Oct. 2, 1923. 1,469,261

A. R. HAVENER

MACHINE FOR PUNCHING AND RIVETING SHEET MATERIAL

Filed Dec. 5, 1922 5 Sheets-Sheet 1

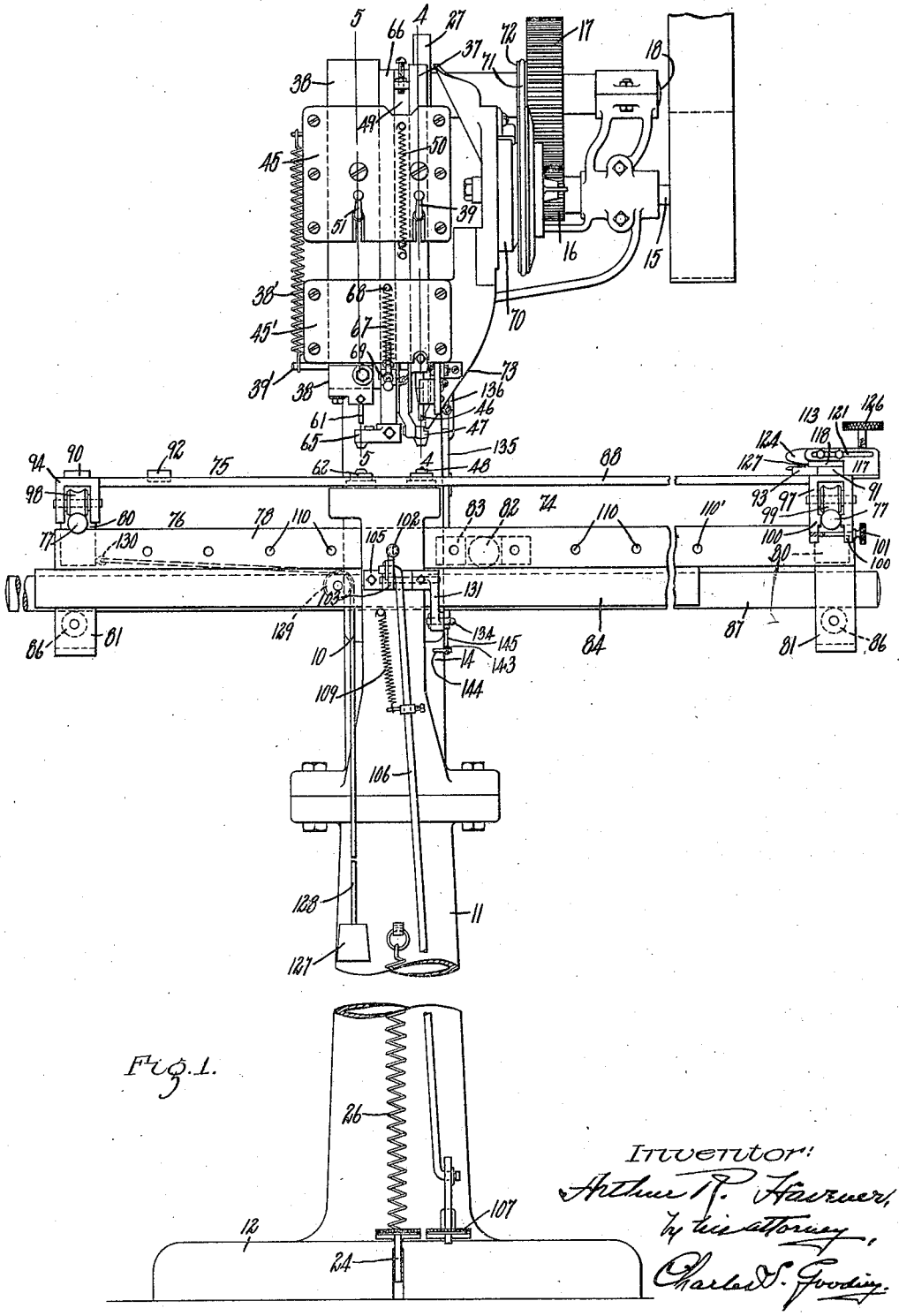


FIG. 1.

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by his attorney,
Charles S. Gooding.

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Filed Dec. 5, 1922 5 Sheets-Sheet 2

