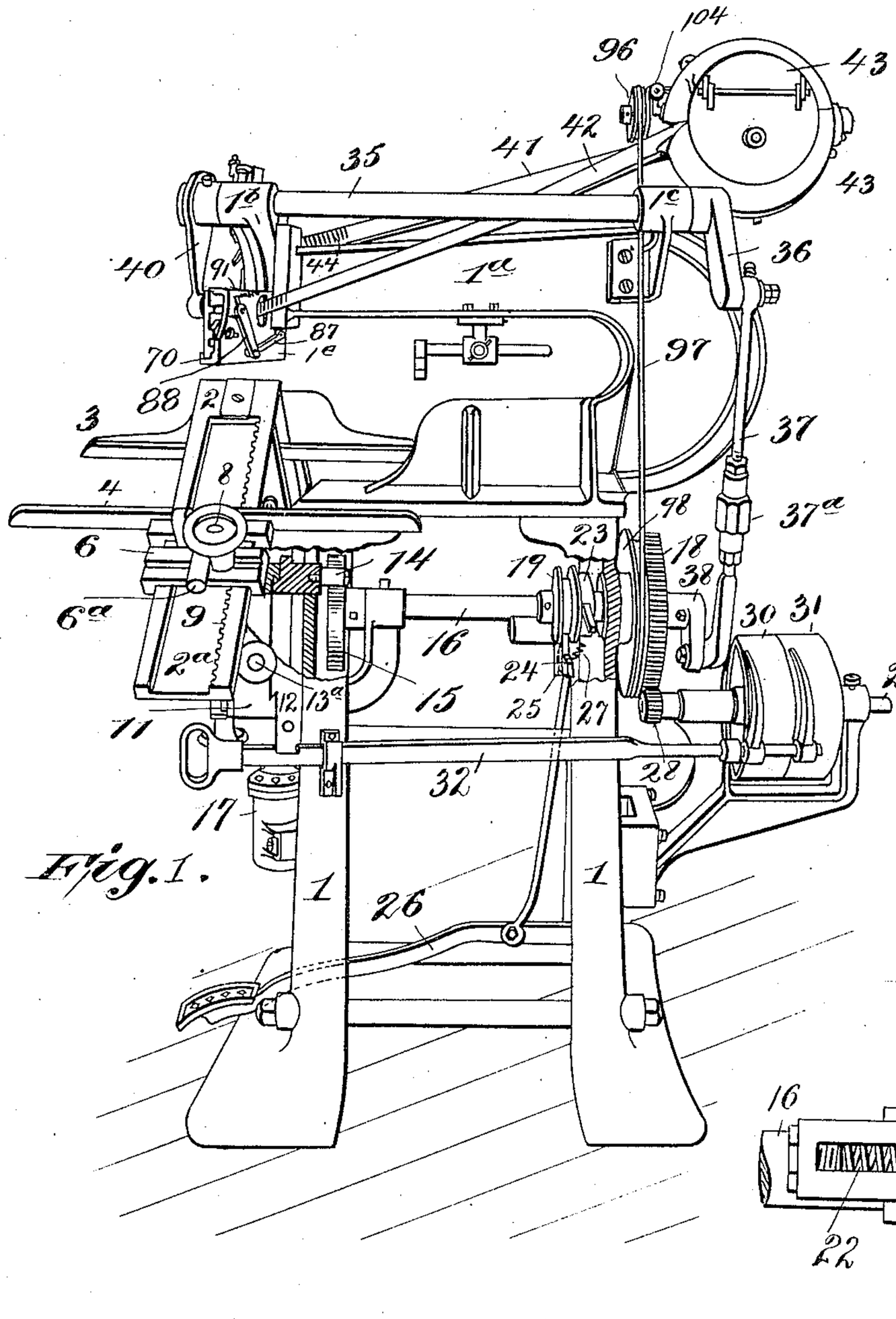
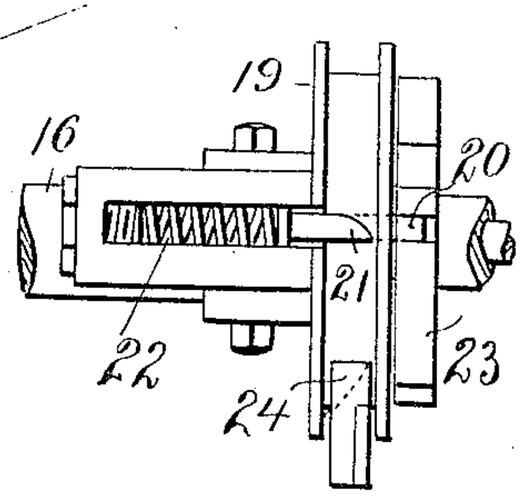


Fig. 1.

Fig. 1a.



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William McMurray.
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By his Attorney P. P. Bourne

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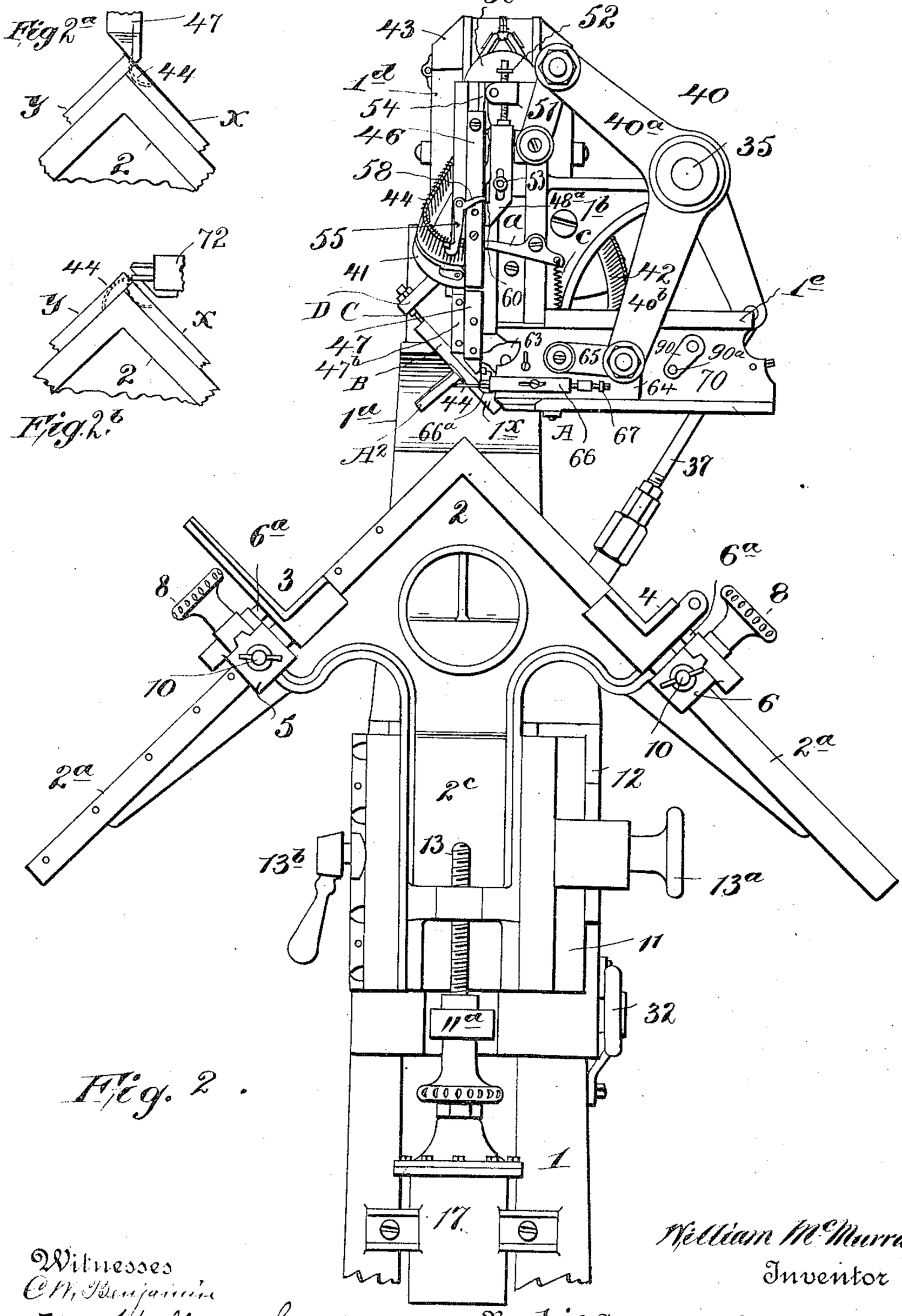

Fig. 2.

Fig. 2a.

Fig. 2b.

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6 SHEETS—SHEET 3.

Fig. 3.

