(No Model.) 4 Sheets—Sheet 1.

E. SALTZKORN & L. NICOLAI.

MACHINE FOR RIVETING CARDBOARD.

No. 543,453. Patented July 23, 1895.

FIG. 1

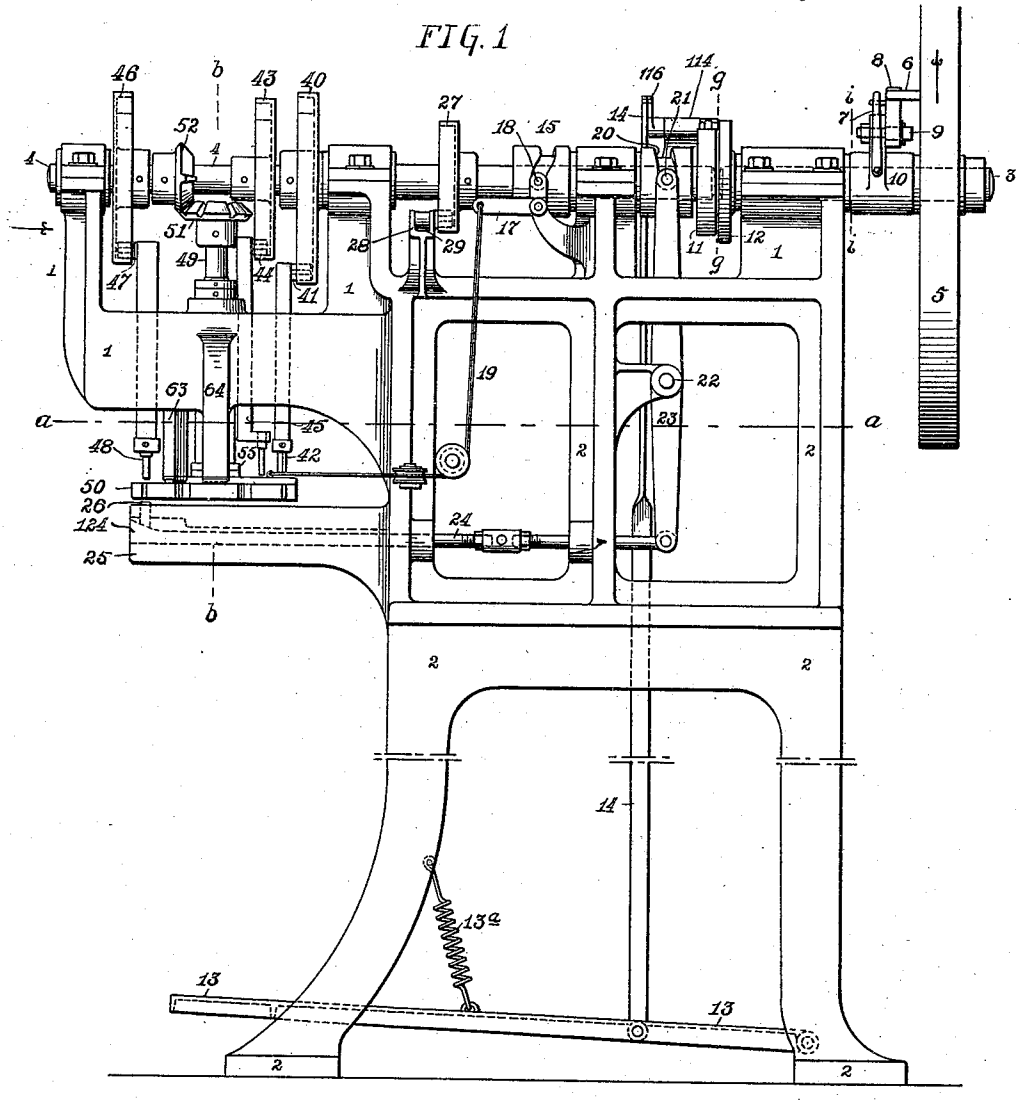
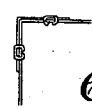


FIG. 21

FIG. 22



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Howard Pell.

(No Model.) 4 Sheets—Sheet 2.

E. SALTZKORN & L. NICOLAI.

MACHINE FOR RIVETING CARDBOARD.

No. 543,453. Patented July 23, 1895.

FIG. 2.

