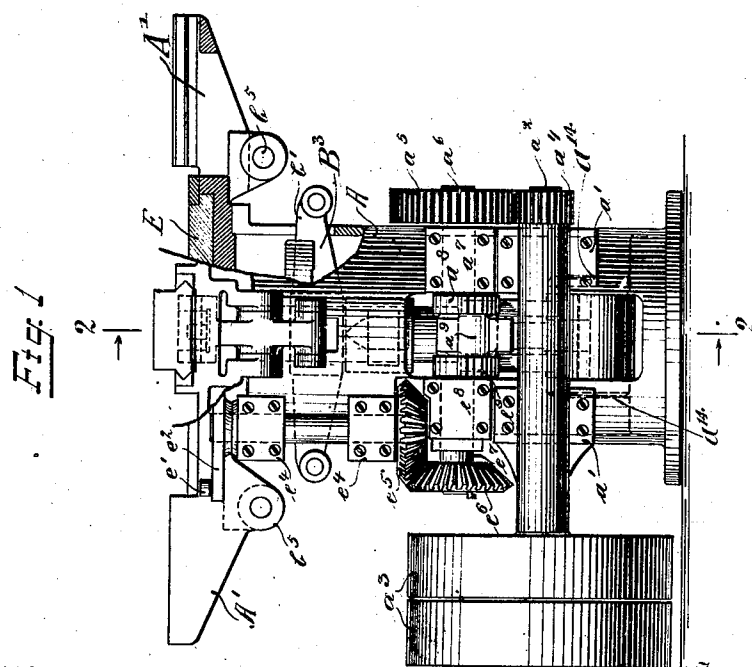
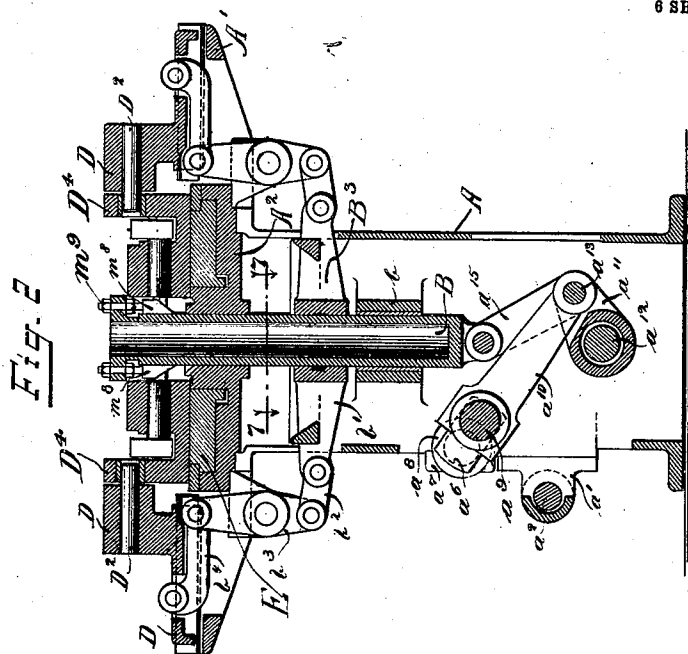


E. NORTON & L. C. KRUMMEL.
SHEET METAL WORKING PRESS.
APPLICATION FILED APR. 6, 1906.

941,806.

Patented Nov. 30, 1909.

6 SHEETS—SHEET 1.



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6 SHEETS—SHEET 2.

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Fig. 4

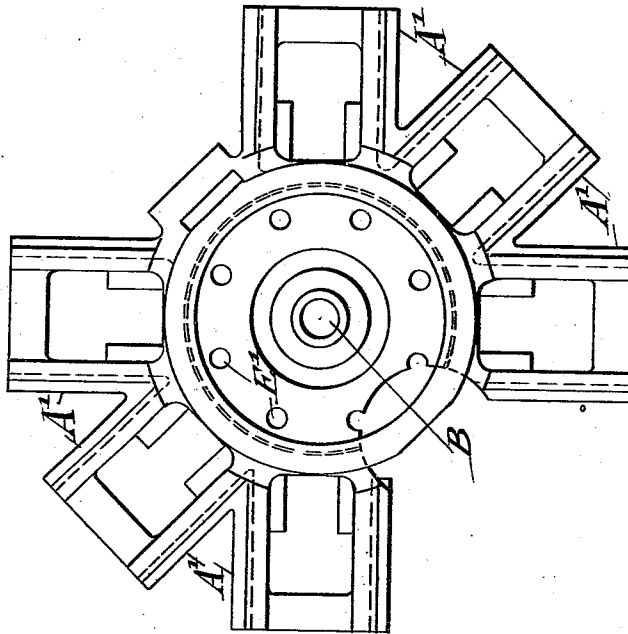
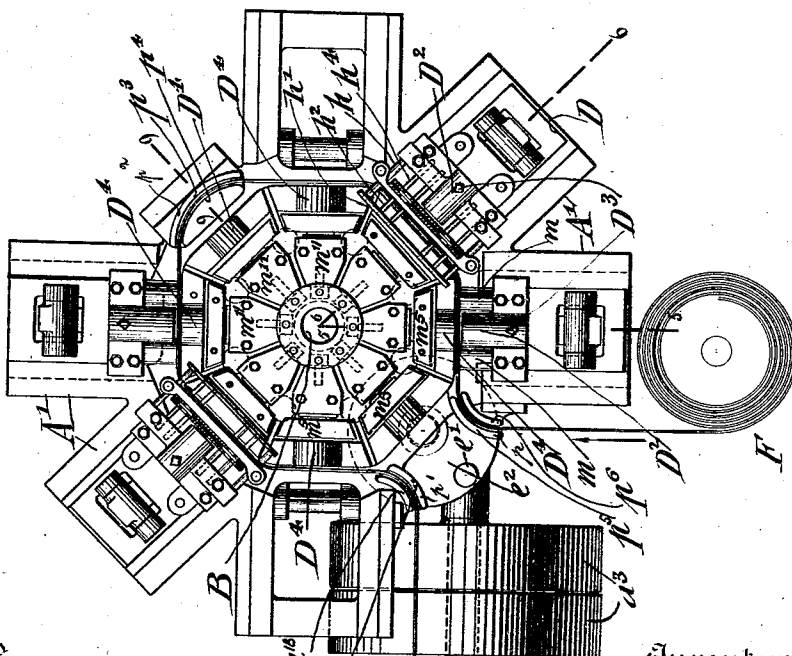