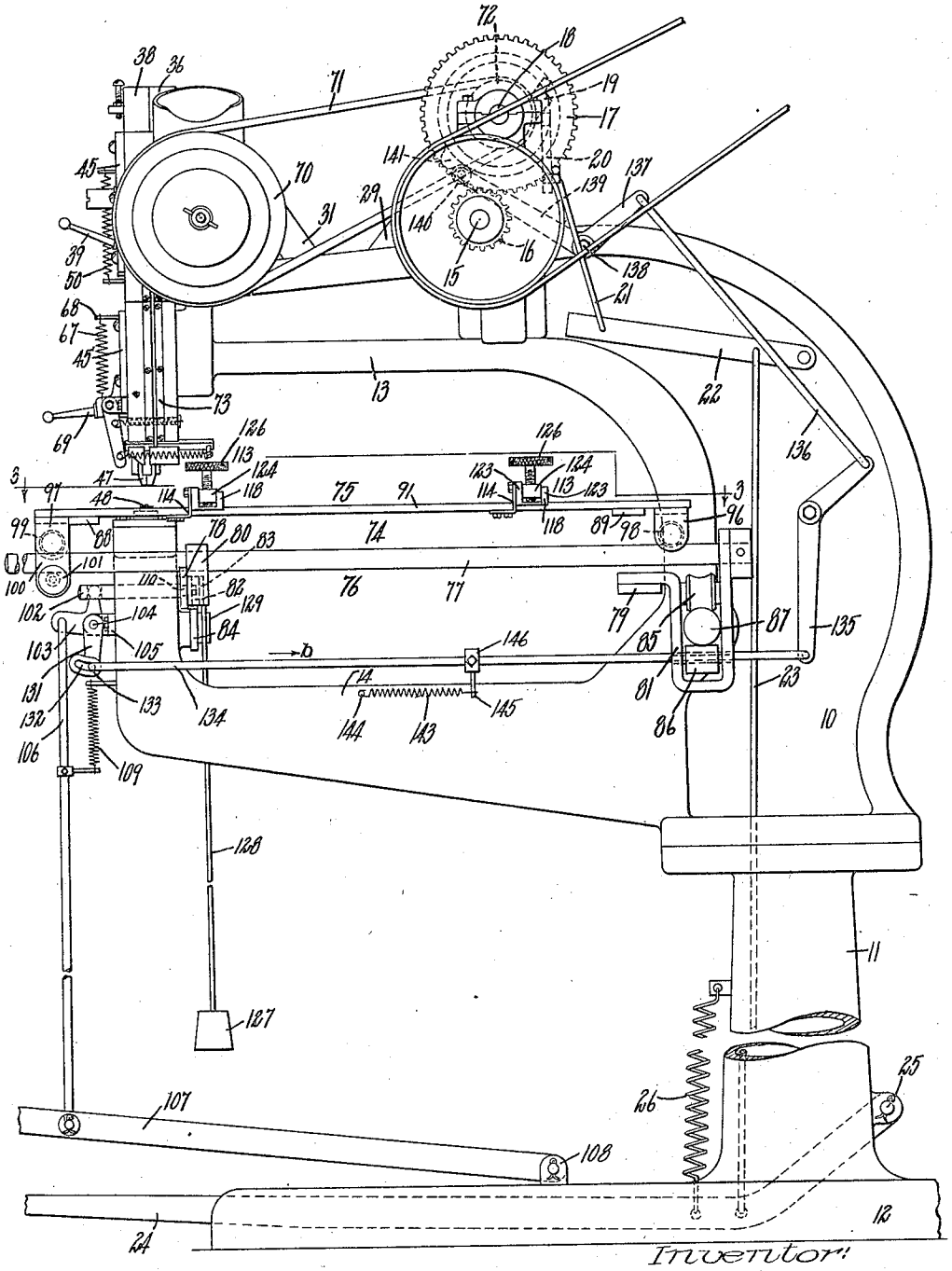


Fig. 2.

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MACHINE FOR PUNCHING AND RIVETING SHEET MATERIAL

Filed Dec. 5, 1922 5 Sheets-Sheet 3

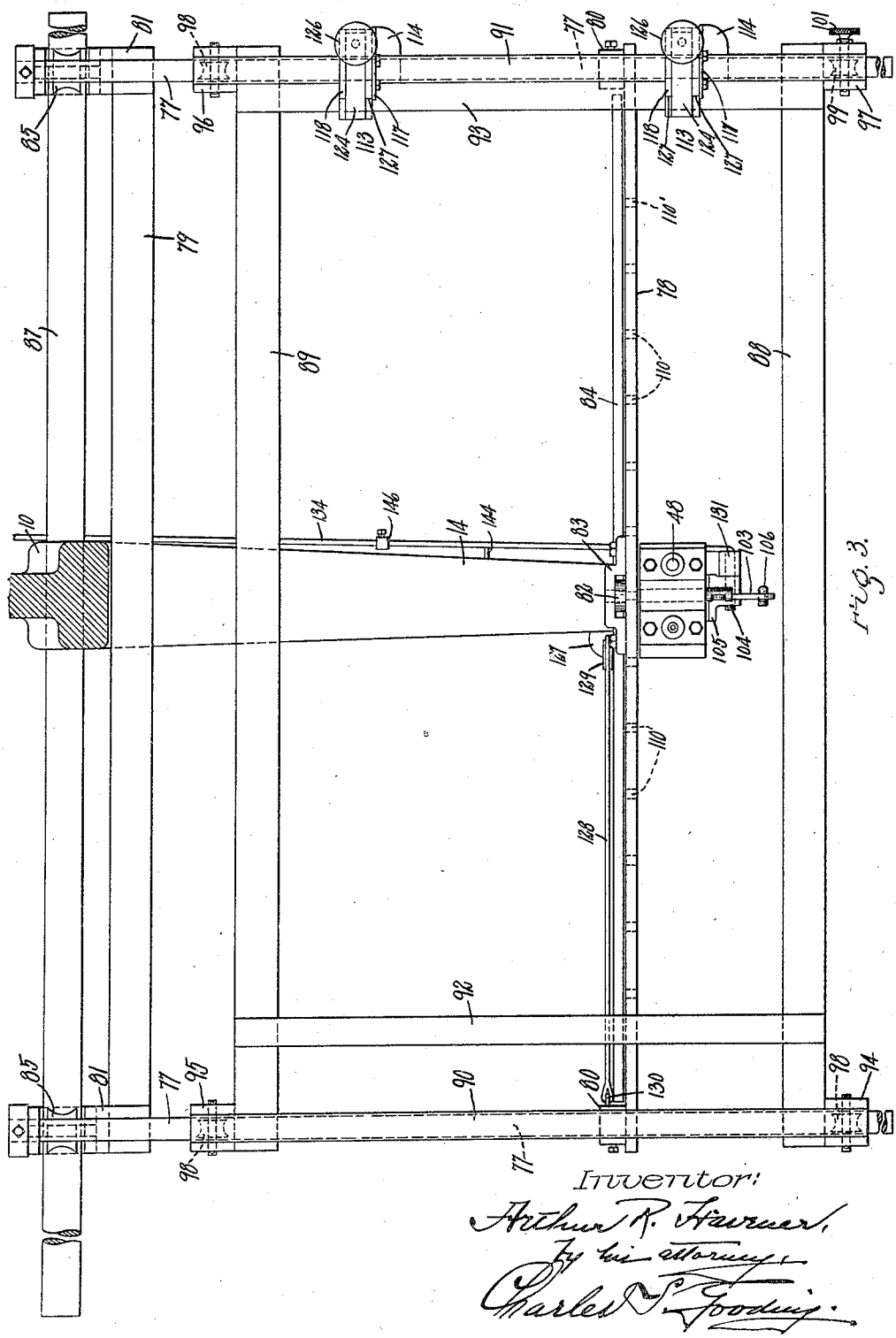


Fig. 3.