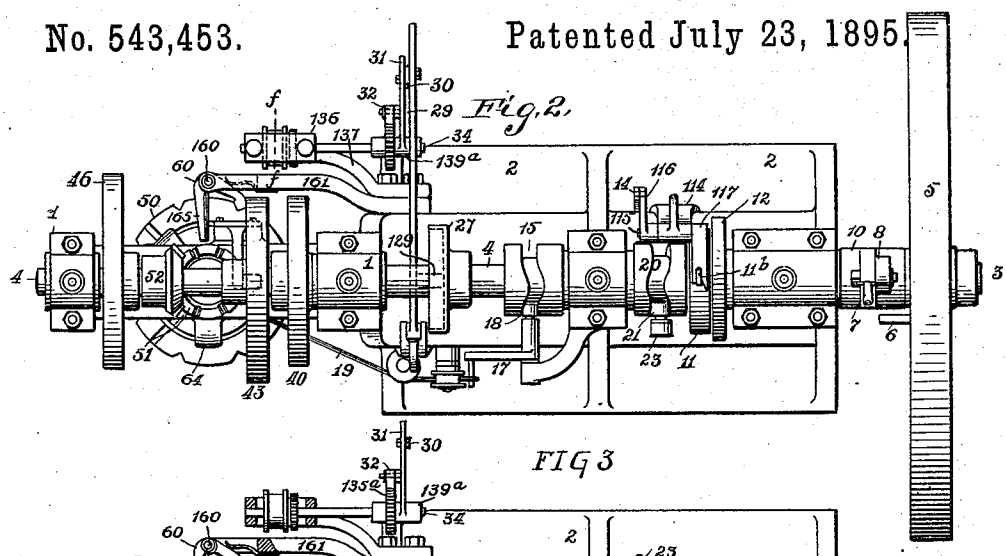


FIG 3

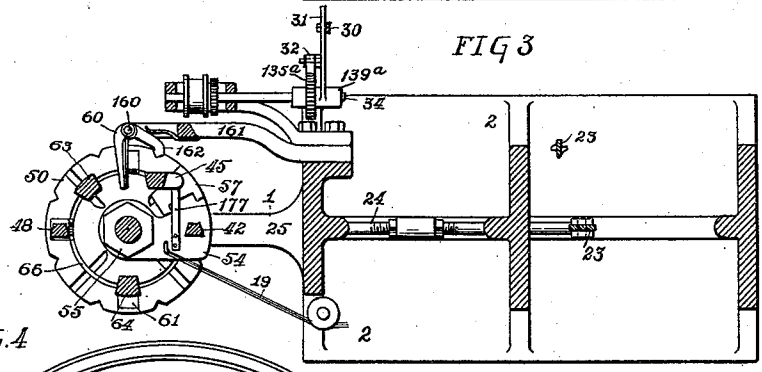


FIG. 4

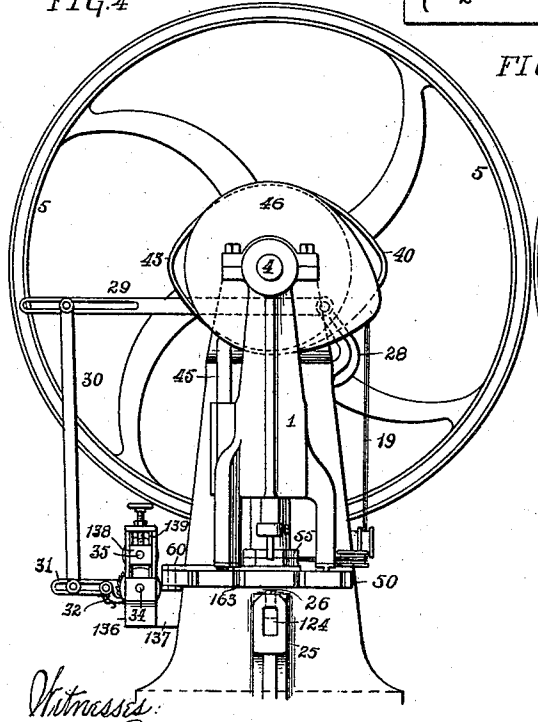
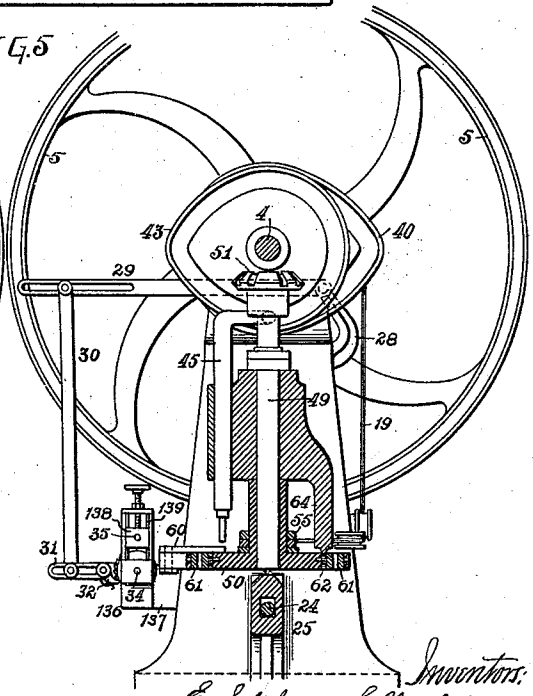


FIG. 5



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(No Model.) 4 Sheets—Sheet 3.

E. SALTZKORN & L. NICOLAI.

MACHINE FOR RIVETING CARDBOARD.

No. 543,453. Patented July 23, 1895.