Fig. 3



Witnesses
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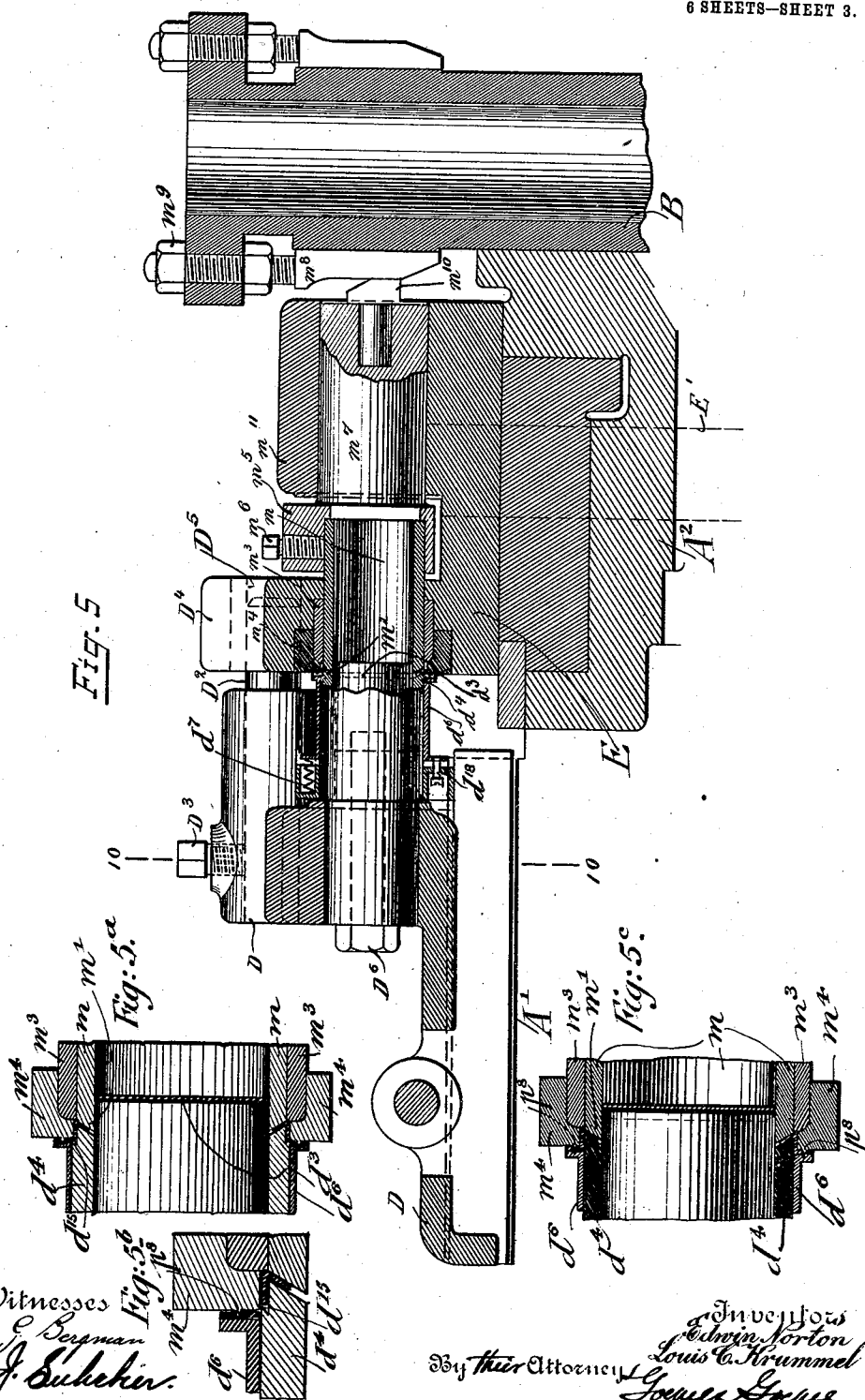
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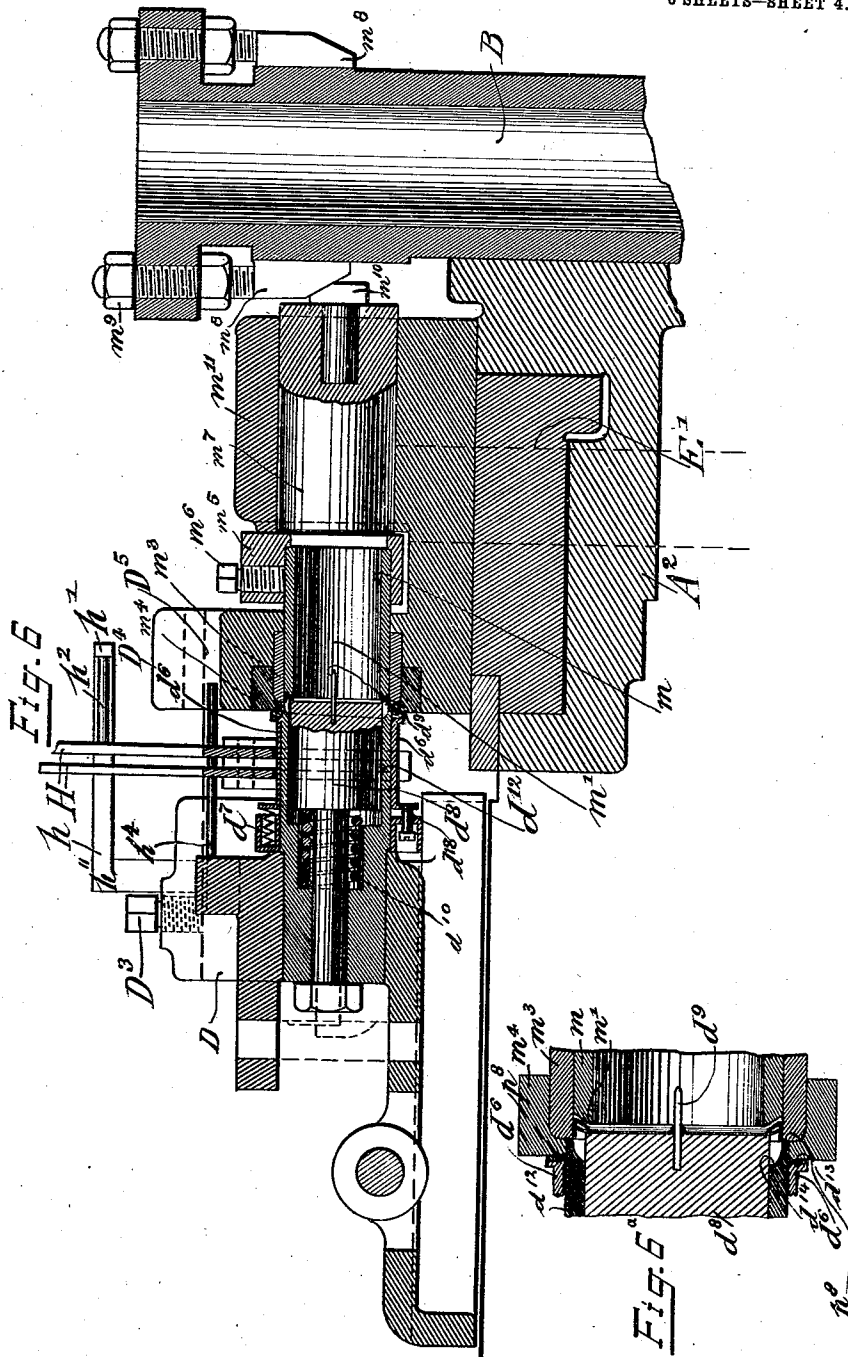
6 SHEETS—SHEET 3.

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941,806.