Inventor:
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MACHINE FOR PUNCHING AND RIVETING SHEET MATERIAL

Filed Dec. 5, 1922 5 Sheets-Sheet 4

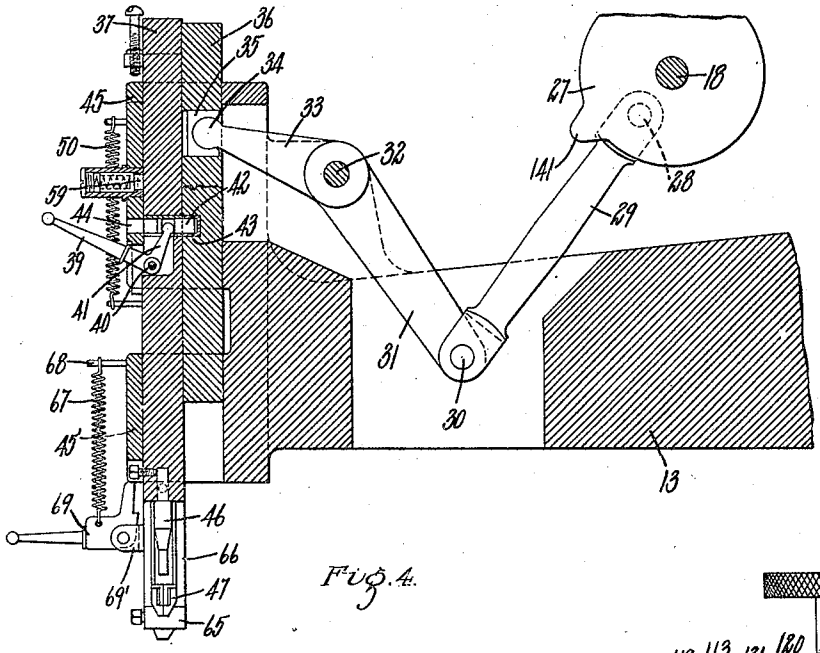


Fig. 4.

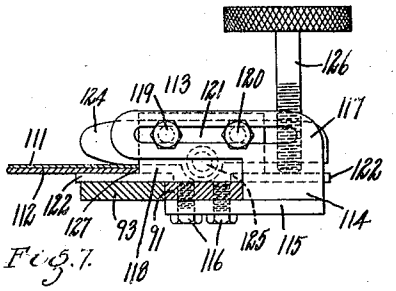


Fig. 7.

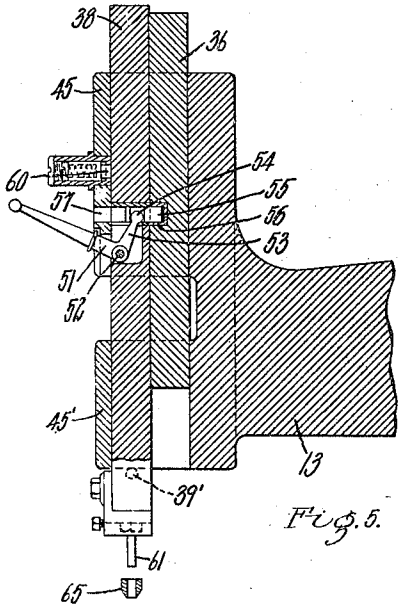


Fig. 5.

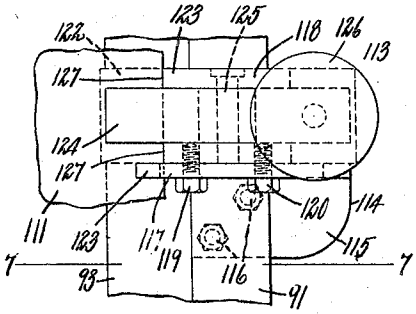


Fig. 6.