FIG. 7

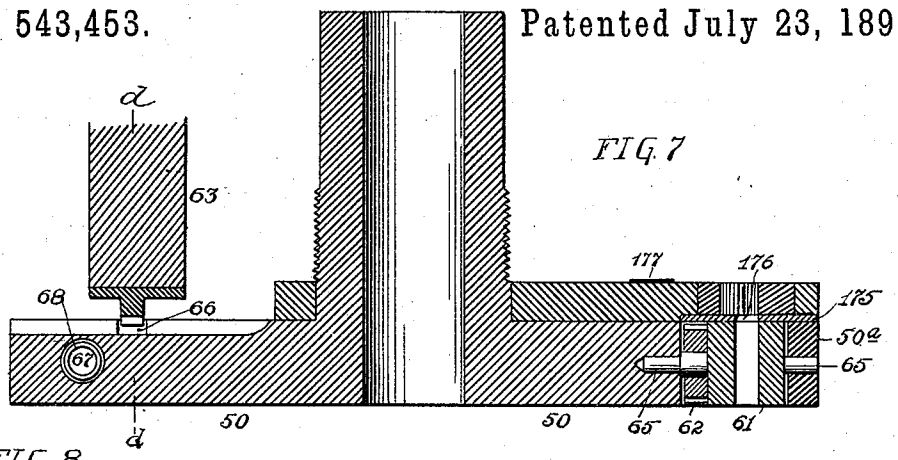

FIG. 8

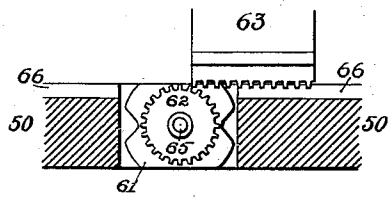

FIG. 6

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(No Model.) 4 Sheets—Sheet 4.

E. SALTZKORN & L. NICOLAI.

MACHINE FOR RIVETING CARDBOARD.

No. 543,453. Patented July 23, 1895.

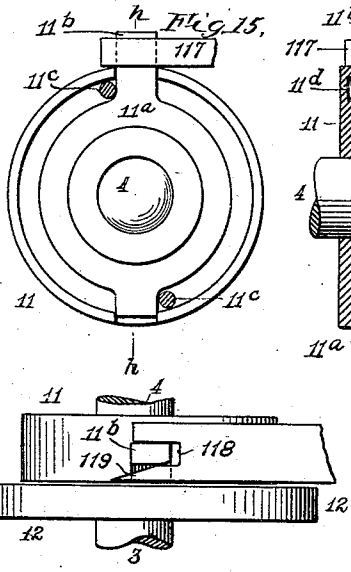


Fig. 15.

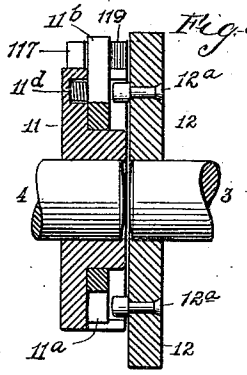


Fig. 16.

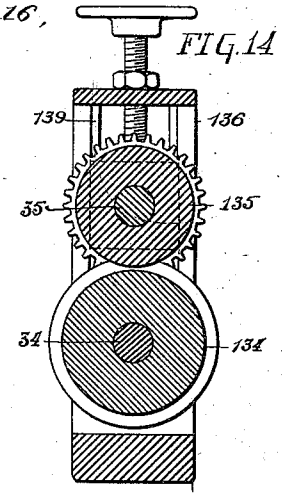


FIG. 14

FIG. 19

FIG. 19a

FIG. 20

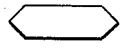


FIG. 20a

FIG. 9

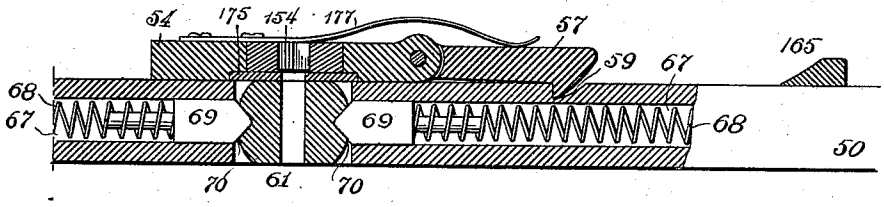


FIG. 10

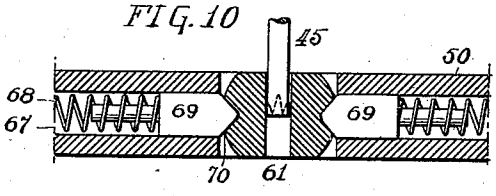


FIG. 11

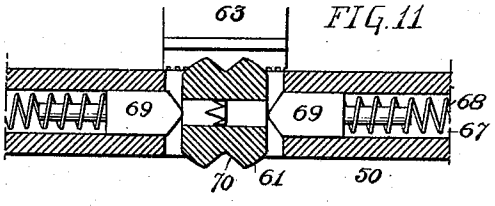


FIG. 12

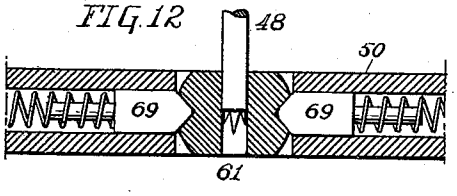
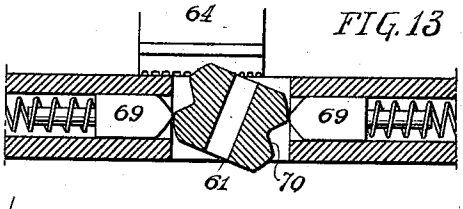


FIG. 13



Witnesses:
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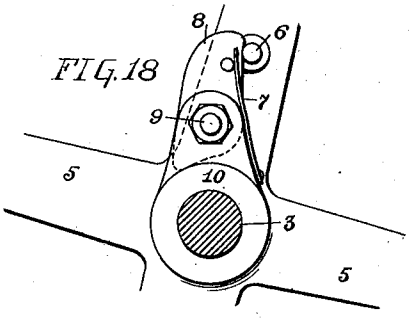
J. Henderson.