6 SHEETS—SHEET 4.



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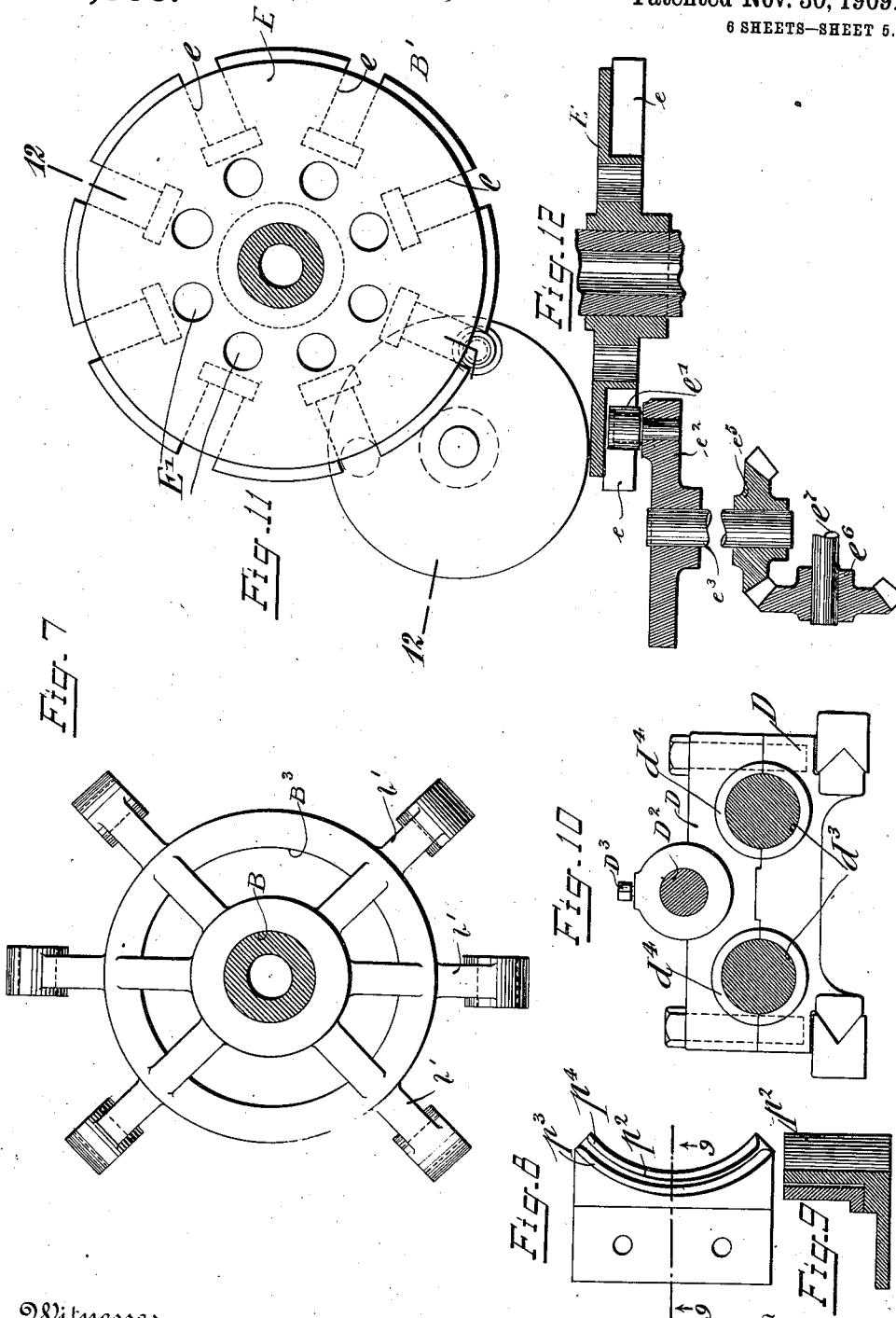
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6 SHEETS—SHEET 5.



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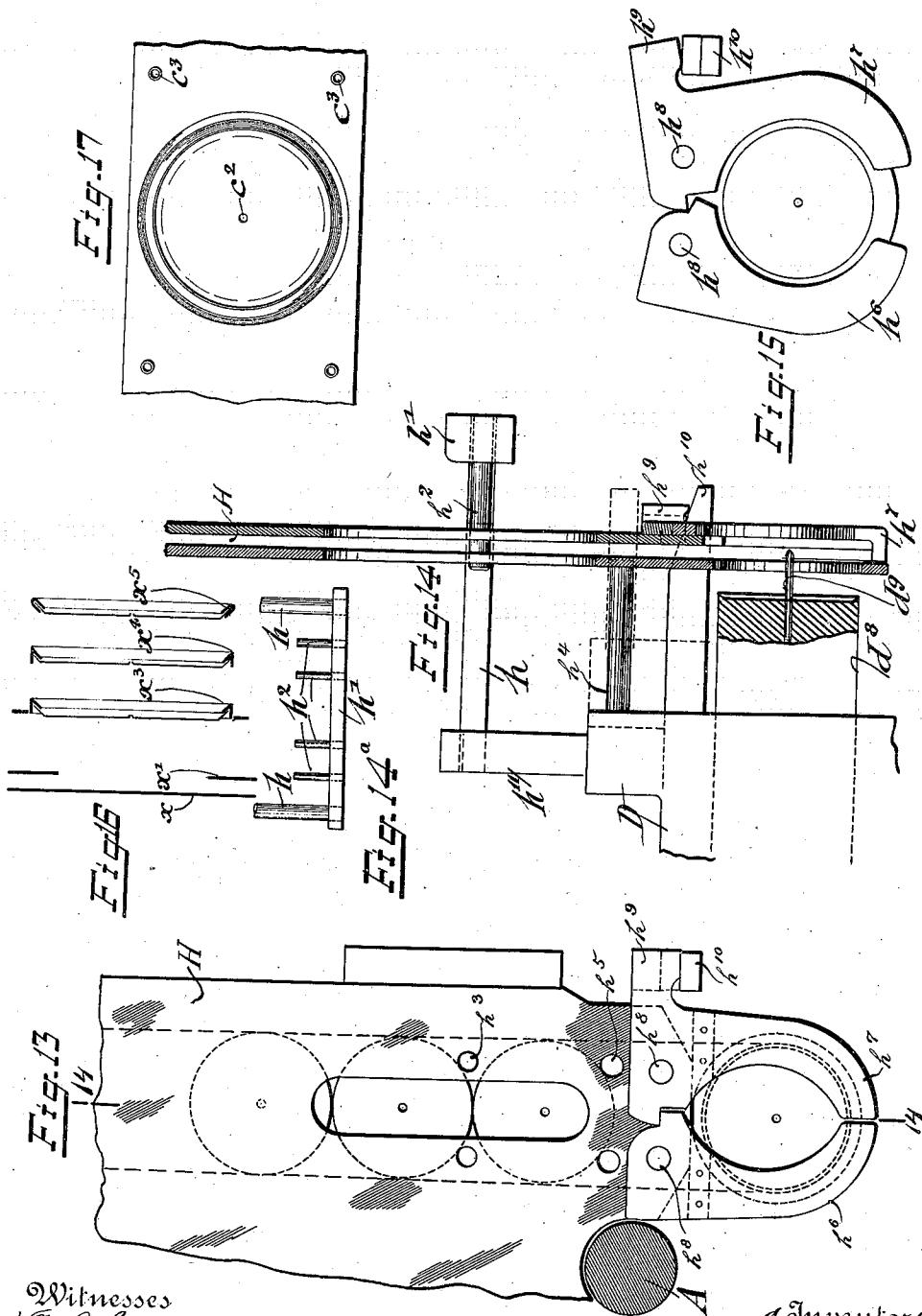
SHEET METAL WORKING PRESS.