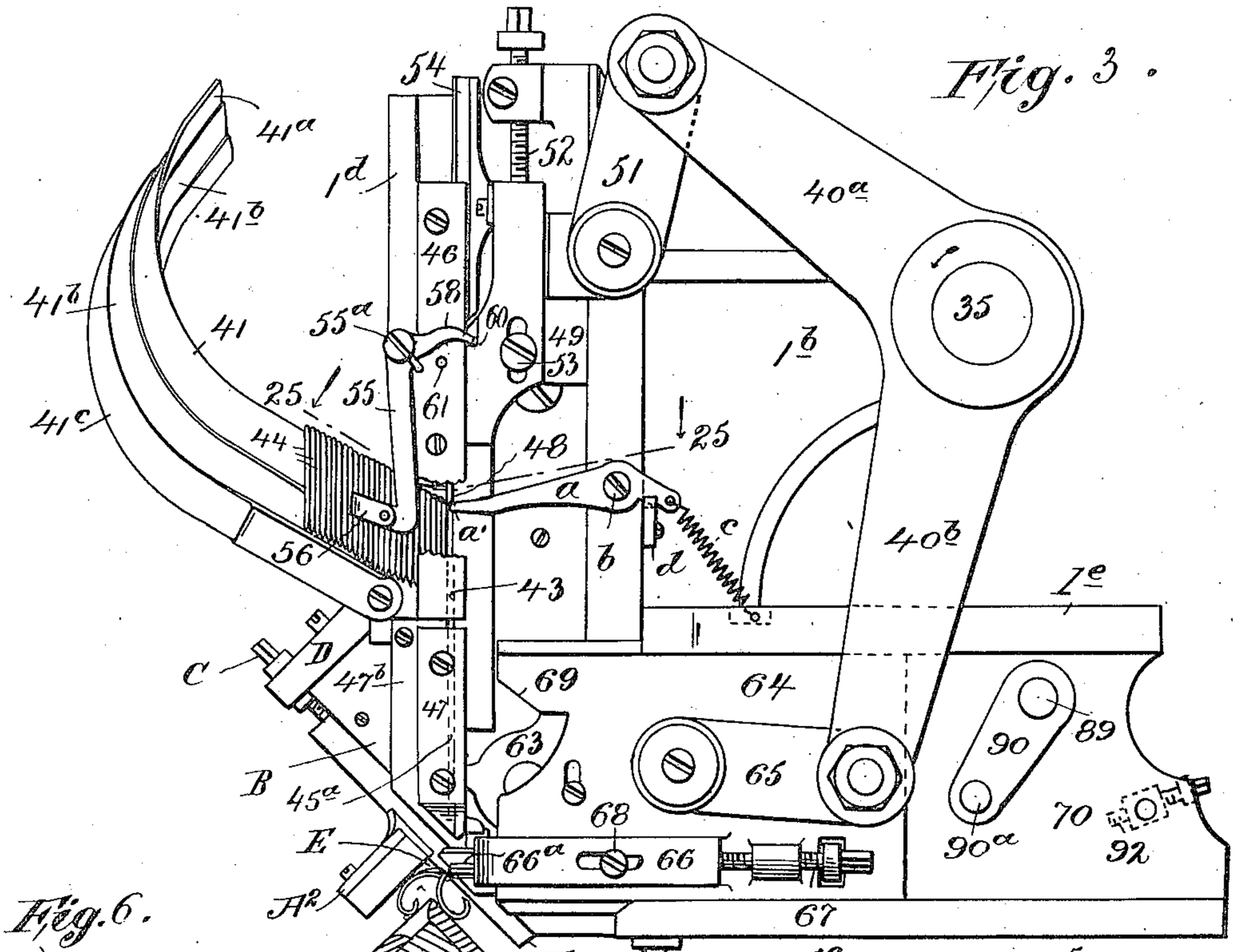


Fig. 6.

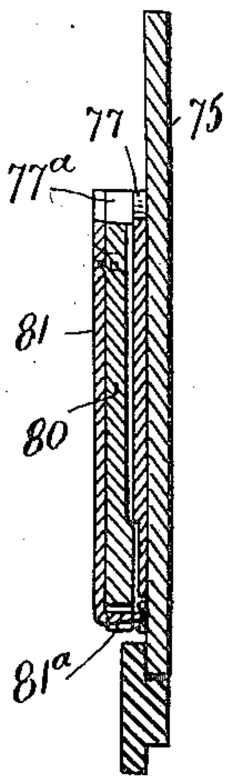


Fig. 5.

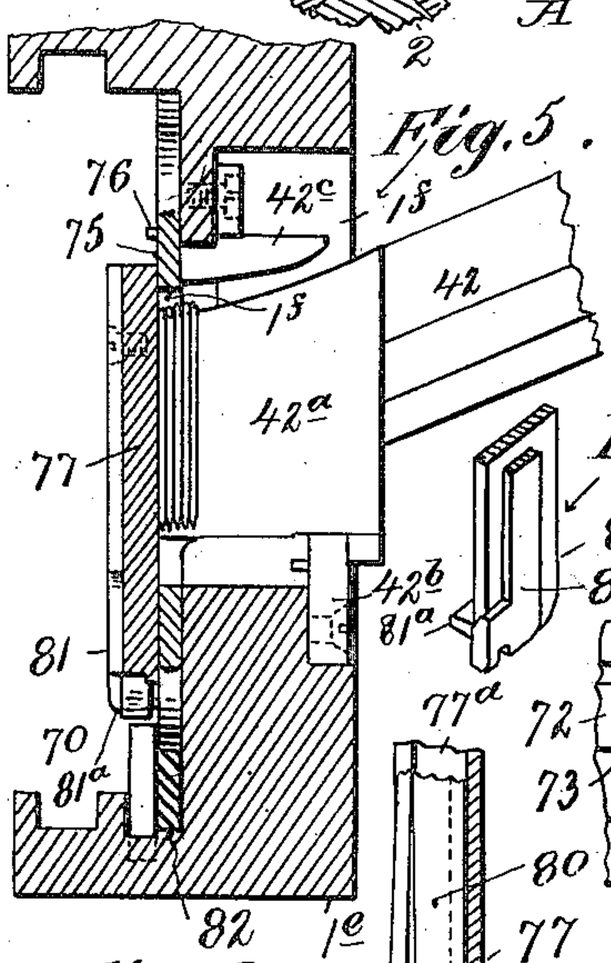


Fig. 9.

Fig. 4.

Fig. 8.

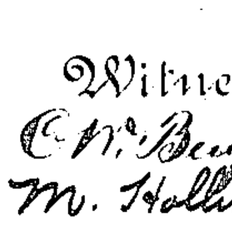
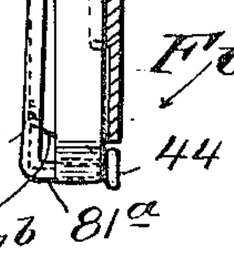


Fig. 7.



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6 SHEETS—SHEET 4.

Fig. 10.

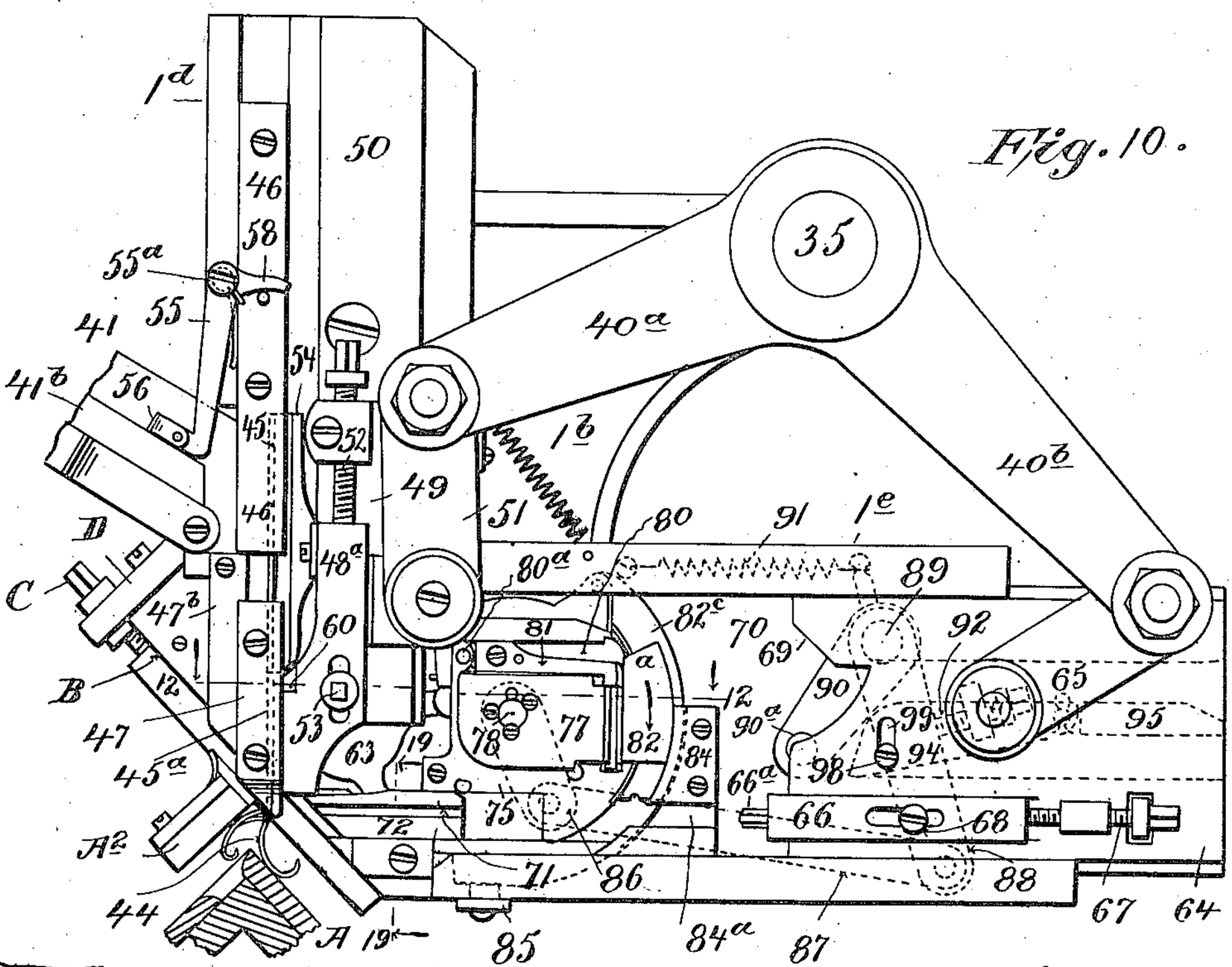
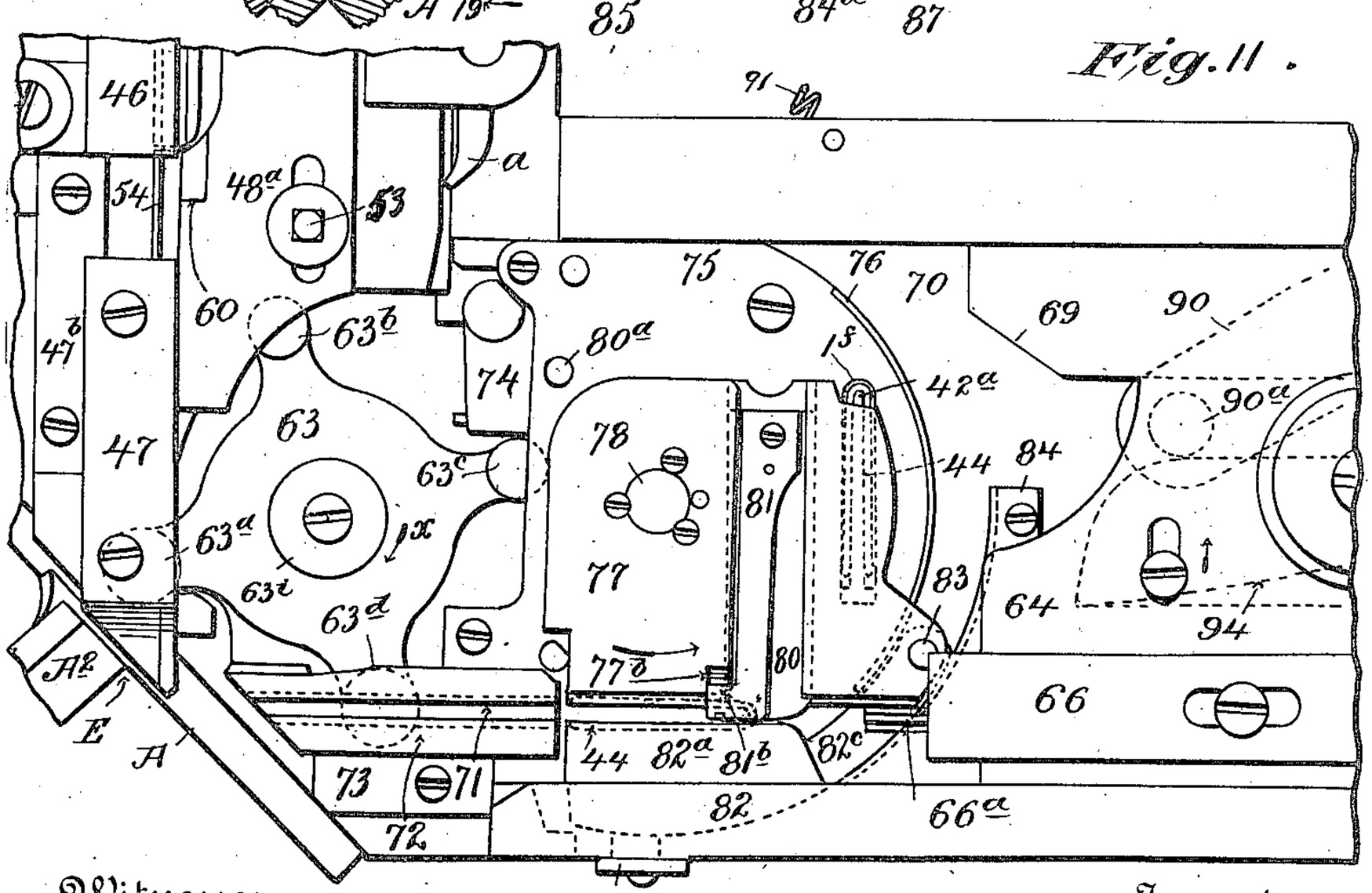