FIG. 18



Inventors:
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by their Attorney
Howard Pellett.

UNITED STATES PATENT OFFICE.

EMIL SALTZKORN AND LUDWIG NICOLAI, OF DRESDEN, GERMANY.

MACHINE FOR RIVETING CARDBOARD.

SPECIFICATION forming part of Letters Patent No. 543,453, dated July 23, 1895.

Application filed March 3, 1893. Serial No. 464,630. (No model.) Patented in Germany February 14, 1893, No. 70,554; in England February 15, 1893, No. 3,418; in France February 20, 1893, No. 228,063; in Belgium February 22, 1893, No. 103,576, and in Austria-Hungary July 5, 1893, No. 10,100 and No. 25,576.

To all whom it may concern:

Be it known that we, EMIL SALTZKORN and LUDWIG NICOLAI, subjects of the King of Saxony, residing at Dresden, Saxony, in the German Empire, have invented a certain new and Improved Machine for Riveting Cardboard, Leather, &c., (for which we have obtained Letters Patent as follows: in Germany, No. 70,554, dated February 14, 1893; in Great Britain, No. 3,418, dated February 15, 1893; in France, No. 228,063, dated February 20, 1893; in Belgium, No. 103,576, dated February 22, 1893, and in Austria-Hungary, No. 10,100 and No. 25,576, dated July 5, 1893,) of which the following is a specification.

The object of this invention is to provide a machine by means of which a great variety of materials—such as cardboard, leather, fabric, and the like—may be joined by metallic staples or rivets, the machine being so constructed as to manufacture the metallic staples or rivets and feed them to the riveting points as required.

The principal object of the invention is to devise a machine which may be utilized in the manufacture of cardboard boxes for joining together the meeting edges of the sides or walls of such boxes, although it may be used for various other purposes as well—such, for example, as the securing together of a number of sheets of paper, cardboard, or other material, or for joining together the edges or surfaces of plates, sheets, washers, bands, or other articles made of sheet material of any kind.

In the accompanying drawings, Figure 1 is a side elevation of a machine constructed in accordance with our invention. Fig. 2 is a plan view of the same. Fig. 3 is a sectional plan view on the line *a a*, Fig. 1. Fig. 4 is an end elevation looking in the direction of the arrow, Fig. 1, the base of the machine being omitted. Fig. 5 is a transverse sectional elevation on the line *b b*, Fig. 1. Fig. 6 is a sectional plan view illustrating, on an enlarged scale, the staple carrying and forming disk in the position shown in Fig. 3. Fig. 7 is a transverse sectional elevation on the line *c c*, Fig. 6. Fig. 8 is a partial transverse sectional elevation on the line *d d*, Fig. 7, illustrating a detail of construction. Fig. 9 is a sectional elevation on the line *e e*, Fig. 6, showing one of the staple or rivet dies. Figs. 10, 11, 12, and 13 are views illustrating in similar manner the different positions assumed by the die-block at different stages of its travel. Fig. 14 is a transverse sectional elevation on the line *f f*, Fig. 2, illustrating, on an enlarged scale, the construction of the feeding-rollers. Fig. 15 is an enlarged sectional elevation on the line *g g*, Fig. 1. Fig. 16 is a sectional elevation on the line *h h*, Fig. 15. Fig. 17 is a plan view of the parts illustrated in Fig. 16. Fig. 18 is a sectional elevation on the line *i i*, Fig. 1. Figs. 19 and 19ª show one of the staples or rivets before and after being bent up into form. Figs. 20 and 20ª are similar views of another form of rivet; and Figs. 21 and 22 represent the manner in which such rivets or staples are applied at the corners of a box, either directly at the angle formed by the junction of two walls or on the two adjoining sides or walls.

The operating parts of the machine are supported upon a suitable framework 1 2, the portion 1 being provided with a series of bearings in which are supported two shafts 3 4, having their axes coincident and their abutting ends being provided, respectively, with clutching or coupling disks 12 and 11, which may be thrown into or out of contact, as desired, by means of a treadle 13, connected to them by a link or connecting-rod 14.

The face of the disk 11 is hollow and is adapted to receive a ring 11ª, having a projecting tongue 11ᵇ, extending beyond the periphery of the disk, and is compelled to rotate with the same by pins 11ᶜ, projecting from the face of the disk. The disk 12 has pins 12ª, which engage with the ring 11ª when the latter is moved toward said disk by the action of the spring 11ᵈ in the disk 11.

The clutching of the disks is governed by a pedal 13, fulcrumed to the frame and normally held up, with the disks separated, by a tension-spring 13ª. At a point on the framework to one side of the disks is a bracket 114, in the upper portion of which is formed a bearing for a shaft 115. On one end of this shaft is an arm 116, having its outer end connected by a rod 14 to the pedal, and on the opposite end of said shaft is an arm 117, having on one

end a recess 118, adapted to receive the projecting tongue 11^b, as shown in Fig. 17. The side of the recess 118 nearest the disk 12 has an inclined face 119, which may act as a wedge to force the tongue 11^b to the inoperative position shown.