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Patented Nov. 30, 1909.

6 SHEETS—SHEET 6.

941,806.



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UNITED STATES PATENT OFFICE.

EDWIN NORTON, OF NEW YORK, N. Y., AND LOUIS C. KRUMMEL, OF CLINTON, CONNECTICUT.

SHEET-METAL-WORKING PRESS.

941,806.

Specification of Letters Patent.

Patented Nov. 30, 1909.

Application filed April 6, 1905. Serial No. 254,184.

To all whom it may concern:

Be it known that we, EDWIN NORTON and LOUIS C. KRUMMEL, citizens of the United States, and residents of New York, borough of Manhattan, and State of New York, and of Clinton, county of Middlesex, and State of Connecticut, respectively, have invented certain new and useful Improvements in Sheet-Metal-Working Presses, of which the following is a specification.

This invention relates to sheet-metal-working presses, of that class to which a strip of sheet-metal is continuously fed to the press, worked upon, and from which, finished articles are made which are discharged from the machine.

The invention has for its object to provide a machine which is actuated by positive mechanism throughout, and which differentiates itself from those used hitherto in the fact that the strip of metal to be acted upon is fed to the machine without the aid of feed rollers commonly employed for that purpose.

The invention has further for its object, to provide a press which is automatic in its action in so far that when once set in motion, and the strip of metal and parts to be assembled continuously fed thereto, articles are produced of the desired shape without manual guidance whatever.

For this purpose the invention consists of a pedestal, supporting dies, a rotatable carrier having a plurality of dies, adapted to be brought in alinement with the dies of the pedestal, means for guiding the strip of sheet-metal placed intermediately between the dies, and means for reciprocating the plunger so as to actuate the dies.

The invention consists secondly, of dies of the first operation, adapted to punch a circular disk out of the strip of sheet-metal interposed between the same, and for forming a circular impression in said sheet immediately concentric to the hole so punched out and separating the circular part from the strip.

The invention consists thirdly, of means for feeding articles to the press adapted to be assembled with parts of the strip of sheet-metal fed to the press, for holding a single article in position, and then releasing the same.

The invention consists further of dies of

the second operation, adapted to cause the assembling and uniting of the circular rim of the strip cut out by the dies of the first operation with an article fed by suitable feeding means.

The invention consists further and lastly of certain novel features in the means for actuating the vertically reciprocating plunger; in the means connected therewith for actuating the dies; in the means for intermittently rotating the die carrier; in the means for guiding the strip of metal from the inlet end of the machine or press, to the outlet end tangentially to the dies of the carrier, so as to be interposed intermediately between the dies; in the means for securing the strip of sheet-metal to the rotatable die carrier so as to retain the strip of metal in exactly the same position relatively to the carrier throughout the operations to which the strip of sheet-metal is subjected; in the means for changing the position of the strip so that that part of the strip between that part acted upon by the dies of the first operation is interposed between the dies of the second operation so as to utilize fully all the material of the strip; and in the further novel features and combination of parts which will be more fully described herein-after and finally pointed out in the claims.

In the accompanying drawing Figure 1 represents a front view of our improved machine, Fig. 2 shows a vertical longitudinal section taken on line 2—2, of Fig. 1, Fig. 3 shows a plan view of our improved machine, Fig. 4 also shows a plan view with parts removed, Fig. 5 shows a vertical longitudinal section of the die and alinement plunger of the first operation taken on line 5—5, of Fig. 3, Fig. 5^a shows the die of the first operation on an enlarged scale, Fig. 5^b shows a detail view of Fig. 5^a, on a larger scale, Fig. 5^c shows a modified form of die of the first operation. Fig. 6 shows a vertical longitudinal section of the die and alinement plunger of the second operation, taken on line 6—6, of Fig. 3, Fig. 6^a shows the die of the second operation on an enlarged scale, Fig. 7 shows a plan view of the radial operating arms as seen from line 7—7, of Fig. 2, Fig. 8 shows a plan view of the intermediate support or guide-brackets for guiding the strip from which articles are to be stamped and for changing the position of the strip

relatively to the dies. Fig. 9 shows a vertical section of the same taken on line 9—9, of Fig. 8, or on line 9—9, of Fig. 3, Fig. 10 shows a vertical transverse section of the slide having an alinement plunger and a pair of dies, taken on line 10—10, of Fig. 5, Fig. 11 shows a plan view of the die carrier and the means for intermittently rotating the same, Fig. 12 shows a vertical section of Fig. 11 taken on line 12—12, of Fig. 11, Fig. 13 shows a front view of the hopper adapted to feed articles to jaws arranged at the lower end of the same and hold them separately in position between the dies of the second operation. Fig. 14 shows a vertical transverse section of Fig. 13 taken on line 14—14, of Fig. 13, Fig. 14^a shows a detail view of the yoke of the hopper supporting the guide-pins, Fig. 15 shows the jaws of the hopper in open position, Fig. 16 shows sections of the strip of metal, showing progressively the various stages of operation, and Fig. 17 shows a rear view of a portion of the sheet-solder after the first operation.

Similar letters of reference indicate corresponding parts.

Our improved press for cutting and stamping sheet-metal articles consists essentially of the following main parts: 1. The pedestal, for supporting the actuating mechanism and the stationary guide plate for the rotatable die carrier, provided with radial brackets for the slides carrying the alinement plungers and reciprocating dies. 2. A vertically reciprocating plunger located centrally of the pedestal, actuated by the operating mechanism and adapted to actuate the dies of the carrier and the slides with the alinement plungers, and reciprocating dies. 3. A carrier rotatable on the stationary guide plate, having dies each alike to the other in all respects. 4. Means for intermittently rotating the die carrier so as to bring one die after the other in alinement with, first, the reciprocating dies of the first operation and secondly the reciprocating dies of the second operation. 5. The reciprocating dies of the first operation. 6. The hopper for feeding singly articles in position between the dies of the second operation and holding the same in position. 7. The reciprocating dies of the second operation.

1 and 2. Pedestal and actuating mechanism.—Referring to the drawings and more particularly to Figs. 1 and 2, the pedestal A is securely supported, having at its upper end radially arranged supporting brackets A¹, in which slides D are movable. On the upper end of the pedestal A is secured the guide-plate A² in which the die carrier E is rotatable. To the lower exterior part of the pedestal A, brackets a¹ are arranged which support a driving-shaft a², one end of which is provided with pulleys a³ rotatable by means of any suitable transmission means.