Fig. 11.



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6 SHEETS—SHEET 5.

Fig. 12.

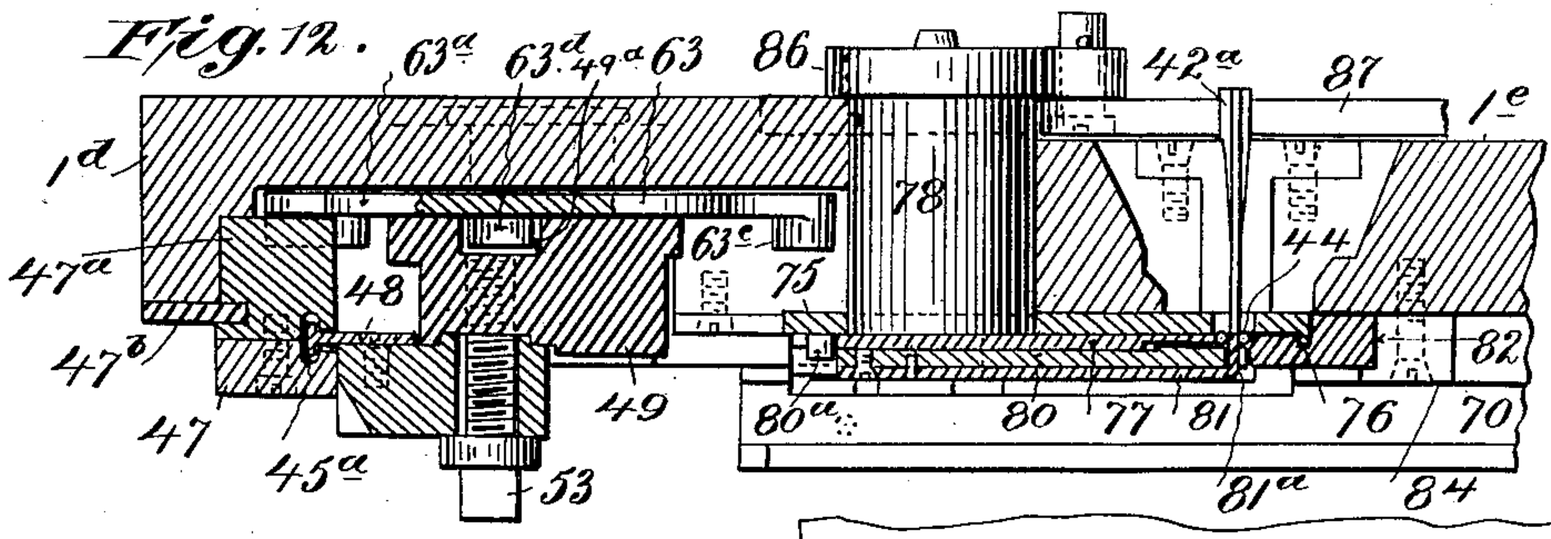


Fig. 14.

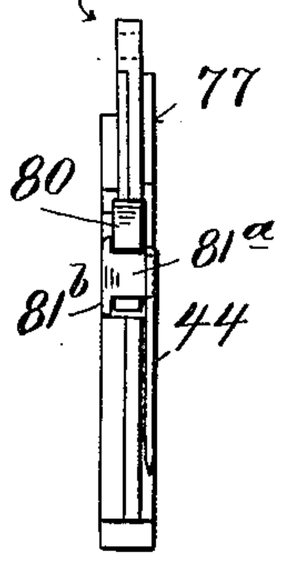


Fig. 13.

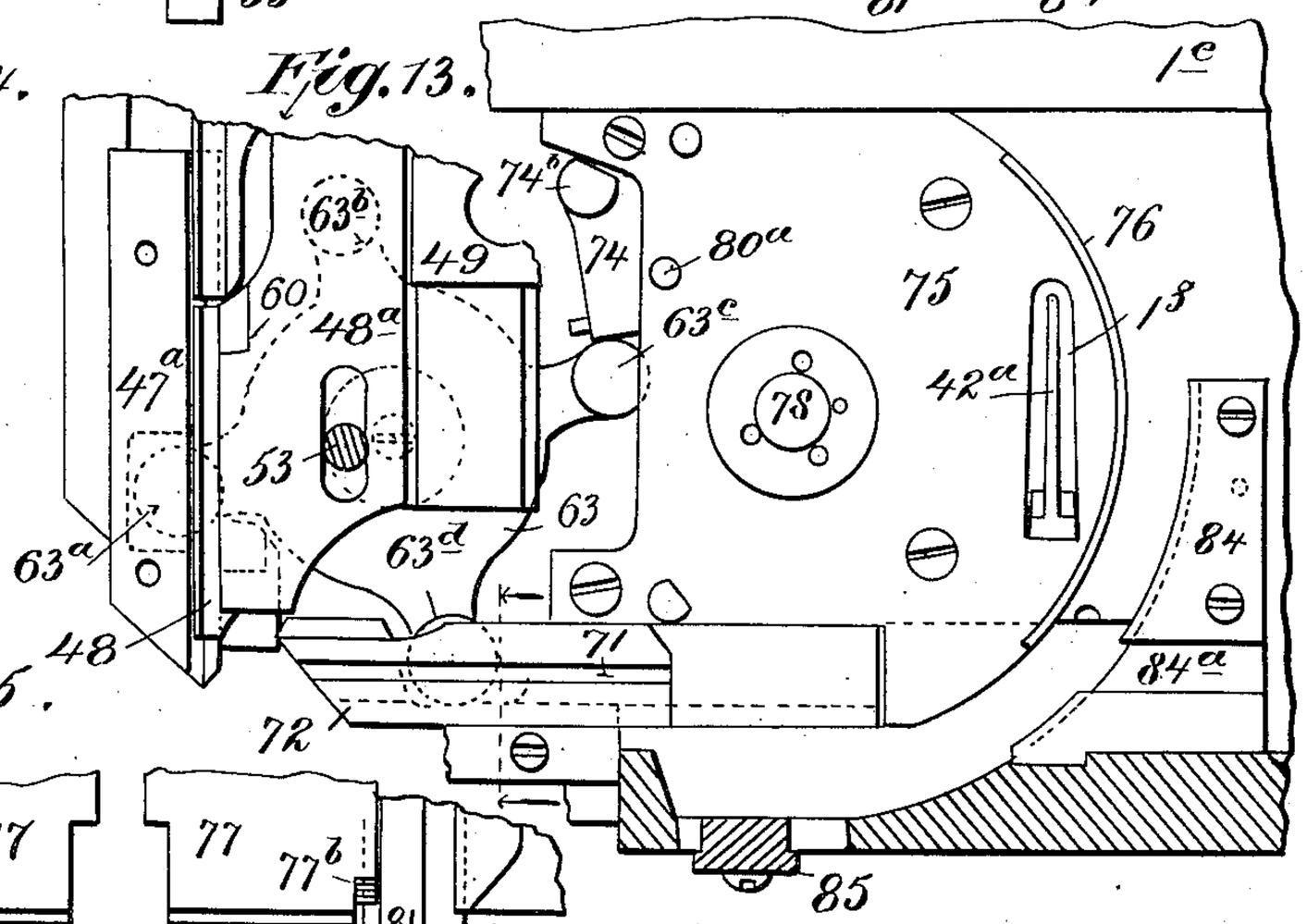


Fig. 15.