In the operation of the machine the depression of the pedal 13 will cause the raising of the arm 117 and leave the tongue 11^b free, so that the ring 11^a may, under the action of the springs 11^c, be moved into contact with the pins 12^a of the disk, and so turn the shaft 4 and effect the movement of the operating parts of the machine.

To disconnect the shaft it is merely necessary to remove the pressure on the pedal, when the spring 13^a will move it to the position shown in Fig. 1, and the arm 117 will then fall with its inclined face 119 directly in the path of the tongue 11^b, and as the disk 11 rotates said tongue will engage on the inclined face and will be directed into the recess 118, in which position the ring 11^a will be out of engagement with the pins 12^a.

The necessary driving motion is imparted to a belt-wheel 5, mounted loosely upon the shaft 3 and provided with a pin 6, projecting laterally from the face of the wheel and adapted to engage a pawl 8, fulcrumed at 9 to a projecting lug formed integral with a sleeve or hub 10, rigidly secured to the shaft 3. The pawl 8 is movable in one direction only and is normally held up in such position as to be engaged by the pin 6 by a spring 7, and when the belt-wheel is rotating in the direction indicated by the arrow, Fig. 1, the contact of the pin 6 with the pawl will effect a corresponding rotative movement of the shaft 3. If by accident the belt-wheel 5 be rotated in the opposite direction injury to the operating mechanism is avoided, as the pin 6 will in such event depress the pawl 8 against the action of the spring 7 without rotating the shaft 3.

In suitable bearings at the front of the machine is mounted a shaft 49, carrying at its lower end a disk 50, in which are a number of dies 61—four in the present instance—each of precisely the same construction and each removable, so that dies of different shape or size may be substituted for the manufacture of different staples or rivets.

Each die 61 comprises a substantially rectangular block having a central staple-receiving chamber extending entirely through the block, and in which the staples or rivets are bent into form and retained in position until the die has been traveled to the point where the staple is to be driven into the material being acted upon. Projecting latterly from the opposite sides of each block 61 are pivot-pins 65, adapted one to a suitable opening formed in the body of the disk 50 and the other in a removable plate 50^a, secured to the periphery of the disk in such manner that it may be readily removed when access is to be had to the die-block, or the latter is to be repaired or replaced by one of different size or shape. On one of the pivot-pins of each block is secured a gear or friction wheel 62, the teeth of which project somewhat above the bottom of a groove 66, formed in and concentric to the periphery of the staple-carrying disk, and such teeth being adapted to engage with and be rotated by teeth provided upon depending blocks 63 and 64, carried by the frame 1.

Near the periphery of the disk 50 is a channel 67, formed concentric with such periphery and provided with a series of four coiled springs 68, the opposite end of each spring being adapted to force a locking or retaining dog 69 into recesses 70, formed in the opposite sides of each die-block 61 and serving to normally retain the latter in proper position.

On the hub of the disk 50 is loosely mounted a collar forming part of a die-carriage 54, and held in position by suitable nuts 55 in such manner as not to interfere with the movement of the carriage during its travel. In the carriage is secured a die-block 154, of any suitable size, and having formed therein a female blank-forming die of a contour corresponding to the shape of the staple or rivet being manufactured, and the male cutting-die being of corresponding shape and operated at predetermined intervals to cut from a strip of metal blanks for the manufacture of the various staples or rivets as they are used by the machine.

The bottom of the female die is formed by a plate 175, which may be integral with the carriage 54, or separate, as shown. This plate 175 has an opening 176 of the same diameter as the openings in the die-blocks 61, and the staple-blank contained in the female die is forced through such opening by the forming-die and is received by the die-blocks 61, each block receiving one staple in its proper turn. At one side of the carriage 54 is hinged a plate 57, having one of its edges curved in hook-like form and adapted to engage successively in radially-arranged slots or grooves 59 in the upper surface of the disk 50, so that as the latter is rotated it will carry with it the carriage 54 until such time as the hook-like plate is disengaged from the slot 59. The plate is normally held down in engagement with the radial slot by a spring 177.

The staple-carrying disk 50 receives a step-by-step movement through the medium of beveled gears 51 and 52, Figs. 1 and 5, the gear 51 being secured to the upper end of the shaft 49, and having eight teeth or grooves, with which engage alternately two teeth provided at diametrically-opposite points on the wheel 52, the latter being secured to and revolving with the shaft 4, so that four complete rotations of the shaft 4 are necessary to effect one complete rotation of the disk 50. During the intervals between the successive partial rotations of the disk 50 the latter is locked in position by means of a lever 60, fulcrumed at 160 to a fixed pin on a bracket 161,

projecting from the frame and having one of its arms 162 adapted to engage in a series of notches 163, arranged at equidistant points on the periphery of the disk 50, and the lever being held in engagement with any one of such notches by means of a spring 164, secured to the bracket 161. The opposite arm 165 of the lever 60 has an inclined edge facing the hook-like edge of the plate 57 and being on a radial line from the center of the disk, as is also the edge of the plate 57.