The other end of the driving-shaft is provided with a pinion a⁴ which meshes with a gear wheel a⁵ secured to a shaft a⁶, supported by and rotatable in a bracket a⁷, secured to the pedestal somewhat above the bracket a¹. The free end of the shaft a⁶ is provided with a crank arm a⁸, to the crankpin a⁹ of which a pitman a¹⁰ is connected, the other end of which connects with a crankpin a¹³ of a crank a¹¹ secured to a rockshaft a¹², rotatable in and supported by bearings a¹⁴. Connected to the crankpin a¹³ of the crank a¹¹ is a link a¹⁵, the free end of which is connected to the lower end of a vertically reciprocating plunger B which is guided by a sleeve b secured to the interior of the pedestal and also by a central opening of the guide plate A² of the die carrier.

The upper end of the vertically reciprocating plunger B is provided with eight wedge shaped cams m^s, adjustable by nuts m^p. Four of these cams are of the same shape and the other four are of another shape they being so arranged that four of one shape alternate with the four of the other shape. The four of one shape are adapted to actuate the dies of the carrier brought in alinement with the reciprocating dies of the first operation and the four of the other shape are adapted to actuate the dies of the carrier brought in alinement with the reciprocating dies of the second operation.

Secured to the vertically reciprocating plunger B, intermediately between its upper and lower ends is a ring shaped part B³, shown in Figs. 2 and 7, having radial arms b¹, to the outer end of which are connected links b², the free ends of which are connected to one end of links b³ pivoted to brackets b⁵. The other ends of the links b³ are connected with links b³ the free ends of which are connected with the slides D. By the vertical to and fro movement of the plunger B, the slides D are caused to be moved horizontally to and fro, in the radial brackets A¹ of the pedestal A. The slides D are provided with alinement plungers D² and with dies reciprocating therewith to be more fully described hereinafter.

3 and 4. Rotatable die carrier.—The die carrier E is rotatable in the guide plate A² and, as shown in detail view in Figs. 11 and 12 is of circular shape and rotatable around the plunger B. It is provided at its lower part with radial slots or recesses e which are adapted to be engaged by a stud-wheel e¹ of a crank disk e² which is secured to a vertical shaft e³, rotatable in brackets e⁴ secured to the pedestal A. The lower end of the shaft e³ is provided with a beveled gear-wheel e⁵ meshing with a beveled gear-wheel e⁶ secured to a horizontal shaft e⁷ which is supported in a bracket e⁸, secured somewhat above the bracket a¹ to the exterior of the pedestal A. The free end of the shaft e⁷ is

provided with a crank e^0 , to the crankpin a^0 of which is secured the crank a^8 , so that by the driving of the pulleys a^3 and rotation of the driving-shaft a^2 , rotary motion is imparted to the crank disk e^2 . When the stud e^1 of the crank disk e^2 engages one of the slots or recesses e of the die carrier E, the continuing rotation of the crank disk causes the rotation of the die carrier, until the stud e^1 leaves its engaging slot e of the carrier E. The carrier then remains stationary and the crank disk e^2 continues its rotary motion until the stud e^1 of the crank disk e^2 , engages the next slot of the carrier whereupon the rotation of the carrier E is again accomplished. Hence by the rotation of the crank disk, with the intermittent engagement of its stud successively with each slot of the carrier, an intermittent rotary motion is imparted to the carrier E. The carrier E is provided with eight vertical supports D^4 , having openings D^5 adapted to be engaged by the alinement plungers D^2 of the slides D. At each side of the supports D^4 are arranged dies alike throughout in all their parts, so that the carrier shown in the drawings is provided with eight pairs of dies.

Each die of the carrier consists of a cutting die m having a hollow interior and its end m^1 beveled and sharpened so as to insure an efficient cutting edge. Concentric to this cutting die m is arranged a forming die m^3 , and concentric to this die m^3 is arranged a second or outer cutting die m^4 , adapted to serve as a forming die and as a cutting die. The forming die m^3 and the outer cutting die m^4 are permanently secured to the carrier, while the hollow cutting die m is movable in said die m^3 and is adjustably secured at its rear part to a yoke m^5 by means of a screw m^6 . To the yoke m^5 is secured a plunger m^7 movable in its casing m^{11} and provided with wedge shaped cams m^{10} adapted to be engaged by the wedge shaped cams m^8 of the plunger B, so that by the downward movement of the vertically reciprocating plunger B, a horizontal outward movement is accomplished.

The pedestal A is provided with six radial brackets, two of which are, for present purposes, not used, two are provided with reciprocating dies of the first operation and two with reciprocating dies of the second operation. Three of these radial brackets, one unused, one with a reciprocating die of the first operation and one with a reciprocating die of the second operation are arranged symmetrical to the other three, in such a manner, that the dies of the first operation are diametrically opposite each other, and the dies of the second operation diametrically opposite each other, reference being made to Fig. 3.

Exterior to the press is arranged a feed roll with a supply of the material to be used

and to be formed into articles of the desired shape. This material may be a strip of sheet-metal, as brass, copper, lead or solder.

Before the machine is operated the sheet of metal is fed into one end of the machine and caused to be arranged tangentially to all the dies of the carrier so as to be intermediately between the reciprocating dies and the dies of the carrier registering therewith. In order to insure the proper position and feeding of the sheet-metal strip, circular guide brackets are arranged one, p , at the inlet end of the machine, one, p^1 at the outlet end of the machine and one, p^2 , intermediately between the inlet and outlet guides of the machine, as shown in Fig. 3 and in detail in Figs. 8 and 9. The guide-brackets p and p^1 each consist of two circular upright walls p^5 and p^6 , and p^7 and p^{18} , respectively, concentric to each other and spaced some distance apart, between which the strip of sheet-metal passes, the curvature of the walls causing the strip to be guided tangentially to the dies of the carrier.

5. Reciprocating dies of the first operation.—By the intermittent rotation of the carrier, the sheet-metal strip is moved and so fed into one end of the machine and out of the other. As it is essential that the strip of sheet-metal be secured to the face of the carrier so as to prevent its displacement from the time it is subjected to the first operation to the time that it is subjected to the second operation, the face of the carrier is provided with a plurality of sharpened projections p^8 , which pierce the strip of sheet-metal and so hold it in position until after it leaves the second operation of the machine. Pressers d^6 may be provided which serve to hold the ends of the strip in position, during the stamping of the same, so as to prevent its buckling. It is essential that when a portion of the metal has been cut out from the strip by the action of the first set of dies, the strip will be securely carried forward to be acted upon by the remaining set of dies, or be extracted and discharged from the press, as the case may be. Instead of the means just described any other accomplishing the purpose set out, may be used, the essential feature being that after the sheet-metal strip or rim has been subjected to one operation, it remains in exactly the same position, until after being subjected to the second operation. The reciprocating dies of the first operation, arranged diametrically to each other, are alike to each other in all respects and but one will be described.

Referring more particularly to Fig. 5, the bracket A^1 is provided with slots in which the slides D are movable by means of the actuating mechanism secured to the shaft B. Each slide D is provided with a plunger D^2 adjustable by screws D^3 . The plunger D^2

serves to insure the alinement of the dies by engaging the opening D^5 of the support D^4 of the die carrier. At each side of each plunger D^2 , is arranged a reciprocating or male die, adapted to register and engage with the dies of the carrier or female dies in alinement therewith.