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MACHINE FOR PUNCHING AND RIVETING SHEET MATERIAL

Filed Dec. 5, 1922 5 Sheets-Sheet 5

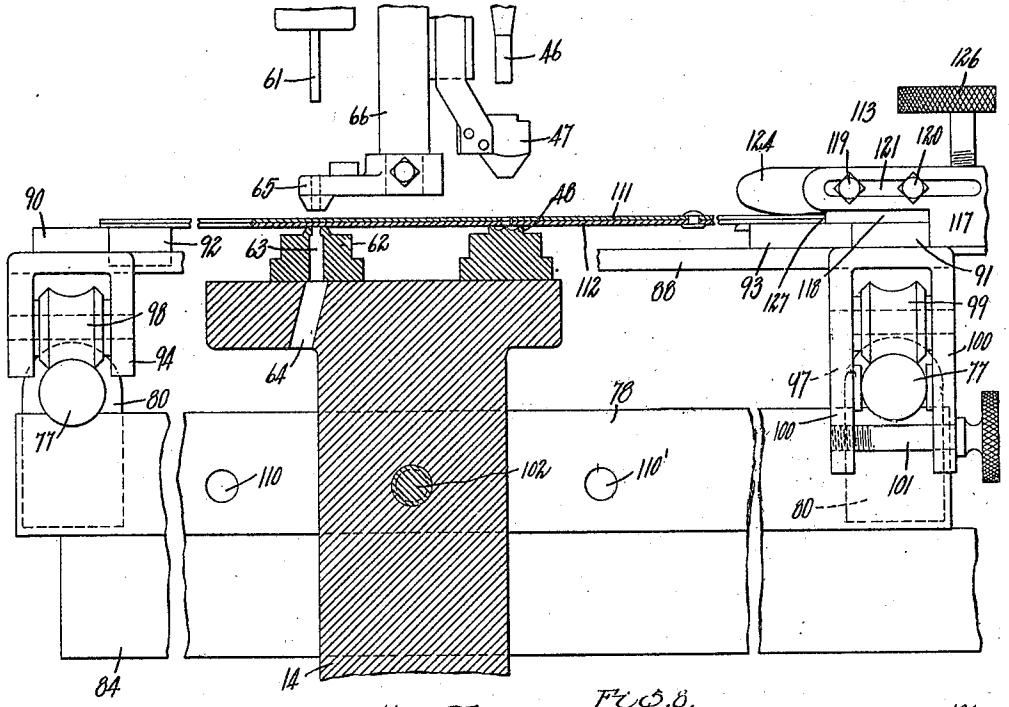


FIG. 3.

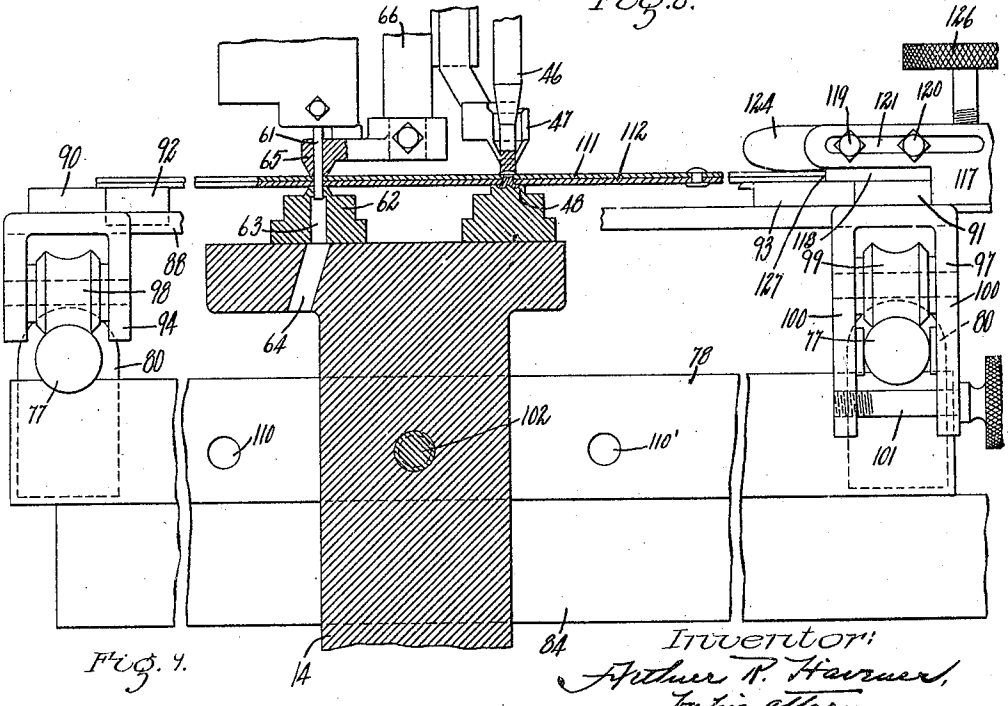


FIG. 4.

Inventor:
Arthur R. Havener,
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Charles S. Goodage.

Patented Oct. 2, 1923. 1,469,261

UNITED STATES PATENT OFFICE.

ARTHUR R. HAVENER, OF WAYLAND, MASSACHUSETTS, ASSIGNOR TO JUDSON L. THOMSON MFG. CO., A CORPORATION OF MASSACHUSETTS.

MACHINE FOR PUNCHING AND RIVETING SHEET MATERIAL.

Application filed December 5, 1922. Serial No. 605,060.

To all whom it may concern:

Be it known that I, ARTHUR R. HAVENER, a citizen of the United States, residing at Wayland, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Machines for Punching and Riveting Sheet Material, of which the following is a specification.

This machine relates to a machine for punching and riveting together sheets of material. It is particularly adapted for punching and riveting together comparatively large sheets of material, such as a sheet of metal and a sheet of fiber. This material when finished being used in cotton mills for transferring cotton and cotton yarn from one part of the mill to the other. These sheets of material are used for the sides and ends of the cars, which are fastened together by suitable means such as angle irons and brackets.

Heretofore it has been the custom to rivet the sheets of metal and the sheets of fiber together in the following manner:—

1st. Two sheets of material are glued together.

2d. One of the sheets is marked with chalk by means of a templet, the templet having holes therein and being placed on the sheet of material which is to be punched.

3d. Chalk is then dusted over the surface of the templet and passing over the holes in the templet leaves small deposits of the chalk on the surface of the sheet which is to be punched, in the positions where the rivets are to be driven.

4th. The templet is then removed from the sheet; the two sheets glued together are then carried to a punch; the holes are punched in the sheet where the small chalk dots appear; and

5th. The sheets are then taken to a riveting machine and riveted.

Thus it will be seen that five operations are necessary to secure the sheets together in this manner. Moreover, the holes when punched in this manner have to be located by the eye, that is, the chalk dots have to be located beneath the punch by the eye, and the rivet has to be set in the hole by positioning the sheet material relatively to the rivet setting instrumentalities.