The operation of this portion of the mechanism is as follows: With the parts in the position illustrated in Figs. 1 and 6 the blank cutting-die 42 will first descend and cut from a sheet or strip of metal a rivet or staple blank of a character dependent upon the contour of the female die 154 in the carriage 54, forcing the blank down into contact with the plate 175, and with the blank still in position in the female die the disk 50 will be rotated one-eighth of a revolution by the engagement at the proper point of the wheels 51 and 52. The hook-like plate 57 of the carriage 54 is at this time in engagement with one of the radial slots or grooves 59 in the disk 50 and is carried with the disk as the latter rotates, the eighth part of a revolution being sufficient to move the female die 154 of the carriage 54 and one of the die-blocks 61 immediately beneath the forming-die 45. On the descent of the forming-die 45 the blank is forced from the female die 154 into the opening in one of the blocks 61, the pointed ends of the staple or rivet being bent upwardly, Fig. 10, and the central or body portion extending entirely across the die-chamber, as shown. During this movement the disk 50 has been locked in position by the engagement of the arm 162 of the lever 60 with one of the eight peripheral notches 163 of the disk. When, however, the wheels 51 and 52 are again engaged and the disk started on a further movement the locking-arm 162 of the lever 60 will be forced out of the notch, causing its opposite arm to move toward the carriage 54, and the inclined face of this arm of the lever engaging with the hook-like edge of the plate 57 will lift the latter out of engagement with the slot or groove 59 against the action of the plate-spring 177, which normally holds the plate in engagement with the slot. The carriage is then free to move back to its initial position for the reception of another rivet or staple blank, and this movement is accomplished by means of a cam 15, to which is adapted an antifriction-roller 18, held on one end of a bell-crank lever 17, the opposite end of which is connected by a flexible cord or chain 19 to the carriage 54, the cam 15 being so timed as to effect the withdrawal of the carriage immediately after the hooked edge of the plate 57 has been disengaged from the slot 59.

The shaft 4 is provided with a series of grooved cams 40, 43, and 46, the cam 40 acting through an antifriction-roller 41 to effect the movement of the blank-cutting die 42, and the cam 43 acting through an antifriction-roller 44 to effect the movement of the staple-forming die 45. The cam 46 is located near the end of the shaft 4 and acts through an antifriction-roller 47 to effect the vertical movement of the ejector or driving-in stamp 48, the latter acting simultaneously with the blank-cutting die 42 and serving to force the formed rivet or staple from its position in the chamber of the die-block 61 into the material to be acted upon, the die-block 61 having previously rotated to the extent of half a revolution by the engagement of its pinion 62 with the fixed rack-teeth of the block 63, Fig. 11, so that when it reaches the ejector 48 the rivet or staple will have assumed a position (shown in Fig. 12) with its pointed ends extending in a downward direction. After the rivet or staple has been ejected the continued rotative movement of the disk 50 will bring the die-block under the block 64, and the fixed rack-teeth of the latter, Fig. 13, engaging the teeth of the pinion 62, will rotate the die-block until it assumes its initial position and is again ready to receive a second rivet or staple; or, if necessary, this further half rotation of the die-block may be omitted, as both sides of the die-block may be made of precisely the same construction, so that a rivet or staple may be driven into its receiving-chamber from either end.

Immediately below the disk 50 is a work-table 25, preferably detachable from the machine, so that the tables of different size and shape may be substituted for different classes of work. This table is provided on a line coincident with the center of the ejector 48 with a vertical recess, in which is guided an anvil 26, the lower or foot portion of which is supported on a block 124, having an upper inclined face and forming part of or connected to a rod 24, one end of which is connected to a lever 23, fulcrumed at 22 to the frame and at its upper end being provided with an antifriction-roller 21, adapted to a peripheral cam or groove in a cam 20, secured to the shaft 4, the cam being so timed that as the ejector descends the block 124 will be drawn backward and its upper inclined face will raise the anvil 26 and aid the ejector in bending down the pointed ends of the staple or rivet.

The rivets or staples are formed from a strip of suitable metal, which is fed in under the blank-cutting die 42 by two feed-rolls 134 135, mounted on shafts 34 35, adapted to suitable bearings in a frame 136, supported by a bracket 137, the bearings of the upper shaft 35 being formed by the blocks 138, adapted to guideways 139, and adjustable by means of screws 38 toward and from the lower roll. The shafts 34 and 35 are provided with intermeshing gear-wheels 36, so that both will rotate and positively feed the strip, and after each operation of the blank-cutting die 42 these rolls rotate a sufficient distance to feed the strip to an extent necessary for the manufacture of a single rivet or staple blank.

Motion is imparted to the shaft 34 by a cam

27, through the medium of a lever 29, fulcrumed at 28 to a bracket on a frame and provided with an antifriction-roller 129, adapted to the cam-groove, the opposite end of the lever being connected by a rod 30 to a lever 31, which latter has a loose sleeve 139ª surrounding the shaft 34 and carries a pawl 32, adapted to engage the teeth of the ratchet-wheel 135ª, secured to such shaft, so that the movements of the lever will act through the pawl and ratchet-wheel to rotate the shaft and pull the punched strip away from the blank-cutting die, a single rotation of the shaft 4 being sufficient to manufacture a single staple or rivet and a single rotation of the cam being sufficient to feed the strip a sufficient distance to bring a fresh portion of the strip beneath the blank-cutting die.