Each of the reciprocating active or male dies of the first operation consists of a circular cutting die d^2 , which enters the hollow interior of the cutting die m , said dies d^3 and m , being adapted to punch a circular disk out of the strip of sheet-metal interposed between them, and to force said punched out disk into the hollow interior of the die m . When the hollow interior of the die m becomes filled, each successive disk forced into the inlet end of the same, causes one or more disks to be discharged from the outlet end of the same, and to drop through openings E^1 out of the machine. Some distance from the end of the cutting die d^3 is arranged, a forming die d^4 which is provided with an inwardly beveled end, and which, in conjunction with the outwardly beveled end m^1 of the die m , is adapted to form a circular impression into the strip interposed between the registering dies, in such a manner that the impression resembles the letter V, one leg being inclined and formed by the beveled ends of the dies d^4 and m , and one leg being vertical to the strip itself and formed by the outer straight side of the male die d^4 and inner straight side of the female die m^4 . In order to prevent an upsetting of the ends of the strip of sheet-metal, pressers d^6 are provided, which are forced by means of springs d^7 against the ends of the strip of sheet-metal remaining after the circular disk is punched out of the same. The pressers d^6 are adjustable by means of screws d^{18} . With the strip of sheet-metal in position, and the plunger B reciprocating, the plunger D^2 of the slide and the plunger m^7 of the carrier are caused to be moved toward each other, so that the plunger m^7 of the carrier causes the dies m to arrive at their outward position before the reciprocating or male dies of the first operation arrive in proximity thereto so as to engage therewith. Thereby the metal strip is stamped and the stamped part separated from the strip by a cutting die d^{15} of the die d^4 , and the separated stamped part or rim forced into the dies m^4 and m , as shown clearly in Figs. 5^a and 5^b. This is the preferred form. A modified form is shown in Fig. 5^c, in which the stamped part is not separated from the strip of sheet-metal, but in which the strip of sheet-metal is only stamped, and the stamped part not separated, the strip being secured to the die carrier, and moved in position to be acted upon by the dies of the second operation, which in this case cause the separation of

the stamped part from the strip. The first operation having taken place the reciprocating or male die is caused to be moved in outward direction away from the strip of sheet-metal and its female die, and the alinement plunger D^2 is caused to be disengaged from its support D^4 . In the meantime the stud e^1 of the crank-disk e^2 , will have engaged the next recess e of the carrier E and thereby cause the rotation of the same, and cause the next pair of dies of the carrier to be brought in alinement with the reciprocating or male dies of the first operation, and cause the dies of the carrier hitherto in alinement with the male or active dies of the first operation to be brought in alinement with the male or active dies of the second operation. Thus, a strip of sheet-metal still intact is interposed between the dies of the first operation and the rim, or in case of the preferable form, that part of the strip acted upon by the dies of the first operation, in case of the modified form, is interposed between the dies of the second operation.

6. *The hopper.*—Supported by the slides of the male dies of the second operation and intermediately between the dies of the second operation are arranged feed hoppers H to the upper end of each of which a supply of can tops having small holes at their center, is supplied, so as to be edgewise one on top of the other. These tops may be supplied by any suitable mechanism. Each hopper is provided with sets of guide holes h^3 and h^5 which are adapted to be engaged by sets of guide pins h^2 and h^4 . The lower set of pins, h^4 , are secured to the slide D and adapted to enter and engage the guide holes h^5 from the outer end of the feed hopper, while the upper set of pins, h^2 , are secured to a yoke h^1 supported by bars h secured to supports h^{11} of the slide D, and are adapted to engage the guide-holes h^3 from the inner end of the feed hopper H. The upper set of guide pins h^2 and the lower set of guide pins h^4 are spaced a distance apart equal to the width of the article to be fed, in this case the diameter of the circular can-tops illustrated in the drawings, and are so arranged that they always cover each other in their to and fro movement. At the end of the outward movement of the slides D, the lower set of pins h^4 , are caused to leave the holes h^5 of the hopper H, whereby the lower can-top until now supported by the same, drops downwardly into the jaws h^6 and h^7 . By the inward movement of the slide D, the lower set of pins again engage the holes h^5 of the hopper. When the slide D arrives at the end of its inward movement, the upper set of pins h^2 , are caused to leave the holes h^3 of the hopper whereby the can-tops drop downwardly until the lowest one encounters the lower set of pins h^4 . The outward movement of the slide D, again causes

the engagement of the pins h^2 with its holes h^3 , and thereby causes the lowest can-top to be surrounded by the upper and lower sets of pins. By these means but one single can-top is permitted to drop at one time into the jaws, namely, when the lower set of pins is removed out from below the same the remaining can-tops being prevented from falling by the upper set of pins h^2 .

The slide D of the second operation is provided with a projecting rod h^{10} , the free end of which is provided with an inclined surface and adapted to engage the inclined surface of a projection h^9 of one of the jaws of the hopper. By the inward movement of the slide and its engagement with one of the jaws, one of the jaws is caused to be moved around its pivot h^8 in doing which it engages the other jaw and interacting therewith, causes its movement around its pivot simultaneously with that of the other jaw, whereby both jaws are opened. The weight of the jaws on the return movement of the slide causes their closing. The opening of the jaws is so timed that the articles held in position by the same is first engaged by suitable means so as to support it.

7. Reciprocating dies of the second operation.—The second bracket A^2 and that diametrically opposite to the same, supports slides D each of which is provided with an alinement plunger D^2 similar to that of the slides of the first operation, which engages a corresponding opening D^5 of the support D^4 of the die carrier, so as to cause a proper alinement and registering of the dies. On each side of the alinement plunger D^2 is arranged a reciprocating active or male die, which consists of a holding die d^8 which is provided at its circumference with a projecting portion, the surface of which is inclined toward the die and at its central portion with a supporting or drill pin d^9 adapted to engage the central holes of those can-tops held in position by the jaws h^6 and h^7 of the hopper. The die d^8 is movable in the hollow interior of a die d^{12} and is spring actuated by means of a spring d^{10} so that when the can-top supported by the drill-pin d^9 is brought into position against the impression formed into the strip of sheet-metal the supporting die d^8 is caused to be moved into the die d^{12} . The die d^8 is provided with a drill pin d^9 adapted to support a can-top and move the same against the rim of metal supported by the female die; as shown in Fig. 6. The die d^{12} is provided at its inner part with a portion d^{14} , beveled so as to be curved as shown, the curved portion being clearly shown in Figs. 6 and 6^a, but which in particular cases may be beveled so as to be inclined. With the rim shaped part of the metal in position as shown in Figs. 6 and 6^a, the wedge-shaped cam m^8 , will engage the cams m^{10} and thereby cause