With the machine of my invention all of this work can be done accurately and quickly in one operation and without the necessity of gluing the sheets together. This result is attained by means of a suitable punching and riveting machine combined with the work support, movable relatively to the punching and setting instrumentalities, either forwardly and backwardly or from one side to the other, or both, and the work support is provided with one or more clamps which are mounted on the work support and movable therewith and which clamp the sheets of material together and to the work support.

The invention consists in the combination of a punching mechanism or riveting mechanism, or both punching and riveting mechanism, with a work support upon which is mounted clamping means, the work support together with the clamping means being movable relatively to the punching mechanism or riveting mechanism, and punching and riveting mechanism, as the case may be.

The invention further consists in certain combinations of mechanisms and in the improved work support hereinafter set forth in the specification and particularly pointed out in the claims.

Referring to the drawings:

Figure 1 is a front elevation of my improved punching and riveting machine, certain parts being broken away to save space in the drawing.

Fig. 2 is a side elevation of the same as viewed from the right of Figure 1, also broken away.

Fig. 3 is a sectional plan taken on line 3—3 of Fig. 2, particularly illustrating the work support.

Fig. 4 is a sectional elevation taken on the line 4—4, Figure 1.

Fig. 5 is a sectional elevation taken on the line 5—5, Figure 1.

Fig. 6 is a plan view of one of the clamps and a portion of the work support upon which it is mounted.

Fig. 7 is a sectional elevation taken on line 7—7, Fig. 6.

Fig. 8 is a front elevation partly in section through the punching and riveting instrumentalities, showing the parts in the relative positions before the punching and riveting takes place.

Fig. 9 is a front elevation similar to Fig. 8 with the parts in the relative positions assumed thereby while the punching and riveting operations are taking place.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is the frame of the machine supported upon the column 11 and base 12. The frame 10 consists of an upper arm 13 upon which the punching and riveting mechanisms are mounted and of another arm 14 upon the front end of which the punch block and anvil are supported, together with a portion of the work support.

Punching and riveting instrumentalities.

The punching and riveting instrumentalities are both driven from a main driving shaft 15 which has a pinion 16 fast thereto meshing into a gear 17 which is loosely mounted upon a shaft 18 but which can be locked thereto in a manner well known to those skilled in the art by a clutch 19 operated by means of a clutch lever 20, link 21, lever 22, link 23 and treadle 24 pivoted at 25 to the rear of the column 11, the treadle being moved upwardly by means of a spring 26 and downwardly by the foot of the operator.

The shaft 18 has a face plate 27 fast thereto upon which is a crank pin 28. A connecting rod 29 is pivotally mounted upon the crank pin 28 at one end and at its other end is connected by a pin 30 to a lever 31 pivoted at 32 to the frame of the machine and having an arm 33 thereon with a rounded end 34 which projects into a sliding block 35 slidably mounted in a vertical slide 36 whereby a reciprocatory movement is imparted to said slide 36. The slide 36 is the main slide and operates two auxiliary slides, namely, the rivet slide 37 and the punch slide 38. The rivet slide 37 may be locked to the main slide 36, when so desired, by means of a bell crank lever 39, pivoted at 40 within the rivet slide 37 and having an arm 41 thereon which has a rounded end projecting into a locking pin 42 slidably mounted in the rivet slide 37 and adapted to be moved into a recess 43 in the main slide 36, or into a recess 44 in a cap 45 fast to the frame of the machine. Thus the lever 39 may be operated to lock the rivet slide 37 to the main slide 36, whereupon a reciprocatory movement will be imparted to said rivet slide, or the rivet slide may be unlocked from the main slide 36 and locked to the cap 45 when it is desired to hold the same in a stationary position. A rivet driver 46 is fastened to the lower end of the rivet slide 37 and coacts with a rivet carrier 47 to feed and drive rivets through the material and clinch them against an anvil 48, in a manner well known to those skilled in this art. The anvil 48 is supported upon the arm 14. The rivet carrier or pocket 47 is made in two parts and is carried by a rivet carrier slide 49, which is pushed downwardly by the rivet carrier slide 47 and driver 46 and is carried upwardly by a spring 50. The punch slide 38 may be locked to the main slide 36 in a manner similar to that hereinbefore described, whereby the rivet slide is locked to the main slide.

Referring to Fig. 5, a bell crank lever 51 is pivoted at 52 to the punch slide 38 and has an arm 53 thereon with a rounded end 54 projecting into a locking pin 55 which can be operated by said lever 51 to enter a recess 56 in the slide 36, or to enter a recess 57 in a cap 45 fast to the frame of the machine. The locking pins 42 and 55 are of such a length that they may be positioned entirely within the slides 37 and 38 respectively and not project into the recesses 43 and 44, or 56 and 57, and at such a time the said slides 37 and 38 are held stationary by spring actuated friction plugs 59 and 60 respectively. The slide 38 is held in its upward position when the locking pin is being shifted by a spring 38′, the lower end of which is connected to a pin 39′ which is fast to the slide 38 and engages the arm 13, thus forming a stop to limit the upward movement of the punch slide. When the plug 42 is in its midway position the slide 37 may be lowered to bring the driver 46 into contact with the sheet material to position the same, or the punching slide 38 to bring the punch 61 into contact with the sheet material. The punch 61 co-operates in the punching operation in the usual well-known manner with a punch block 62 which is supported upon the front end of the arm 14. The punch block is provided with a passage 63 through which the pieces punched from the sheet material pass downwardly and through a passage 64 provided in said arm 14.