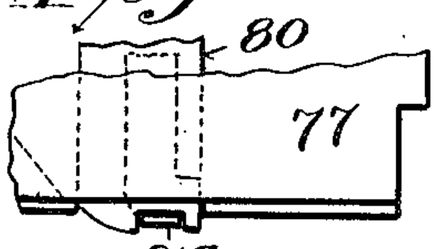


Fig. 16.

Fig. 20.

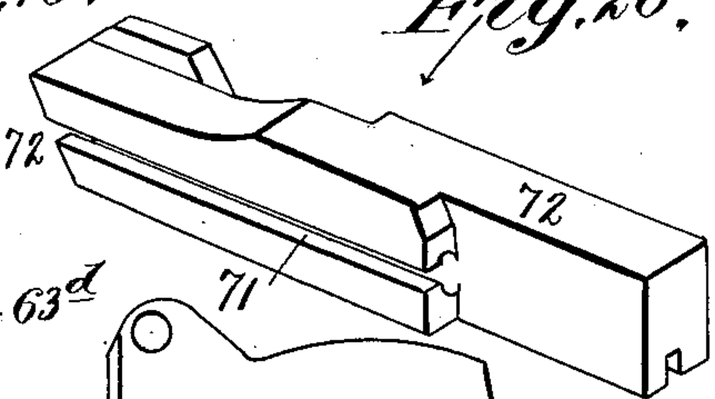
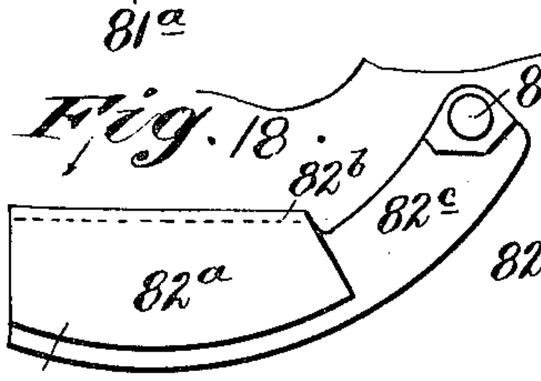
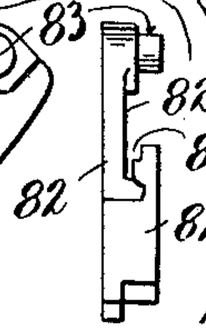


Fig. 18.





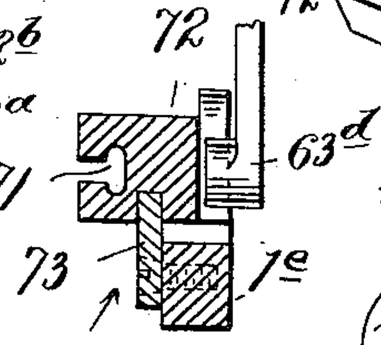


Fig. 19.

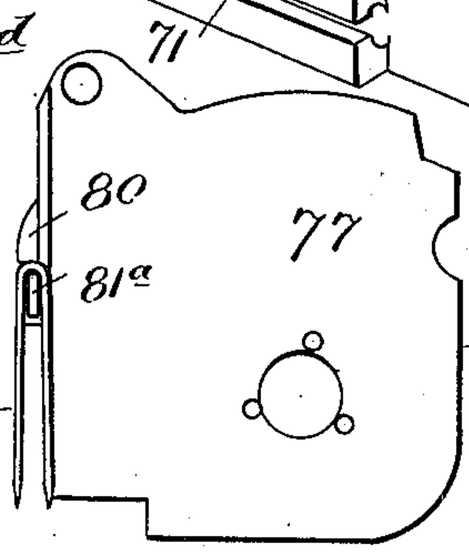


Fig. 17.

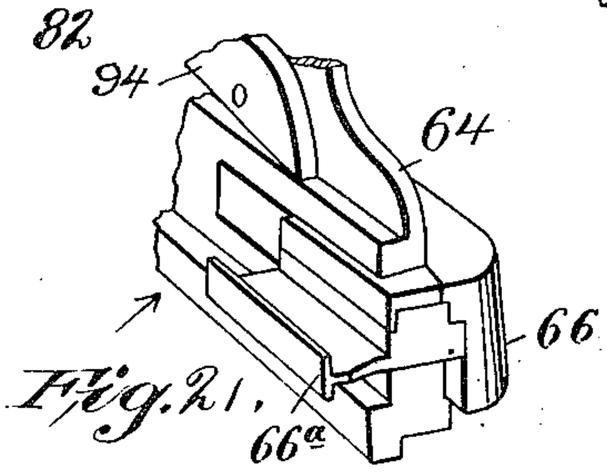


Fig. 21.

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No. 820,244. PATENTED MAY 8, 1906.

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BOX HINGING MACHINE.

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6 SHEETS—SHEET 6.

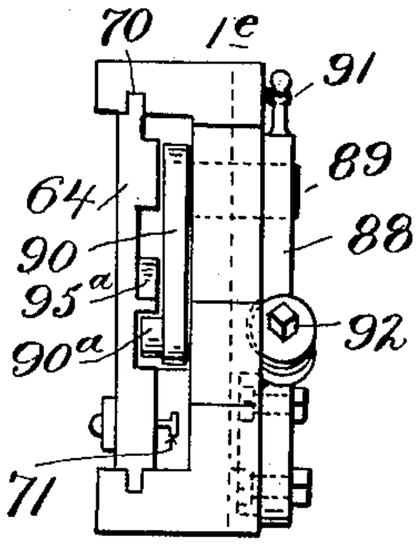

Fig. 23

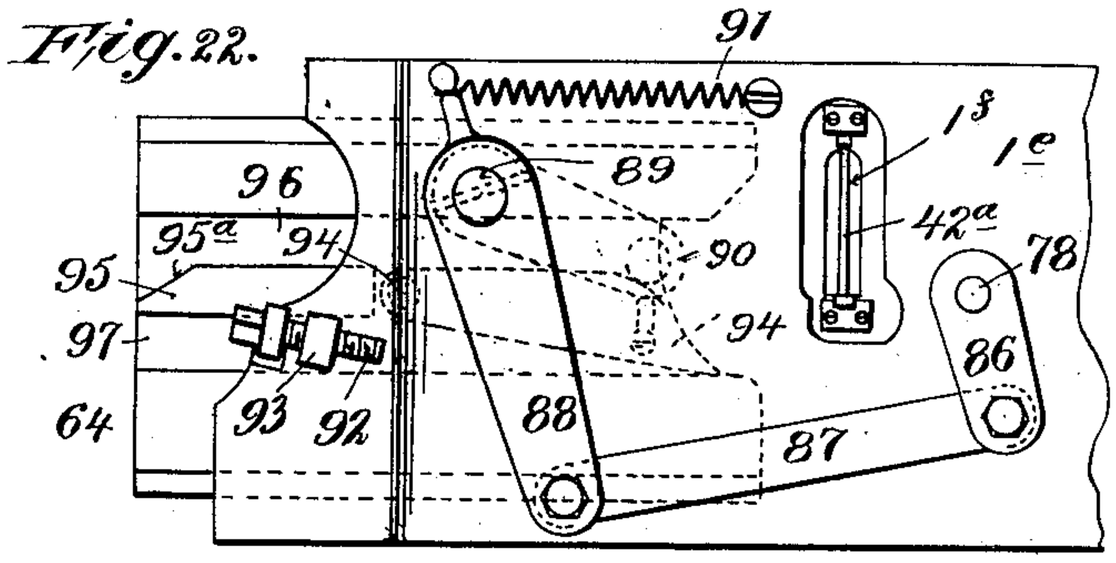

Fig. 22.

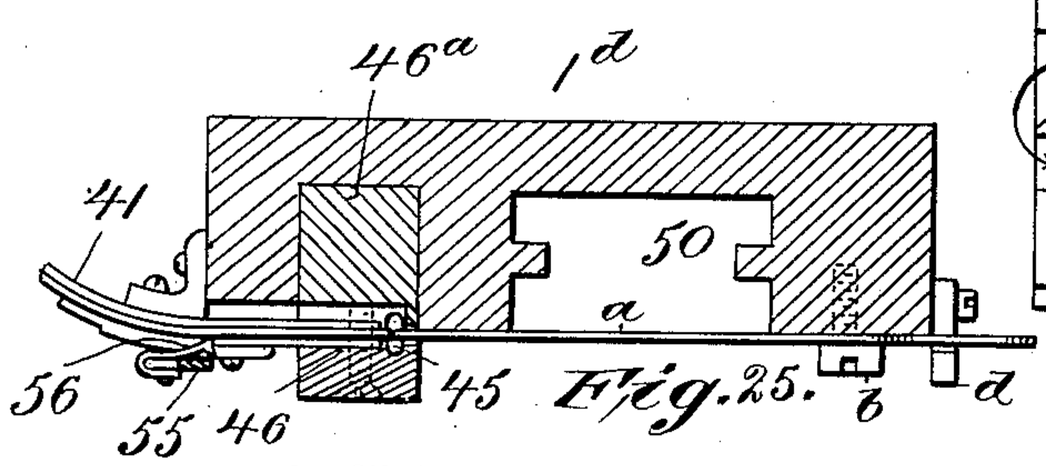

Fig. 25.