It is considered of course that certain unimportant changes may be made in the details of the machine herein described. Thus, for instance, another form of coupling may be used in place of the disk 11 and 12 described, or the number of cams may be lessened and their work accomplished by the remainder, or the apparatus, to guard against the reversal of direction of rotation of the apparatus, may be changed or even omitted altogether without departing from the spirit of our invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination of the die carrier, a die carried thereby, a blank forming die, a cutting die co-acting therewith, a forming die and means for moving such blank forming die alternately between the cutting die and the forming die, substantially as specified.

2. The combination of the die carrier, a staple receiving die carried thereby, a blank forming die, a cutting die co-acting therewith, a staple forming die, means for moving the blank forming die alternately under the cutting die and the forming die, an ejector, and mechanism for intermittingly moving the staple receiving die under the forming die and the ejector, substantially as described.

3. The combination of the staple-carrying disk, a pivoted die-block supported thereby, a blank-cutting die, a forming die, an ejector, devices for intermittingly revolving the staple-carrying disk, a carriage, a female blank-cutting die carried thereby, and means for moving such carriage between the blank-cutting die and the forming die, substantially as specified.

4. The combination of the die carrier, a pivoted die block carried thereby, a blank cutting die, a staple forming die, an ejector, an anvil co-acting with the ejector to clinch the ends of the staple or rivet and mechanism for intermittingly moving the die under the successive cutting and forming dies and ejector and means for turning the die on its axis, substantially as described.

5. The combination of the blank cutting die, the forming die, the ejector, with a rotated staple carrying disk, a series of die blocks carried by said disk, an independent female die for receiving the blanks, a carriage supporting the same and means for moving the carriage to present the female die alternately under the cutting die and the forming die, substantially as specified.

6. The combination of the blank cutting die, the female die co-acting therewith, a forming die, an ejector, with a rotated staple carrying disk, a series of pivoted die blocks supported thereby, mechanism for moving such disk intermittingly to present the die blocks in succession beneath the successive dies and ejector, and mechanism for rotating the die blocks on their axes, substantially as described.

7. The combination of the staple carrying disk, a series of dies supported therein, a female blank cutting die, a carriage on which the same is supported, and mechanism for moving the disk and carriage intermittingly and forming and ejecting dies, substantially as specified.

8. The combination of the staple carrying disk, a die block carried thereby, a swiveled carriage located above such disk, a female blank forming die carried by such carriage, mechanism for effecting the movement of the die block and the female blank forming die simultaneously, a forming die adapted to force the blank from the female die into the chamber of the die block and an ejector for removing the finished article from such die block, substantially as specified.

9. The combination of the staple carrying disk, a series of rotatable die blocks mounted therein, a pinion carried by each of such blocks, a forming die adapted to force within the chamber of such die, a staple or rivet, fixed gear teeth with which said pinion is adapted to engage, and an ejector adapted to force such staple or rivet from the die chamber after the die block has been partly revolved, substantially as specified.

10. The combination of the staple carrying disk, a series of pivoted die blocks mounted therein, devices for effecting the rotation of such die blocks, locking dogs adapted to engage with the recessed sides of such die blocks and springs acting upon such locking dogs to keep them in engagement with the die blocks, substantially as specified.

11. The combination of the staple carrying disk having near its outer edge an annular channel, a series of die blocks mounted in such disk at equal distances from each other, locking dogs provided in such channels and adapted to engage with the opposite recessed sides of the die blocks and coiled compression springs extending in such channel between adjoining locking dogs, substantially as specified.

12. The combination of the staple carrying disk, a series of independent die blocks mounted in such disks at equal distances

from each other, pinions provided one on each of such blocks, stationary gear teeth adapted to engage with such pinions and dies adapted to act in conjunction with such die blocks to produce staples or rivets, substantially as specified.

13. The combination of the female blank cutting die, a die acting in conjunction therewith, a swiveled carriage carrying such female die, a staple carrying disk, mechanism for intermittingly rotating the same, a series of die blocks pivotally mounted in such disk, pinions secured one to each of such die blocks, a forming die adapted to force the formed blank from the female die into the receiving chamber of one of such pivoted blocks, an ejector, and stationary gear teeth located between the forming die and the ejector and between the ejector and the cutting die, such gear teeth being adapted to engage with the said pinions and at each engagement effect a partial rotation of the die block, substantially as specified.

14. The combination of the female blank cutting die, a die as 42, acting in conjunction therewith, an oscillated carriage carrying such female die, a staple carrying disk, a die block pivotally mounted therein, a pinion secured to such die block, a series of radial grooves or slots in the face of such disk, a hooked plate pivoted to said carriage and adapted to engage in one of such radial grooves, a forming die adapted to force the formed blank from the female die into the receiving chamber of the pivoted die block, an ejector, stationary gear teeth located between the forming die and the ejector and adapted to engage the teeth of said pinion, mechanism for intermittingly rotating the disk, a bell crank lever fulcrumed to the frame and having one of its arms adapted to engage with and lock the disk between successive movements, the opposite arm of said bell crank lever extending into the path of the hooked plate and adapted to effect a disengagement of the latter from the radial groove or grooves of the disk and mechanism for effecting the return of the carriage to its initial position, substantially as specified.