In order to strip the material from the punch during the upward movement of the same, a stripper 65 is provided through which the punch projects, said stripper being fastened to a slide 66 mounted to slide in ways in the front end of the arm 13. The said slide is pushed downwardly by the punch slide 38 and is carried upwardly by a spring 67, one end of which is fastened to a stationary pin 68 fast to a stationary cap 45′ and the lower end of which is connected to a bell crank lever 69 pivoted to a bracket 69′ fast to the slide 66. The bell crank lever 69 when in the position illustrated in Fig. 4 limits the distance to which the stripper can move upwardly sufficiently to allow space for the sheet material to be fed during the several punching and riveting operations. When, however, it is desired to insert the sheet material in the machine or to remove it therefrom, the lever 69 is operated to allow the stripper to move upwardly to the position illustrated in Figs.

1 and 2 by tipping the bell crank lever 69 downwardly and allowing the spring 67 to pull the slide 66 and the punch stripper with it upwardly so as to give greater space between the stripper and the punch block for inserting the material to be punched and riveted, or for removing the same from the machine after it is punched and riveted.

Rivets are supplied to the rivet carrier 47 from a hopper 70, Figs. 1 and 2, the movable member of which is driven by a belt 71 and by a pulley 72 on the shaft 18. The rivets pass down the raceway 73 and are fed to the carrier in a manner well known to those skilled in the art.

A work support 74, upon which material is placed and positioned relatively to the punching and rivet setting instrumentalities, comprises an upper slidable member 75 and a lower slidable member 76. The upper slidable member is slidable forwardly and backwardly on the machine between the arms 13 and 14 and upon the lower slidable member 76, and the lower slidable member is slidable from one side to the other of the machine between the arms 13 and 14, the two members 75 and 76 together forming the complete work support 74. The lower slidable member 76 consists of a pair of parallel rods 77 extending forwardly and backwardly of the machine and joined together by flat strips 78 and 79. The flat strip 78 is fastened at its opposite ends to the rod 77 by brackets 80 and the flat strip 79 is fastened to the rods 77 by brackets 81, so that the lower member 76 of the work support comprises a rectangular frame consisting of the two end rods 77, the front strip 78, the rear strip 79 and the brackets 80 and 81. This lower slidable member 76 of the work support is supported at its front end by a roll 82 journalled upon a bracket 83 fast to the strip 78 and mounted to roll upon a bracket 84 fast to the arm 14. The brackets 81 are U shaped in form and between the legs of the U's are mounted guide rolls 85 and 86 which engage a stationary rod 87 extending transversely of and fast to the frame 10.

The upper slidable member 75 of the work support consists of a rectangular frame formed of flat strips 88 and 89 extending transversely of the frame 10 and fastened to strips 90 and 91 fast thereto and extending longitudinally of the arms 13 and 14. Auxiliary strips 92 and 93 extending approximately parallel to the strips 90 and 91 form in effect a portion of the upper slidable member 75. The upper slidable member 75 is slidably mounted upon the rods 77 of the lower slidable member 76 by means of inverted U-shaped brackets 94, 95, 96 and 97. The brackets 94, 95 and 96 are alike and each has rotatably mounted thereon a guide roll 98 and these rolls are mounted to roll upon the rods 77. The bracket 97, see Figs. 8 and 9, is also U shaped and has a roll 99 rotatably mounted thereon. The bracket 97 has the opposite legs 100 thereof projecting downwardly on opposite sides of the rods 77 at the right of the machine and a screw 101 having screw-threaded engagement with one of said legs is adapted to clamp the two legs 100 against opposite sides of said rod 77 to fix the upper slidable member 75 of the work support in a stationary position relatively to the lower slidable member 76.

The lower slidable member 76 of the work support is locked in position by a locking pin 102 which is slidably mounted in the front end of the arm 14 and is operated by means of a bell crank lever 103 pivoted at 104 to a bracket 105 fast to said arm 14. A rod 106 connects said bell crank lever to a treadle 107 pivoted to a bracket 108 on the base 12 and a spring 109 draws the treadle 107 and rod 106 upwardly to tip the bell crank lever 103 in the proper direction to move the locking pin 102 toward the right, Fig. 2, and into any one of a series of holes 110 provided in the strip 78. Thus it will be seen that the upper slidable member 75 and the lower slidable member 76 of the work support may be positioned independently of each other relatively to the punching and rivet setting instrumentalities and locked in position.

The work in this particular instance consisting of a sheet of material 111 and a sheet of material 112 to be fastened together by rivets. These two sheets of material are placed upon the upper slidable member of the work support as illustrated in Figs. 8 and 9, the left hand sides of said sheets of material resting upon the strip 92, the right hand sides resting upon the strip 93. The right hand edges abut against gauges forming a part of clamps 113, two of which are provided and each of which consists of the following instrumentalities:—A bracket 114 has a horizontal base plate 115 which is fastened by screws 116 to the underside of the strip 91 and has a vertical flange 117 thereon to which an adjustable frame 118 is fastened by means of screws 119 and 120 which project through a slot 121 provided in the vertical flange 117 of the bracket 114.

The frame 118 consists of a horizontal base plate 122 and two parallel vertical flanges 123 spaced apart from each other to receive a clamping lever 124 which is pivoted by means of a pin 125 to the vertical flanges 123. A clamp screw 126 has screw-threaded engagement with the rear end of the clamping lever 124 and its lower end bears against the plate 122 of the frame 118. The wooden strip 93 is cut out to receive a portion of the base 123 and as will be seen by reference to Figs. 6 and 7, the right hand edges of the pieces of sheet material 111 and 112

rest against the front edges 127 of the vertical flanges 123. It will be evident, therefore, that the vertical flanges 123 forming a part of the frame 118 constitute gauges to determine the distance of the right hand edges of the sheet material from the punching and rivet setting instrumentalities when the material is first placed upon the work support. This initial distance of the right hand edges of the sheet material may be varied by adjusting the frame 118 toward the right or left by loosening the screws 119 and 120 and sliding the frame 118 together with the clamping lever 124 toward the right or left as may be desired, and then tightening said screws. The distance to which this adjustment may be carried may be increased by entirely removing one of the screws 119 or 120.