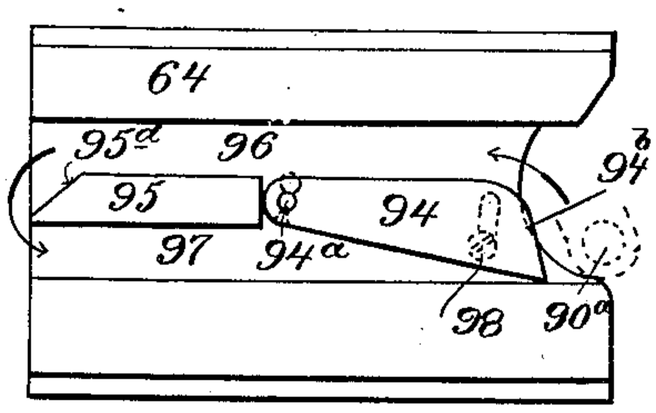

Fig. 24.

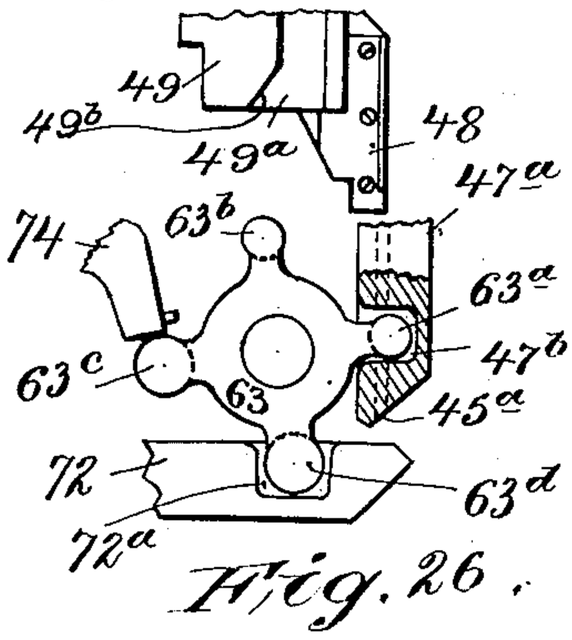

Fig. 26.

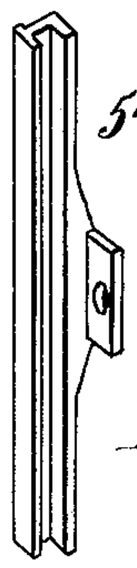

Fig. 28.

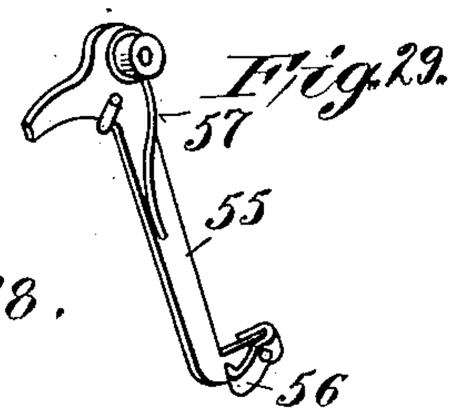

Fig. 29.

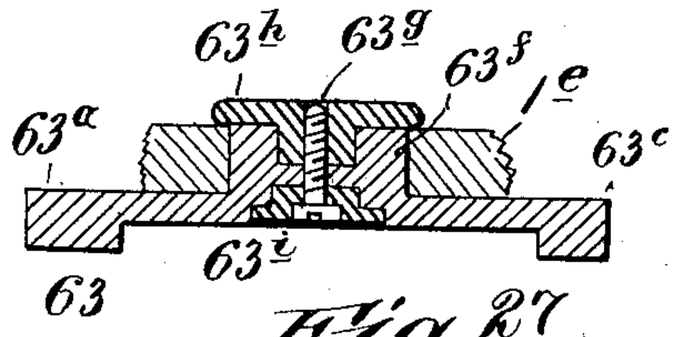

Fig. 27

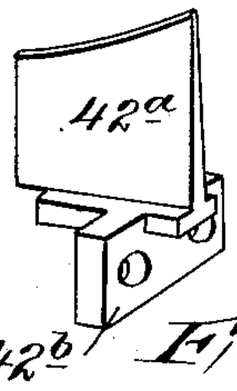

Fig. 30.

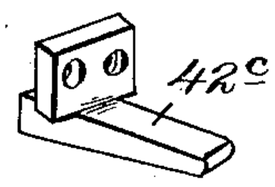

Fig. 31.

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UNITED STATES PATENT OFFICE.

WILLIAM McMURRAY, OF NEW YORK, N. Y., ASSIGNOR TO WILLIAMS WIRE HINGING MACHINE COMPANY, A CORPORATION OF NEW YORK.

BOX-HINGING MACHINE.

No. 820,244. Specification of Letters Patent. Patented May 8, 1906.

Application filed August 20, 1903. Serial No. 170,175.

To all whom it may concern:

Be it known that I, WILLIAM McMURRAY, a citizen of the United States, residing in New York city, borough of Manhattan, State of New York, have invented certain new and useful Improvements in Box-Hinging Machines, of which the following is a specification.

This invention relates to improved means for driving staples at an angle to each other to cause them to be interlocked to form a hinge, and particularly for hinging covers upon boxes, or hinging boards, box parts, or the like together generally, and the invention has special reference to means for presenting staples in proper position in line with drivers that operate to drive the staples into boards and the like.

The invention comprises the novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a side elevation, partly in section, of a machine embodying my invention. Fig. 1ª is a detail section of a clutch. Fig. 2 is a front elevation enlarged. Figs. 2ª and 2ᵇ are detail views showing the manner of driving staples. Fig. 3 is a detail view, enlarged, showing the driving devices in the normal position of rest. Fig. 4 is a detail view, partly broken, illustrating the devices for placing the horizontally-driven staples in position to be driven. Fig. 5 is a section on the line 5 5 in Fig. 4. Fig. 6 is a detail section substantially on the line 6 6 in Fig. 4. Fig. 7 is a detail section, enlarged, on the line 7 7 in Fig. 4. Fig. 8 is a similar view on the line 8 8 in Fig. 4 looking in the direction of the arrows. Fig. 9 is a detail perspective view of parts shown in Figs. 4 to 9 for picking staples from a track. Fig. 10 is a view similar to Fig. 3, but showing the parts in a different position. Fig. 11 is a view of parts shown in Fig. 10, on an enlarged scale. Fig. 12 is a horizontal section, enlarged, substantially on the line 12 12 in Fig. 10. Fig. 13 is a detail view substantially similar to Fig. 11, parts being removed. Fig. 14 is an edge view of the devices for picking staples from a track. Fig. 15 is a detail rear view thereof. Fig. 16 is a detail view from the opposite side of Fig. 15, showing parts moved from their normal position for the purpose of illustration. Fig. 17 is a rear view of the oscillatory plate carrying said staple-pickers. Fig. 18 is a detail face and edge view of part of said staple-picking devices. Fig. 19 is a section on the line 19 19 in Fig. 10, showing an impresser or staple-carrier for pressing against a board while a staple is driven. Fig. 20 is a perspective view of said impresser or carrier. Fig. 21 is a perspective view illustrating the horizontally-disposed staple-driver. Fig. 22 is a rear view illustrating the devices for operating the picker for the horizontally-driven staples. Fig. 23 is an edge view thereof looking from the left in Fig. 22. Fig. 24 is a detail view of a slide shown in Fig. 22. Fig. 25 is a section, enlarged, on the line 25 25 in Fig. 3. Fig. 26 is a detail rear view, partly broken, of the devices for operating the impressers or staple-carriers. Fig. 27 is a detail section through the wheel 63. Fig. 28 is a detail perspective view of a follower operating with the vertically-disposed staple-driver. Fig. 29 is a perspective view of a staple-feeder. Fig. 30 is a perspective view of a track end or extension for horizontally-driven staples, and Fig. 31 is a detail view of a guide located above said track end.

Similar numerals and letters of reference indicate corresponding parts in the several views.

In the drawings the numeral 1 indicates generally a suitable frame, shown provided with an arm 1ª, having bearings or brackets 1ᵇ 1ᶜ and having a head shown comprising members 1ᵈ 1ᵉ, which head carries the main staple setting and driving devices. Beneath said driving devices is located a table or support upon which boards or box parts are to be placed to receive the staple-hinges. For this purpose at 2 is indicated a table, shown of right-angle form, having its apex pointed upwardly, upon which the boards or box parts to be hinged are to be placed edge to edge, and upon the parts 2ª of said table are adjustable guides 3 4, against which the box parts are placed. The guides 3 4 are movably held on the parts 2ª and are adjusted to position and retained by blocks 5 6, guided by the parts 2ª and provided with hand-wheels 8, having pinions to engage teeth 9 for adjusting the guides along parts 2ª, clamp-screws 10 holding the guides in adjusted positions. Such adjustment of the guides 3 4