the plunger m^7 and dies m to be moved in radially outward direction toward the reciprocating or male dies now stationary and cause thereby the end of the vertical leg of the rim to follow along the curved or if desired inclined surface d^{14} of the die d^{12} and thereby cause the circumference of the disk to be enveloped by the rim; in other words, to cause the rim to be assembled with the can-top. When this is accomplished, the male or active die recedes from its engagement with the female or receptive die and the stud e^1 of the crank e^2 arrives in proximity to the next slot or recess of the carrier, engages the same and causes its rotation. In order to prevent the upsetting of the free end portions of the strip, pressers d^6 are provided, similar to those described for the dies of the first operation. The strip of sheet-metal is now provided with two circular holes, approximately distant from each other, equal to the diameter of one of the holes. In order to utilize the remaining material between the holes, a second set of dies is provided respectively diametrically opposite the dies of the first and second operations just described. Inasmuch, however, as owing to the symmetrical arrangement of the dies these holes of the strip would be placed in position between the dies of the first operation of the second set of dies and thus no material be interposed between the dies so as to be acted upon, the intermediate guide or by-pass p^2 is provided, which consists of two circular upright walls p^3 and p^4 , concentric and spaced some distance apart, between which the strip of sheet-metal passes, the curvature of the walls causing the position of the strip to be so changed, that those parts of the strip of sheet-metal still intact immediately between those parts acted upon by the first set of dies, are presented to the second set of dies diametrically opposite the dies of the first and second operations just described. By this by-pass the material between the two holes of the strip is caused to be placed between the dies of the first operation of the second set of dies and the same operation caused to take place as hitherto described for the first and second operations of the first set of dies. The finished or assembled product, drops out of the machine on the separation of the dies of the second operation.

The operation is as follows: The strip of sheet-metal is passed into the press at the inlet guide p of the same and around the carrier E, tangentially to the dies supported thereon, being guided and held in position by the intermediate guide or by-pass p^2 and outlet end guide p^1 of the press. The carrier E is rotated so as to bring the dies in alinement with the reciprocating male dies. With the strip in position and engaged by

the projections p^4 of the die carrier which penetrate the strip so as to form holes c^3 , (Fig. 17) or otherwise securely held in position thereon, the pulleys a^3 are rotated and the operating mechanism set in motion. Thereby the plunger B is vertically reciprocated and the slides D with the alinement plungers D^2 horizontally reciprocated so as to engage the openings D^5 of the supports D^4 of the die carrier E, cause thereby the interlocking of the same and securely hold the carrier so as to be immovable. The male or active dies of the first operation will then by the continuing movement of the slides engage the female or receptive dies in alinement therewith, which have been moved in radially outward position by the engagement of their cams m^{10} with the cams m^8 of the plunger B. Thereby the cutting die d^3 in conjunction with the cutting die m will punch a circular hole into the strip of sheet-metal (Fig. 16,—X¹) and in its continuing movement force the punched out disk into the interior of the cutting die m from the rear end of which they are finally discharged, whereby they drop through openings E^1 of the carrier E. By the continuing movement of the male die, its beveled forming die d^4 in conjunction with the beveled end m^1 of the forming die m and the end of the die m^4 causes a circular impression to be formed into the strip of sheet-metal, and the die d^{15} causes the separation of the stamped part or rim from the strip of metal. The first operation having been completed, the reciprocation of the plunger B will cause the radially outward horizontal movement of the slides D, and thereby the disengagement of the dies, and of the alinement plungers with the supports of the dies of the carrier, so as to leave the carrier free to be rotated. By this time the stud e^1 of the crank disk e^2 will have arrived at a point approximately to one of the recesses e^1 of the carrier E and finally by the continuing rotation of the crank disk e^2 cause its engagement with the recesses, thereby causing the rotation of the carrier E. The carrier E will be rotated until the stud e will have disengaged itself from its recess at which time the female die hitherto in alinement with the male die of the first operation with the separated rim of metal will be brought in alinement with the male die of the second operation. Thus by the rotation of the carrier that part of the strip of sheet metal operated upon will be moved with it to the second operation dies and simultaneously a new portion of the strip will be caused to be interposed between the male die of the first operation and the female die now brought opposite thereto. The strip of sheet metal, which by the rotation of the female dies became tangential to the carrier and hence to the female dies and as yet still unoper-

ated upon (Fig. 16,—x) is thus interposed between those male and female dies which now constitute the dies of the first operation and is acted upon in the same manner as before described. By the time the female die with the rim of metal arrives in alinement with the male die of the second operation, the plunger B will be actuated and thereby cause the slides D to be moved radially inwardly so as to cause the locking of the plungers D^2 with the supports D^4 of the carrier E. By the movement of the slides the projection h^{10} will engage the projection h^9 of the jaws of the hopper, and open the same, immediately prior to which, the drill-pin d^9 or other supporting means will engage the can-top or other article supported by the jaws of the hopper so as to prevent the article from dropping when opening the jaws. With the can-top suitably supported by the drill-pin d^9 and by the continuing movement of the slide D with the reciprocating or male die, the die d^3 continues in its movement until the edge of the can-top abuts against the rim of sheet-metal (Fig. 16,—x³).

By the simultaneous rearward movement of die m , and forward movement of die d^3 , brought about partly by actuating members, B, b^1 , b^2 , b^3 and b^4 , and sudden expansion of spring d^{10} , the rim and can-top are thrust into the position shown in Fig. 6^a. In case the modified form shown in Fig. 5^c is used, during the first operation, whereby the rim becomes simply pressed but not separated from the strip, then, the strip with the rim portion impressed is brought in alinement with the dies of the second operation by the rotation of the carrier, and the rim portion severed by the outer and cutting edge of the die d^{12} of Fig. 6^a. Thus severed by the simultaneous forward movement of the die d^3 with can-top, and expansion of the spring d^{10} and rearward movement of the die m , the rim, together with the can-top is brought in the position shown in Fig. 6^a. With the parts in this position, the cams m^8 of the plunger B will engage the cams m^{10} of the plungers m^6 secured to the pairs of female dies and by the downward movement of the plunger B cause the radial outward movement of the dies m against the die d^3 , causing thereby the free end of the rim to be moved against and along the curved inner surface of the die d^{12} , until this end is pressed against the can-top and the rim caused to envelop the edge of the can-top at which time the rim is given a final pressure so as to tightly clamp the same. (Fig. 16,—x⁵, and Fig. 19). Thus the article desired to be made, is completed in two operations, and ready to be ejected from the machine. This ejection of the finished article takes place when the dies are moved away from each other and the article released,

whereupon the latter will fall from the press. The reciprocation of the plunger B will cause the disengagement of the dies of the second operation, the engagement of the stud e' with the next recess of the carrier will cause its rotation, and the strip of sheet-metal will be changed in position relatively to the carrier by means of the intermediate guide bracket or by-pass p^2 and the strip of metal subjected to the same operation as hereinabove described for the first and second operations, of the first set.

The dies of the carrier have been described as female dies and the reciprocating dies as male-dies and arranged on the stationary pedestal. Nothing herein described shall limit us to this arrangement of dies, it being within the scope of our invention to reverse the position of the same, and thereby make the male dies rotatable and female dies stationary.

The press herein before described has special reference to the manufacture of tops of sheet-metal cans, the intention being to provide a can-top having a rim of solder so that when the can-top assembled with its rim of solder is placed on the can-body and heat applied to the rim of the can-top, the solder will become fused and the can-top become secured to or assembled with the can-body.