The general operation of the mechanism hereinbefore specifically described is as follows:—Assuming the parts to be in the relative positions illustrated in Figs. 1 and 2, the two sheets of material 111 and 112 are placed upon the upper slidable member 75 of the work support, with the right hand edges thereof bearing against the edges 127 of the vertical flanges 123 of the frame 118. These two sheets of material are then clamped to the base 122 of the frame 118 by means of clamping levers 124 and clamp screws 126. A mark is made upon the sheet of material 111 for the first hole to be punched and the upper slidable member 75 of the work support is moved forwardly or backwardly, and the lower slidable member 76 of the work support is moved sidewise until the mark is brought beneath and in alignment with the punch 61, whereupon the upper slidable member 75 is locked to the lower slidable member 76 by tightening the screw 101 which clamps the legs 100 of the bracket 97 to the rod 77, Figs. 8 and 9. The upper slidable member 75 and the lower slidable member 76 of the work support are now locked together and are moved bodily together until the locking pin 102 drops into the first hole 110′ of the series of holes 110. While moving the work support as a whole toward the left or right, the locking pin 102 is kept out of engagement with any of the holes 110 in the strip 78 by the treadle 107, link 106 and lever 103, the lever being depressed by the operator and when it is desired to lock the work support rigidly in position by means of the locking pin 102, the operator releases the treadle 107, whereupon the spring 109 moves the said parts to cause the locking pin 102 to enter the hole 110′. In aligning the punch 61 with the mark for the first hole to be punched in the sheets 111 and 112, the said punch can be moved downwardly without operating the rest of the punching and riveting instrumentalities by moving the bell crank lever 51 downwardly until the locking pin 55 is disengaged from the slide 36 and is out of engagement with the cap 45. The punch 61 and its slide 38 can then be moved downwardly until the punch is in close proximity to the upper surface of the sheet 111 and thus the sheets can be very accurately positioned for punching the first hole.

The rivet slide 37 is locked to the cap 45 by moving the bell crank lever 39 downwardly from the position shown in Fig. 4 until the locking pin 42 enters the recess 44.

The operator after having positioned the sheets as hereinbefore described releases the slide 38 and allows it to move upwardly until the pin 39′ engages the arm 13, and the bell crank lever 51 is then operated to lock the main slide 36 to the punch slide 38 by means of the locking pin 55. The operator then depresses the treadle 24, which operates as hereinbefore described, to throw the clutch into operation and thus rotate the shaft 18 which through the link 29 will operate the lever 31 to impart a reciprocatory motion to the main slide 36. The slide 36 will first move downwardly carrying with it the slide 38 and during its downward movement will engage the stripper 65 and carry it downwardly to the position illustrated in Fig. 9, that is, in engagement with the upper surface of the sheet 111. The punch will at the same time perforate the two sheets of material 111 and 112. Upon the upward movement of the punch slide 38, the punch will be withdrawn from the sheet material and will pass upwardly into the stripper 65 and thus the material will be stripped off of the punch. The stripper will only move upwardly a short distance to the position illustrated in Fig. 8, further upward movement of the stripper and stripper slide being prevented by the vertical arm of the bell crank lever 69 engaging the lower side of the plate 45′. The operator releases the treadle 24 soon after depressing it and the clutch is automatically thrown out at the end of one rotation of the shaft 18 in a manner well known to those skilled in the art, and the different instrumentalities then come to a stop with the punching and riveting instrumentalities in the relative positions illustrated in Figs. 4 and 8.

The operator now disengages the locking pin 102 from the strip 78 by lowering the treadle 107 and moves the work support as a whole toward the right until the hole which has just been punched in the sheet material is brought into alignment with the rivet driver 46. He then throws the bell crank lever 39 upwardly to lock the main slide 36 to the rivet slide 37 as illustrated in Fig. 4. He then lowers the treadle 24 to operate the punching and rivet setting instrumentalities, as hereinbefore described, the punch punching a new hole and the rivet driver 46

driving a rivet through the hole previously punched in the sheet material, and clinching the same against the anvil 48, the punch and rivet driver and coacting parts all being shown in Fig. 9 as the new hole is being punched and the new rivet being set. The punching and rivet setting instrumentalities then move upwardly to the relative positions illustrated in Fig. 8 and the operator having meanwhile released the treadle 24, the machine comes to a stop. He then moves the work support toward the right again and punches a new hole and sets a new rivet in the same manner as hereinbefore described. Before the last rivet is set in any one line the punch is thrown out of operation by the lever 51 and pin 55.

When all of the rivets have been set in one line extending transversely of the arms 13 and 14, a new line of rivets is set by first releasing the locking pin 102 by depressing the treadle 107, then moving the work support as a whole toward the left, then releasing the clamp screw 101 to allow the upper slidable member 75 to be moved forwardly a distance equal to the distance between the two rows of rivets to be set, then locking the upper slidable member 75 to the lower slidable member 76 by means of the clamp screw 101 and then proceeding with the punching and rivet setting instrumentalities, as hereinbefore described.

When all of the rivets have been set in the sheets of material, the stripper 65 is released by lowering the bell crank lever 69 to disengage the vertical arm thereof from the cap 45', whereupon the spring 67 will move the stripper upwardly from the position illustrated in Fig. 8 to the position illustrated in Figure 1 and the work can then be easily removed from the machine.

The strips 92 and 93, it will be understood, rest upon the strips 88 and 89 of the upper member 75 and the strip 92 can be moved longitudinally of the strips 88 and 89 to any position desired, the same being recessed on its underside at its opposite ends to form shoulders which bear against the inner edges of the strips 88 and 89 and thus the strip 92 is positioned on said strips by frictional engagement of said shoulders with said strips. The strip 92 is positioned to bear against the left hand edges of said sheets 111 and 112 when the right hand edges of said sheets bear against the strip 93 and the strip 92 can be adjusted as hereinbefore described to accommodate sheets of different lengths.