provides for box parts and boards of different dimensions. The guides 3 4 may be loosely supported on their block and bear against a spring-pressed post 6^a, whereby the guides will adjust themselves to accommodate uneven widths and edges of boards, &c. The table 2 is adapted to be adjusted and operated in a vertical direction and to be adjusted laterally. For these purposes the lower part 2^c of the table is guided vertically in a block 11, that is guided transversely in a block 12, which is guided to rise and fall on frame 1, an adjusting-screw 13 connecting the table part 2^c with block 11 through a lug 11^a, projecting from block 11, a locking-screw and handle 13^b holding 2^c and 11 rigidly together when the table is adjusted vertically, an adjusting-screw 13^a holding block 11 in transverse adjustment on block 12. During operation the table 2 with blocks 11 and 12 are to be raised and lowered, and for this purpose block 12 has a projection or roller 14 operating with a cam 15 on shaft 16, journaled in frame 1. A dash-pot or cylinder 17, carried by frame 1 and containing a piston that is connected with the block 12, controls or cushions the descent of table 2 when released by cam 15 by means of oil or air within the cylinder beneath the piston. Above table 2 is an abutment A, located at the lower end of head 1^d, between which abutment and the table the box parts are to be clamped. The abutment A, (see Fig. 2,) as shown, comprises a bar or slide guided along the edge B of head 1^d (as in a dovetail groove) and adapted to be adjusted at an angle to the vertical along said edge by means of a screw C, carried by a suitable part D of said head, and said abutment has an extension or wing A^2, shown at right angles to the main part A, forming an angular recess E, adapted to receive the corresponding angular portion of table 2, whereby boards placed upon said tables may be firmly clamped against said abutment. The extension A^2 serves as an anvil or clench-block, against which horizontally-driven staples are pushed after passing through a board to turn them back or clench them. By means of the angular movement permitted the abutment A the angle or apex of recess E can be adjusted to receive the angle of boards upon table 2, according as said boards differ in thickness and also according to the lateral adjustment of table 2 with respect to the varying thicknesses of boards. In the example illustrated the table 2 is designed to be raised and lowered each time two staples are interlocked to form a hinge, and this is accomplished by permitting shaft 16 to have an intermittent rotation. For this purpose a clutch is provided between said shaft and a driving-gear 18, loose on said shaft, as follows: A peripherally-grooved disk 19 is secured on said shaft and carries a spring-pressed bolt 20, having a beveled extension 21 entering said groove of said disk. (See Fig. 1^a.) The bolt when pressed by spring 22 is arranged to engage a toothed wheel 23, secured to gear 18, whereby in the position shown in Fig. 1^a gear 18 will be clutched by the bolt and disk to shaft 16. To release the clutch, a shifter 24, entering the groove of disk 19, engages extension 21 of bolt 20 to push back the bolt as disk 19 rotates. Shifter 24 is carried by a lever 25, pivoted on frame 1, adapted to be drawn down by a treadle 26 and raised by spring 27, the shifter 24 being normally in the groove of disk 19. Gear 18 is operated by a gear 28, secured to a shaft 29, suitably supported by frame 1 and shown provided with fast and loose pulleys 30 31 to receive a driving-belt controlled by a belt-shipper 32. When the machine is to operate, the belt is shifted to the fast pulley, and by depressing the treadle 26 the shifter 24 will descend out of the path of bolt 20 to permit said bolt to engage wheel 23 to set the clutch, and gear 18 will then rotate shaft 16 to operate table 2 through cam 15. By releasing the treadle the clutch will be uncoupled by shifter 24 rising into the groove of disk 19, drawing back bolt 20, when said bolt next engages said cam, and the table will not rise.

The table and its operating parts above set forth are shown for the purpose of illustrating means for holding boards in proper angular positions to receive the staple-hinges when driven by the devices above the table, as follows: At 35 is indicated a rock-shaft shown journaled in the bearing 1^b 1^c, said shaft having a crank 36, connected to crank 38, secured on shaft 16 by a link 37, which is preferably made adjustable by a turnbuckle 37^a. Shaft 35 also carries a lever 40, shown in the form of a bell-crank, for actuating the staple driving and setting devices. Vertical and horizontal guideways are provided for the staples, so that the latter may be guided to the point of intersection or meeting edges of the boards x y on table 2. (See Figs. 2^a, 2^b.) A track 41 leads to the vertical staple-guide, and a track 42 supplies staples for the horizontal staple-guide, and these tracks are shown as leading from a casing or hopper 43, containing staples 44 and provided with any suitable means for picking up the staples and transferring them to the tracks; but the staples could be placed upon said tracks by hand, if preferred. Said tracks, as shown, comprise vertically-disposed strips 41^a 42^a, narrower than the spaces between the legs of the staples to permit the latter to slide freely along the tracks, and at a distance below the upper edge of the tracks are ribs (indicated at 41^b) slightly wider than the strip 41^a, along which the legs of the staples slide, 42^c being strengthening-strips at the lower edge of the track, all whereby the loop ends of the staples may slide on the strip 41^a and be guided by

the ribs 41[b], whereby friction on the staples is reduced to permit them to freely slide along the tracks. The track 42 is similarly arranged. The track 41 leads to a vertical groove or guideway above table 2, (indicated at 45, see Fig. 25,) shown formed between or cut in two bars 46 46[a], secured to the head 1[d], the end of track 41 terminating about in line with said guideway or groove, (see Fig. 25,) whereby the staples may pass off the end of said track and slide into said guideway. The parts 46 and 46[a] are shown screwed together, and two parts are thus provided for convenience in forming the guideway or groove 45. Beneath said guideway 45, and as a continuation thereof, is a guideway or groove 45[a], formed in a staple-carrier or presser, shown consisting of two blocks 47 47[a], held together by screws, that is guided upon head 1[d] to press upon a board or box part, the part 47 being shown provided with a groove receiving a tongue or guide 47[b]. (See Fig. 12.) The lower end of said carrier is shown beveled to bear upon the box part upon table 2. At 48 is indicated a staple-driver adapted to travel in the guideways 45 and 45[a] and attached to or formed on a bar 48[a], carried by a vertically-movable block 49, guided in bearing-guide 50 in head 1[d], which block is pivotally connected with the upper arm 40[a] of a lever 40 by a link 51, whereby as shaft 35 rocks the driver 48 will be reciprocated to drive staples. The driver 48 and its bar 48[a] are adjustable on block 49 to accommodate staples of different lengths by means of a screw 52 connecting the bar 48[a] with said block, a screw or bolt 35, passing through a slot in bar 48 and entering block 49, serving to secure the bar to said block. Driver 48 is lifted above the end of track 41, as in Fig. 3, and descends to push a staple from said track through guideways 45 45[a] out from carrier 47 into a board, as indicated in Fig. 10. The block 49 carries a follower 54, adapted to travel in guideways 45 45[a] and to pass across the end of track 41 to prevent the feed of staples therefrom when the driver descends.

The above-described parts are set forth in detail to explain staple-driving devices with which any improvements are operative.

One feature of my invention resides in means to control stapling at the end of track 41, and to this end at *a* is indicated an arm or lever pivoted at *b* to head 1[d] and normally held by a spring *c* and stop *d* with its end *a'* adjacent to or in contact with the staple-delivery end of track 41 (see Fig. 3) and in alinement with its upper edge to keep the endmost staple from slipping off the track and to sustain such staple in line with guideway 45, the arm *a* being moved away by driver 48 as the latter descends, which driver thereby pushes the endmost staple from track 41. At 55 is indicated an arm shown pivoted to head 1[d], as at 55[a], and provided with a spring 56 to bear on the staples near the end of track 41. (See Figs. 3 and 25.) The arm 55 has a spring 57 bearing against head 1[d] to push the arm to the left, as in Fig. 10, and a pin 61 stopping the outward movement of said arm, an extension 58 to be engaged by a part or edge 60 of bar 48[a], whereby arm 55 is rocked as bar 48[a] reciprocates. As the arm 55 rocks across the staples it feeds them along track 41 to its end over guideway 45.

The staple-guiding block or presser 47 is reciprocated by a star-wheel 63, pivoted to head 1[e], being shown in Fig. 27 as provided with a hub 63[f], journaled in a bearing in arm 1[e], a screw 63[g] passing through said hub and by means of a nut 63[h] and washer 63[i] holding said wheel in position; but other means may be provided for pivotally supporting wheels 63. The arm 63[a] of wheel 63 engages a recess 47[b] in bar 47[a]. (See Fig. 26.) Wheel 63 is rocked to depress block 47 by block 49, which, as shown in Fig. 26, has a groove 49[a], provided with a beveled edge or corner 49[b] to engage the arm 63[b] of wheel 63, said arm entering groove 49[a] after being rocked by beveled edge 49[b] to depress carrier or presser 47 upon a board. The means for turning back wheel 63 will be described later. The above-described devices push staples 44 in a vertical direction into the wood held on table 2.

The horizontally-driven staples 44, which interlock with the vertically-driven staples, are fed and operated as follows: In a horizontally-disposed guideway 70 in arm 1[e] is a reciprocative slide or block 64, that is pivotally connected, as by a link 65, with the lower arm 40[b] of lever 40. To slide 64 is secured a staple-driver block 66, preferably adjustably secured by a screw 67 and a locking-screw 68. The block 66 has a driver 66[a], that works in a staple guideway or groove 71, shown formed in a block or presser 72, movably carried by arm 1[e], which staple-guideway is adapted to receive staples from track 42. Said guideway 71 is adapted to receive driving member 66[a], and presser or block 72 is adapted to be moved toward and from the board on table 2, where the staple is to be driven, said presser being suitably guided on arm 1[e], as by a tongue or guideway 73, secured on arm 1[e]. (See Fig. 19.) The said staple-carrier or presser is alined with the anvil or clench-block A[2], against which horizontally-driven staples are pressed. The presser 72 is arranged to be moved toward and from said anvil or a board on table 2 by wheel 63, for which purpose the arm 63[d] of said wheel engages in a slot 72[a] in the back of presser 72, (see Fig. 26,) and when said presser is moved back and forth its front beveled end is pressed against a board on table 2. Wheel 63 is rocked to move presser 72 toward a board (and in the direction reverse to its movement by block 49) by the forward

movement of slide or block 64, which may be accomplished by causing said block to act upon arm 63^c of said wheel. To this end I have shown a rocker 74, pivotally supported upon arm 1^e, as at 74^a, and adapted to bear upon arm 63^c, the rocker 74 being shown provided with a member or lug 74^b to be engaged by a beveled edge 69 on the slide 64. (See Fig. 4.) Thus when block 49 descends and its bevel edge 49^b rocks wheel 63 it causes carrier 47 to be depressed and presser 72 to be moved to the right, as in Fig. 10, and arm 63^c will then be raised, and on the next stroke as block 49 rises and slide 64 advances its bevel edge 69 will cause rocker 74 to depress arm 63^c, and thereby reverse the motion of wheel 63, whereby block 72 is pushed into contact with a board on table 2 when the latter is raised. The alternate rocking of wheel 63 by blocks 49 and 64 causes the alternate movement of blocks 47 and 72 toward the boards on the table.