15. The combination of the female blank cutting die, a die, as 42, acting in conjunction therewith, a carriage on which the female die is carried, a staple carrying disk, a series of pivoted die blocks mounted in such disk, a pinion secured to each of such die blocks, a hook-like plate pivoted to such carriage and adapted to engage in radial grooves or slots formed in the body of the disk, a spring normally tending to depress such plate, a forming die adapted to force the formed blank from the female die into the receiving chamber of one of such pivoted die blocks, an ejector, stationary gear teeth located between the forming die and the ejector and adapted to engage with the teeth of said pinions, devices for intermittingly rotating the disk, a bell crank lever fulcrumed to the frame and having one of its arms adapted to engage in locking notches formed in the periphery of the disk, and its opposite arm being inclined and extending into the path of the hook-like plate, a cam, 15, rotated shaft upon which such cam is mounted, a bell crank lever operatively connected to such cam, and a flexible cord or chain extending from one arm of such bell crank levers to the carriage and adapted to return the same to its initial position, substantially as specified.

16. A staple carrying disk, a die block, pivot pins formed on the opposite sides of such block and adapted, one to a recess formed in the main body of the disk, and the other to a removable plate, and a removable plate secured to the periphery of such disk, substantially as specified.

17. The combination of the female blank cutting die, a die, as 42, acting in conjunction therewith, a rotated shaft, 4, a cam thereon operatively connected to said die, 42, an oscillated carriage carrying such female die, a staple carrying disk, a series of dies carried thereby, a forming die, a cam mounted on such shaft, 4, and operatively connected to such forming die, an ejector, a cam mounted upon the shaft, 4, and operatively connected to such ejector, and means for intermittingly rotating the staple carrying disk, substantially as specified.

18. The combination of the rotated shaft, 4, a series of cutting, forming and ejector die bars, cams mounted upon said shaft and adapted to operate upon such die bars, a staple carrying disk, a shaft on which said disk is mounted, a bevel gear secured to such shaft and a mutilated gear secured to the shaft 4, and intermeshing with the teeth of such bevel gear, substantially as specified.

19. The combination of the supporting frame, a rotated shaft, 4, supported in suitable bearings therein, a shaft, 49, also mounted in bearings on said frame, a bevel gear, 51, secured to such shaft, 49, a mutilated gear, 52, secured to the shaft, 4, and meshing with the gear, 51, a disk, 50, secured to the lower end of the shaft, 49, a series of die blocks carried by such disk, a female blank cutting die, an oscillated carriage, 54, carrying such female die, a cutting die, 42, an ejector, 48, cams, 40 and 46 secured to the shaft, 4, and adapted to act simultaneously upon the die, 42, and the ejector, 48, respectively, a forming die, 45, a cam, 43, secured to the shaft, 4, and adapted to operate upon the forming die, substantially as specified.

20. The combination of a supporting frame, a rotated shaft, 4, supported in suitable bearings therein, a shaft, 49, also mounted in bearings in said frame, a beveled gear, 51, secured to the shaft, 49, a mutilated gear, 52, secured to the shaft, 4, and adapted to give a step by step rotative motion to the gear wheel, 51, a disk, 50, carried by the shaft, 49, a series of die blocks, 61, pivotally mounted in said disk, 50, pinions, 62, secured to each of

such die blocks, a female blank cutting die, a carriage, 54, swiveled on the shaft, 49, and carrying such female die, a die 42, adapted to act in conjunction with such female die, a cam, 40, for operating said die, 42, a forming die, 45, a cam, 43, adapted to operate upon the forming die, an ejector, a cam, 46, adapted to operate thereon, and stationary gear teeth 63, 64, adapted to engage with and turn said pinions, 62, substantially as specified.

21. The combination of the supporting frame, a shaft, 4, mounted in suitable bearings therein, a shaft, 49, also mounted in bearings in said frame, a beveled gear, 51, secured to the shaft, 49, a mutilated gear, 52, secured to the shaft, 4, and adapted to give a step by step rotative movement to the gear wheel, 51, the disk, 50 carried by the shaft, 49, a series of die blocks, 61, pivotally mounted in said disk, 50, a pinion 62, secured to each of such die blocks, a female blank cutting die, a carriage, 54, swiveled to the shaft, 49, and carrying such female die, a die 42, a forming die, 45, an ejector, 48, cams, 40, 43 and 46 secured to the shaft, 4, and adapted to operate respectively on the die, 42, forming die, 45, and ejector, 48, blocks 64 and 63, depending from the frame, stationary gear teeth provided upon such blocks and adapted to mesh with the teeth of the pinion, 62, a work table, 25, located beneath the disk, 50, an anvil, 26, vertically guided in said work table, an inclined supporting block for such anvil, a cam, 20, secured to the shaft, 4, and operatively connected to said inclined supporting block, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

EMIL SALTZKORN.
LUDWIG NICOLAI.

Witnesses:
RUD. SCHMIDT,
HERNANDO DE SOTO.