In the mechanism hereinbefore described the work support is moved to space the holes and the rivets in one line by the operator, who moves the work support transversely of the driver and punch and longitudinally of the stationary rod 87 and strip 78 by hand. If it is desired to perform this feeding operation or movement of the work support transversely of the punch and rivet driver and longitudinally of the rod 87 and strip 78 automatically, it can be done by means of mechanism illustrated in Figs. 1, 2, 3 and 4 and consisting of a weight 127 which has a cord 128 fast thereto and extending upwardly therefrom over a pulley 129 rotatably mounted on the frame of the machine, said cord being fastened at its upper end to an eye 130 which is fastened to one of the brackets 80 to which the strip 78 is fastened, thus the weight 127 is connected to the lower member 76 of the work support 74 and its tendency is to feed said work support toward the right, Figure 1, when the same is released by the locking pin 102 being removed from one of the holes 110 in the strip 78.

As hereinbefore described, this release of the locking pin was accomplished by means of the treadle 107, link 106 and lever 103. In the automatic releasing of the work support, this is accomplished by means of an arm 131 which is fastened to the pivotal shaft 104 of the bell crank lever 103. The arm 131 is provided with a segmental slot 132 through which a pin 133 extends, said pin being slidable in the slot 132 and fastened to a link 134 which at its rear end is connected to a lever 135. The upper arm of the lever 135 is connected by a link 136 to a cam lever 137 pivoted at 138 to the frame of the machine. The arm 139 of the cam lever 137 has a cam roll 140 journalled thereon and engaging the periphery of the disc 27 which has a projection 141 thereon adapted to intermittently engage the cam roll 140 and rock the levers 137 and 135 to move the rod 134 in the direction of the arrow *b*, Fig. 2. This will impart a rocking movement to the arm 131 and through the pivotal pin 104 the bell crank lever 103 will be rocked to withdraw the pin 102 from one of the holes 110, thus releasing the lower portion of the work support and allowing the weight 127 to operate to move said work support toward the right, Fig. 1. The pin 102 will be immediately released as soon as the cam projecton 141 releases the roll 140 and the spring 109 will then operate the bell crank lever 103 to push the locking pin 102 into another one of the holes 110 as soon as it is brought into alignment with said locking pin by the weight 127. In order to keep the roll 140 in contact with the periphery of the disc 27, a spring 143 is provided, see Fig. 2, which is connected at one end to a pin 144 fast to the arm 14 and at the other end to a pin 145 on a collar 146 which is fastened to the rod 134.

The general operation of the mechanism for automatically moving the work support is as follows:—As the shaft 18 is rotated by the mechanism hereinbefore described, the cam projection 141 will engage the roll 140

and will rock the lever 137 and lever 135, as hereinbefore described, to remove the locking pin 102 from one of the holes 110. The work support will then be moved toward the right, Figure 1, as hereinbefore described, and will then be locked in position by the locking pin 102 which is released as hereinbefore described when the cam projection 141 is fast to the roll 140, and the locking pin 102 being thus released is forced into the next hole 110 in the strip 78 by the spring 109, link 106 and bell crank lever 103.

I claim:—

1. A machine for punching sheet material having, in combination, punching insrtumentalities including a punch, a stripper for said punch, a work support movable relatively to said punch and means mounted on said work support and movable therewith to clamp a plurality of sheets of material together and to said work support, a slide to which said punch is fastened, a slide to which said stripper is rigidly fastened, mechanism adapted to impart a reciprocatory motion to said punch slide, said punch slide being adapted to engage the stripper slide and impart a downward movement thereto and a spring connected to said stripper slide whereby an upward movement is imparted to said stripper.

2. A machine for punching sheet material having, in combination, punching instrumentalities including a punch, a stripper for said punch, a work support movable relatively to said punch and means mounted on said work support and movable therewith to clamp a plurality of sheets of material together and to said work support, a slide to which said punch is fastened, a slide upon which said stripper is mounted, mechanism adapted to impart a reciprocatory motion to said punch slide, said punch slide being adapted to engage the stripper slide and impart a downward movement thereto, a bell crank lever pivotally mounted on said stripper slide, a stationary member and a spring connecting said bell crank lever to said stationary member and a stop adapted to be engaged by said bell crank lever whereby the upward movement of said slide and stripper may be limited.

3. A machine for punching sheet material having, in combination, punching instrumentalities including a punch, a work support movable relatively to said punch and means mounted on said work support and movable therewith to clamp a plurality of sheets of material together and to said work support, and embodying a bracket fast to said work support, a frame adjustably mounted on said bracket, a lever pivotally mounted on said frame and a screw having screw-threaded engagement with said lever and engaging said frame whereby said lever may be tipped to perform the clamping operation.

4. A machine for punching sheet material having, in combination, punching instrumentalities including a punch, a work support movable relatively to said punch and means mounted on said work support and movable therewith to clamp a plurality of sheets of material together and to said work support and embodying a bracket fast to said work support, a frame adjustably mounted on said bracket and constituting an edge gauge for said sheet material, a lever pivoted to said frame and means to tip said lever to perform said clamping operation.

5. A machine for punching and riveting sheet material having, in combination, punching instrumentalities including a punch, rivet setting instrumentalities including a rivet driver, mechanism adapted to impart a reciprocatory motion to said punch and to said driver and means to disengage either said punch or said driver from said mechanism, a work support movable relatively to said punch and driver and means mounted on said work support and movable therewith to clamp a plurality of sheets of material together and to said work support.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ARTHUR R. HAVENER.

Witnesses:

FRANKLIN E. LOW,

HAZEL F. LA MUDGE.