Staples to be driven through guideway 71 are delivered by track 42 at a point in the drawings to the right of said block, and as staples feed most successfully by gravity when hanging on a vertically-disposed track I provide means for transferring the staples from the end of such track where they hang in a vertical position to a horizontal position in line with guideway 71, as indicated by dotted lines in Fig. 11. To such end I have provided devices arranged as follows: At 42^a I have shown an extension of track 42, which is secured in line with an opening 1^f in arm 1^e which extension is shown more fully in Fig. 30 and is shown somewhat in the form of a blade having a foot 42^b to be secured to arm 1^e, the end of track 42 being brought against the extension 42^a. This is for convenience in adjusting and removing track 42, although it will be understood that track 42 could extend directly into opening 1^f. Above extension 42^a I have located a guard 42^c, providing a space therebetween to prevent staples from rising from said extension. (See Fig. 5.) In line with the opening 1^f and against the front face of arm 1^e, within guideway 70, is located a plate 75, shown provided with a curved rib or track 76, partially surrounding the opening 1^f, that leads through plate 75. (See Fig. 13.) The rocker 74 is shown pivoted between parts 1^e and 75. In front of plate 75 is pivotally supported an oscillatory or rocking member or plate 77, which is secured to a shaft 78, (by screws or the like,) that is journaled in arm 1^e for rocking member 77, the means for which purpose will be hereinafter described. (See Fig. 12.) The member 77 carries means for picking staples one by one from the end of the extension 42^a of track 42 and transferring the staples in line with the guideway 71. To this end member 77 is provided with a groove or guide at 77^a, (see Fig. 7,) in which is located a slide or plate 80, that carries a spring 81, having a finger or projection 81^a, extending transversely of slide 80 and toward plate 75, and thereby toward the delivery end of extension 42^a, said finger or projection being shown entering a slot 80, whereby when the oscillatory member 77 is in the staple-receiving position shown in Figs. 10 and 12 the finger or projection 81^a will aline with the extension 42^a, and thereby can enter the endmost staple on extension 42^a. (See Fig. 12.) The plate 77 at other times covers the end of said extension 42^a to keep other staples from sliding therefrom. The tendency of slide 80 when member 77 is rocked is to move outwardly in its bearings, so that when member 77 is swung from its staple-receiving position in Fig. 10 in the direction of the arrow *a* in said figure to the staple-delivery position shown in Fig. 11 the staple 44 will be carried down in line with guideway 71, as in dotted lines in Fig. 11, and thereby in line with the driver 66^a. During such rotation the staple rides against the rib or track 76 and is thereby kept from slipping off the finger 81^a by centrifugal action. Furthermore, to assure that finger 81^a will aline with track or extension 42^a in the staple-receiving position the slide 80 at the end opposite said finger engages a stop or pin 80^a on plate 75, whereby as member 77 rocks back to the position shown in Fig. 10 the slide 80 by encountering said stop will be pushed forwardly to bring finger 81^a in line with extension 42^a. To withdraw the finger 81^a from staple 44 as driver 66^a advances, said driver encounters the lower edge of slide 80, and thereby pushes the same upwardly, (see Fig. 4,) and thereupon the extended portion 81^b of spring 81 rides against an inclined or cam-like edge 77^b on member 77, which causes spring 81 to move outwardly, thereby withdrawing finger 81^a from staple 44, (see Fig. 7,) releasing said staple, whereupon as driver 66^a continues to advance it engages the staple and pushes it through guideway 71 into a board. (See Figs. 2 and 3.) As a support for the staples in their horizontal position (indicated in Fig. 11) the member 77 is provided with a guide 82, (shown more fully in Fig. 18,) which has a relatively wide portion 82^a provided with a groove 82^b to receive the lower leg of a staple, which guide alines with slide 80 to limit its outward movement, the part 82^a being at such a distance from the corresponding edge of member 77 as to provide a space for staple 44, as indicated in Fig. 11. The guide 82 also has a relatively narrow portion 82^c, providing a space through which the driver 66^a may pass. (See Fig. 11.) For convenience of manufacture the guide 82 is made separate from member 77 and is connected thereto by a pivot 83, whereby said guide partakes of the oscillatory movements of member 77. The guide 82 travels along track or way 84, secured on arm 1^e, the

outer edge of guide 82 sliding in a channel in said track 84 and being thereby held from outward movement during oscillation. The track or way 84 has a slot 84ª, Fig. 13, through which driver 66ª can slide toward guideway 71. In the staple-delivery position guide 82 rests upon a support 85, carried by arm 1ᵉ, which may be adjustable by means of a screw 86. (See Fig. 4.) From the foregoing it will be understood that when member 77 is in the position shown in Figs. 10 and 12 a staple 44 will be upon finger 81ª and that when said member is moved downwardly said finger will push said staple from the end of extension 42ª and member 77 then passing over the delivery edge of extension 42ª, and said staple will be held by said finger in the space between 77 and 82, and when the member 77 reaches the position shown in Figs. 4 and 11 driver 66ª will advance, raise slide 80, release finger 81ª from the staple, and push the staple into and through guideway 71, and member 77 will be moved back to its staple-receiving position. Such oscillation of member 77 occurs each time slide 64 is reciprocated back and forth.

The means I have shown for oscillating member 77 are as follows: To shaft 78 is attached a crank 86, connected by a link 87 with an arm or crank 88, secured on a rock-shaft 89, journaled in arm 1ᵉ, (see Fig. 22,) and to said shaft is secured a crank or arm 90, located between arm 1ᵉ and block or slide 64. A spring 91, connected with crank 88 and arm 1ᵉ, tends to hold said cranks, link, and member 77 in the staple-receiving position. (Indicated in Fig. 10.) An abutment 92 on arm 1ᵉ limits the movement of the parts by spring 91, and said abutment is preferably made adjustable, whereby to regulate the position of finger 81ª with respect to the delivery end of track or extension 42ª. Said adjustable abutment is shown in the form of a screw carried by a lug 93 on arm 1ᵉ. (See Fig. 22.) Member 77 by the devices above described is rocked from the staple-receiving position in Fig. 10 to the staple-delivery position in Fig. 11 by means of the block or slide 64 as it advances to drive a staple through guideway 71. To this end I have provided crank 90 with a pin or lug 90ª, adapted to be engaged by a dog or latch 94, carried by slide 64. (See Fig. 24.) The face of the slide 64 is recessed on the side toward pin or lug 90ª, in which the latch or dog 94 is pivoted, as at 94ª, and at 95 is a bar or track in said recess and alined with dog 94, whereby ways or guide, grooves 96 97, above and below parts 94 95, are provided, in which pin or lug 90ª travels. Dog or latch 94 has its vertical movement limited by a screw 98, attached thereto and passing through a slot 99 in slide 64. The forward end 94ᵇ of dog 90 is beveled or inclined to ride under lug 90ª, and the rear end of bar 95 is preferably beveled at 95ª. Thus when the parts are in the staple-receiving positions shown in Fig. 10 and slide 64 advances the dog 94 will slide under lug 90ª and raise the same, thereby rocking crank 90 and through the connected parts turning member 77 to the position shown in Fig. 11, and lug 90ª will thereupon ride through guide 96, and the arrangements are such that just after the staple-driving member 66ª passes beyond member 77 lug 90ª will drop off the end 95ª of bar 95 and thereupon spring 91, acting upon crank 88, will, through the connected parts, cause member 77 to quickly rise back to the staple-receiving position, while driver 66ª continues to advance to drive the staple. Upon the return stroke of slide 64 lug 90ª will slide in groove 97, passing under dog 94 and lifting the same, said lug passing beyond the forward end of said dog when slide 64 reaches its rearmost position, as indicated in Fig. 10. The result of this arrangement is that each time slide 64 is reciprocated the member 77 will be oscillated back and forth to carry a staple from a substantially vertical position to a substantially horizontal position in line with guideway 71 and driver 66ª The advantages of the arrangement described are that the staples can slide in a substantially vertical position, hanging by their loop ends, and can then be readily picked from the track and transferred to a substantially horizontal position for being driven.

The complete operation of the mechanism above set forth may be described as follows: The parts being in the normal or inactive positions shown in Figs. 2 and 3 and staples placed upon tracks 41 42, boards or box parts are placed upon table 2, so that their edges overlap, as indicated in Figs. 2ª and 2ᵇ, and then treadle 26 is operated, whereby the clutch connects gear 18 with shaft 16, and thereupon the table rises and jams the board against the abutment A A², and crank 38 causes the shaft 35 to rock in the direction of the arrow in Fig. 3. Thereupon driver 48 descends and pushes the staple hanging between the end of track 41 and arm or lever *a* through guideway 45 and into carrier 47, (block 64 simultaneously moving to the right in Fig. 3,) and block 49 during its descent causes wheel 63 to rock to push carrier 47 against a board, and while said carrier is in such position the vertical staple is driven through the same into the board, but only to such extent as to leave its loop end projecting from the board and alined with guideway 71. During such time member 77 will be in the position shown in Fig. 10, and a staple will be upon the finger 81ª. Shaft 35 is next rocked reversely whereupon driver 48 ascends and slide 64 advances, and as soon as dog 94 engages lug 90ª crank 90 will be raised and through the connected parts the member 77 will be swung down, carrying a staple to the staple-delivery position, all as indicated in Fig. 11. Slide 64

continues to advance, causing driver 66ª to raise slide 80, release the finger 81ª from the staple, and push the staple into guideway 71. When driver 66ª is free from member 77 and its guide 82, the cam 69 of block 64 will operate rocker 74 and move wheel 63 in the direction of the arrow *x* in Fig. 11, thereby pushing block or carrier 72 against a board and raising carrier 47, and at about such time lug 90ª will slip off the end of bar 95 and member 77 will rise to the staple-receiving position, slide 80 being pushed by stop 80ª, as before stated, and the continued movement of driver 66ª will drive the staple from guideway 71 through the loop of the previously-driven staple, such two staples thereby being interlocked in the form of a hinge, each staple being driven into a different board. Shaft 35 now comes to rest, and if another hinge is to be applied the boards are adjusted the desired distance, treadle 26 is again operated and released, and two staples are again driven in manner above described. As driver 48 descends block 48ª passes from extension 58 of lever 55, and the spring 57 causes spring 56 on arm 55 to slide to the left in Fig. 3, and as said block 48ª next rises its part 60 lifts extension 58, and thereby rocks lever 55, causing spring 56 to push staples toward the delivery end of track 41. This occurs each time the driver 48 is reciprocated, whereby staples are kept at the delivery end of the track. As the staples hang between the delivery end of the track and arm *a*, the endmost staple only is held in position beneath driver 48, and as the latter descends lever *a* will be swung away to permit the block 48ª to pass and will return to the position shown in Fig. 3 as the driver rises.

My invention is not limited to the details of construction shown and described, as they may be altered and the various arrangements modified without departing from the spirit thereof.

Having now described my invention, what I claim is—

1. The combination of a staple-delivering track, a driver to drive staples therefrom, an arm arranged to push staples along the track, a spring to move the arm in one direction, a stop to limit such movement of the arm, said arm having an extension, and means connected with the driver for operating said extension, substantially as described.

2. The combination of a head or support, with staple-carriers arranged at an angle to each other, and means for guiding the same on said support to travel toward a common point, with drivers to drive staples from said carriers, an oscillatory member having arms certain of which respectively movably engage said carriers, said drivers being provided with means for oscillating said member by and during the movement of said drivers, substantially as described.

3. The combination of a head or support, with staple-carriers arranged at an angle to each other, and means for guiding the same on said support to travel toward a common point, with drivers to drive staples from said carriers, an oscillatory member having arms respectively movably engaging said carriers, means operated with one driver for rocking said member in one direction, a rocker to move said member in the reverse direction, and means operated with the other driver for actuating said rocker, substantially as described.

4. The combination of a movable staple-carrier and means for guiding the same, with a driver, an oscillatory member movably connected with said carrier, said member having an arm or extension, and a block operative with the driver and provided with an inclined face to act on said arm to rock said member, substantially as described.

5. The combination of a movable staple-carrier and means for guiding the same, with a driver, an oscillatory member movably connected with said carrier, said member having an arm or extension, and a block operative with the driver and provided with a groove and an inclined face arranged to act on said arm or extension and to receive the same to rock said member to move the carrier toward the staple-impressing point and lock it in such position, substantially as described.

6. The combination of a staple-delivering track and a staple-receiving guideway, with a movable member provided with means to transfer staples from said track to a position in line with said guideway, means to support said member so it may move transversely to the plane of said track, a driver to drive staples from said guideway, and means to operate said movable member coincidently with the operation of said driver, substantially as described.

7. The combination of a staple-delivering track and a staple-receiving guideway, with a movable member provided with a staple-receiving finger adapted to pick staples off the end of said track and transfer them to a position in line with said guideway, means to support said member so it may move transversely to the plane of said track, a guideway and driver located at an angle to the first-named guideway, whereby interlocked staples may be driven, and means to operate said movable member, substantially as described.

8. The combination of a staple-delivering track and a staple-receiving guideway located at a distance from said track, with an oscillatory member provided with a staple-receiving finger adapted to pick staples off the end of said track and transfer them to a position to enter said guideway, means for releasing staples from said finger, means to sup-

port said member so it may move transversely to the plane of said track, a driver to drive staples from said guideway, and means to operate said movable member coincidently with the operation of said driver, substantially as described.

9. The combination of a staple-delivering track and a staple-receiving guideway located at an angle to the plane of travel of staples along said track, with an oscillatory member provided with means for picking staples from said track and presenting them in line with said guideway, a staple-driver alined with said guideway to push staples therethrough, and means for operating said member coincidently with the operation of said driver, substantially as described.

10. The combination of a staple-delivering track, and a staple-guideway, with a movable member provided with a movable finger adapted to enter staples and move them from the end of said track to alinement with said guideway, and means for releasing staples from said finger to permit them to travel through said guideway, substantially as described.

11. The combination of a staple-delivering track, and a staple-guideway located at an angle to the plane of travel of staples along said guideway, with a movable member provided with a movable finger adapted to move staples from the end of said track to alinement with said guideway, means for releasing staples from said finger to permit them to travel through said guideway, and a driver to travel through said guideway, substantially as described.

12. The combination of a staple-delivering track, and a guideway, with a movable member adapted to travel across the end of said track and provided with a finger to enter the endmost staple on the track and push the same sidewise from the track into alinement with said guideway, a slide guided by said member and carrying said finger, means for moving said slide transversely of the plane of the staple to cause the finger to release the staple, and a driver to push staples through said guideway, substantially as described.

13. The combination of a track, and a guideway, with an oscillatory member provided with a slide, a spring-acting finger carried by said slide to aline with the end of the track, the oscillatory member having a cam or inclined surface arranged to release the finger from a staple when the slide is moved inwardly, and a driver arranged to push staples through said guideway and to operate said slide, substantially as described.

14. The combination of a staple-delivering track, and a guideway, with an oscillatory member, a slide carried thereby and provided with a finger adapted to enter a staple on said track, means for moving said slide forwardly to bring the finger in line with said track, means to move the slide backwardly to release the finger from a staple, and means to drive staples through said guideway, substantially as described.

15. The combination of a staple-delivering track, and a guideway, with an oscillatory member, a slide carried thereby, a finger carried by said slide to aline with said track to engage a staple thereon, a stop to engage said slide and push the finger in line with said track when the member is in the staple-receiving position, whereby when said member is turned the staple will be carried by the finger into line with the guideway, and means for pushing said slide back to release the finger from the staple, substantially as described.

16. The combination of a staple-delivering track, and a guideway located at an angle thereto, with an oscillatory member provided with a finger to engage staples at the end of the track, means to support said member so it may move transversely to the plane of said track, a guide concentric to the axis of said member to resist the outward movement of staples, means for driving said staples through said guideway and for releasing them from said finger, a driver to drive staples from said guideway, and means to operate said movable member coincidently with the operation of said driver, substantially as described.

17. The combination of a staple-delivering track, and a guideway, with a movable member provided with a finger to engage and push staples from the end of said track, a guide carried by said member adjacent to said finger providing a space between the member and the guide to receive staples, means for releasing staples from said finger, and means for driving staples through said guideway, a driver to drive staples from said guideway, and means to operate said movable member coincidently with the operation of said driver, substantially as described.

18. The combination of a staple-delivering track and a guideway, with a movable member provided with a finger to engage and push staples from the end of said track, a guide movably connected with said member and located adjacent to said finger providing a space between the guide and member to receive staples, a way or track for said guide, and means for releasing the finger from the staples and for driving staples through said guideway, substantially as described.

19. The combination of a staple-delivering track, and a guideway, with an oscillatory member provided with a finger adapted to pick staples from the end of the track, a guide pivotally connected with said member and provided with a relatively wide part located at a distance from said member to receive staples in the space therebetween, said guide having a relatively narrow portion,

and a driver adapted to pass across the narrow portion of said guide to push staples through said guideway, means for releasing said finger from staples, and a track or way for said guide, substantially as described.

20. In a staple-picking device a pivoted plate provided with a transverse guide, a slide carried in said guide, a spring carried by said slide and provided with a finger extending transversely thereto, and means for causing the finger to move laterally when the slide moves longitudinally, substantially as described.

21. The combination of a track and a guideway located at an angle thereto, with an oscillatory member extending transversely of the delivery end of said track and provided with means for picking staples from said track and carrying them into line with the guideway, a driver alined with said guideway, means for reciprocating said driver, a crank connected with said member, and means connected with said crank and operated during the forward movement of the driver for moving a staple in line with the guideway in position to be pushed therethrough by the driver during its continued forward movement, substantially as described.

22. The combination of a track and a guideway located at an angle thereto, with an oscillatory member provided with means for picking staples from said track and carrying them into line with the guideway, a driver alined with said guideway, means for reciprocating said driver, a reciprocative slide carrying said driver, a crank connected with said member, a rock-arm connected with said crank, and means connected with said slide for rocking said arm when the slide moves in one direction for causing said member to transfer a staple from the track to alinement with the guideway, substantially as described.

23. The combination of a track and a guideway located at an angle thereto, with an oscillatory member provided with means for picking staples from said track and carrying them into line with the guideway, a crank connected with said member, a driver alined with said guideway, means for reciprocating said driver, a rock-arm connected with said crank, a slide connected with said driver and provided with two guideways, said arm having a lug to enter said guideways, and a dog pivoted between said guideways adapted to engage said lug to rock said arm when moving in one direction and to permit the lug to travel thereunder when moving in the opposite direction for oscillating said member, substantially as described.

24. The combination of a track and a guideway located at an angle thereto, with an oscillatory member provided with means for picking staples from said track and carrying them into line with the guideway, a crank connected with said member, a driver alined with said guideway, a slide connected with said driver, means for reciprocating said slide, a rock-arm connected with said crank, a slide connected with said driver, a spring to actuate said arm, said slide having a dog to engage a lug on said arm to operate the arm against the tension of said spring, said dog being adapted to travel over said lug when moving in a reverse direction, substantially as described.

25. The combination of a head provided with staple-receiving guideways located at an angle to each other, a track leading to one guideway to deliver staples thereto, a driver to drive staples from said track, another track located at an angle to the plane of the other guideway, and means for transferring staples from said track to a position in line with said guideway, substantially as described.

26. The combination of a head provided with staple-receiving guideways located at an angle to each other, a track leading to one guideway to deliver staples thereto, a driver to drive staples from said track, another track located at an angle to the plane of the other guideway, a movable member adapted to move in a plane transverse to the plane of said track and provided with means to transfer staples from said track to a position in line with said guideway, means to operate said movable member to cause it to place staples from said track in line with said guideway, and a driver to drive staples through said guideway, substantially as described.

27. The combination of a head provided with staple-receiving guideways located at an angle to each other, a track leading to one guideway to deliver staples thereto, a driver to drive staples from said track through said guideway, another track located at an angle to the plane of the other guideway, a movable member provided with a staple-receiving finger adapted to pick staples off the end of said track, means to operate said movable member to cause the finger to turn the staples from the plane of the track to the plane of the guideway and in line therewith, and a driver to drive staples from said movable member through said guideway, substantially as described.

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Witnesses:
T. F. BOURNE,
H. B. BRADBURY.