The improved machine is equally applicable to the working of sheet-metal generally, paper-strips and other like substances, and the arrangement on the part of the dies may be greatly varied according to the many uses to which the invention may be put without departing from the main features thereof.

The machine described is especially adapted to produce a large number of articles at a very high rate of speed. After the strip is once placed in position tangentially to the female die carrier, and the feed-hopper supplied with can-tops, the machine is entirely automatic in its action. The feeding of the strip of sheet-metal to the machine is accomplished without the aid of the usual feed-rollers, its operations are positive in their action, and all parts are so arranged that in case of wear or in case of breakage of any part, it may be easily replaced by a new part many parts being adjustable so as to take up the wear caused by the friction of the parts and adapt the machine to the manufacture of articles of different sizes and shapes. By the duplicate arrangement of the sets of male and female dies of the first and second operations, articles are formed out of strips of sheet-metal, and the strip of sheet-metal utilized to such an extent that substantially no metal remains in the strip large enough to be availed of at a further operation.

We do not wish to limit ourselves to the use of a pedestal as described hereinabove. It being within the scope of our invention

to support the male dies by any means equivalent thereto, as for instance a frame, support, or separate legs.

It is obvious that the press could be used for performing separate operations on sheet-metal articles which are not cut from a strip of sheet-metal but which are fed by hoppers suitably arranged at various stations.

We have shown one embodiment of our invention but we do not wish to limit ourselves to the details thereof, since such may be changed without departing from the spirit of our invention.

Having thus described our invention we claim as new and desire to secure by Letters Patent.

1. A sheet-metal working press, having a pedestal, dies horizontally reciprocatory circularly arranged on the pedestal, a carrier horizontally rotatable, a plurality of dies arranged concentrically circular to the circularly arranged pedestal dies, and adapted to coöperate therewith, and means for actuating the dies.

2. A sheet-metal working press, having a pedestal, dies horizontally reciprocatory circularly arranged on the pedestal, a carrier horizontally rotatable, a plurality of dies arranged concentrically circular to the circularly arranged pedestal dies, and adapted to be brought horizontally in alinement with the horizontally reciprocatory dies, and means for actuating the dies.

3. A sheet-metal working press, having a pedestal, dies horizontally reciprocatory circularly arranged on the pedestal, a carrier horizontally rotatable, dies on the same arranged concentrically circular to the circularly arranged pedestal dies, and adapted to be brought horizontally in alinement with the dies on the pedestal and adapted to be engaged thereby, and means for actuating the dies on the carrier and pedestal for operating on material arranged between the dies.

4. A sheet-metal working press comprising horizontal stationary reciprocating dies circularly arranged, a carrier horizontally rotatable, dies on the same arranged concentrically circular to the circularly arranged pedestal dies, and separate means for horizontally alining the dies on the carrier with the respective stationary reciprocating dies.

5. A sheet-metal working press, comprising horizontal, stationary reciprocating dies circularly arranged, a carrier horizontally rotatable, dies on the same arranged concentrically circular to the circularly arranged pedestal dies, and adapted to be brought successively in horizontal alinement with the stationary dies, means for locking said dies in position when in horizontal alinement with each other, and means for actuating the dies when in locked position.

6. A sheet-metal working press, having a pedestal, horizontally reciprocatory alinement mechanism and dies on the same circularly arranged, a carrier horizontally rotatable, means on the same adapted to be engaged by the alinement mechanism, a plurality of dies on the carrier arranged concentrically circular to the circularly arranged pedestal dies, and adapted to be engaged by the dies of the pedestal, and means for actuating the dies.

7. A sheet-metal working press, having a pedestal, slides movable on the same, alinement plungers and dies on said slides, plungers and dies being horizontally reciprocal, said dies being circularly arranged, a carrier horizontally rotatable, a plurality of supports on the same, having openings adapted to be engaged by the alinement plungers of the slides, a plurality of dies on said carrier arranged concentrically circular to the circularly arranged pedestal dies, and means for actuating the dies.

8. A sheet-metal working press, having a pedestal with radial brackets, slides movable in the same, alinement plungers and dies on said slides, a rotatable carrier, a plurality of supports on the same, having openings adapted to be engaged by the alinement plungers of the slides, a plurality of dies on said carrier, a vertically reciprocating plunger located centrally of the pedestal, and means connected with the plunger adapted to actuate the dies.

9. A sheet-metal working press, having a pedestal with radial brackets, slides in said brackets, alinement plungers on said slides, dies on said slides, a rotatable carrier, supports on the same having openings adapted to be engaged by the alinement plungers, a plurality of dies arranged on the carrier, provided with wedge-shaped cams, a vertically reciprocating plunger, located centrally of the pedestal and having wedge-shaped cams at its upper end adapted to be engaged by the wedge-shaped cams of the dies, means connected with the plunger for actuating the slides in the radial brackets, and means for actuating the vertically reciprocating plunger.

10. A sheet-metal working press, having a pedestal, male-dies, dies of the first operation and dies of the second operation, a carrier horizontally rotatable, a plurality of dies on said carrier adapted to be brought successively in alinement with the male-dies of the first operation and then with the male-dies of the second operation, said male and carrier dies being horizontally coacting, and means for actuating the dies then in alinement with each other.

11. A sheet-metal working press, having a pedestal, a plurality of male dies supported thereon, being dies of the first operation and dies of the second operation, a rotatable car-

rier, a plurality of dies on the same registerable with the male dies, and means for actuating the dies, means for guiding a strip of sheet-metal intermediately between the registering dies, means for bringing successively one die after the other of the carrier first in alinement with the dies of the first operation and then, together with that part of the strip acted upon by the dies of the first operation in alinement with the dies of the second operation.

12. A sheet-metal working press, having a pedestal, a plurality of male-dies supported thereon, dies of the first operation and dies of the second operation, a plurality of female-dies, registerable with the male-dies, means for guiding a strip of sheet-metal intermediately between the registering dies, means for bringing successively each female-die in alinement with, first, the male-die of the first operation, and then together with that part of the strip of sheet-metal acted upon by the dies of the first operation, in alinement with the male-dies of the second operation, means for actuating the dies, and means for feeding the articles to be assembled with portions of the strip, intermediately between the dies of the second operation.

13. A sheet-metal working press, having a pedestal, a plurality of horizontally reciprocatory male-dies on the same circularly arranged thereon, a carrier horizontally rotatable, a plurality of female-dies on the same arranged concentrically circular to the circularly arranged pedestal dies, means for simultaneously actuating both sets of dies; and means arranged operatively between the dies adapted to feed between the same the material to be operated upon by the respective dies.

14. A sheet-metal working press, having a pedestal with male-dies arranged in pairs opposite to each other, one set of pairs of opposite male-dies being of the first operation, and one set being of the second operation, a rotatable carrier, a plurality of pairs of female-dies arranged on the carrier, means for guiding a strip of sheet-metal intermediately between the dies, means for actuating the dies, and means for rotating the carrier so as to bring successively each pair of female dies in alinement with the male-dies of the first operation and then together with that part of the strip acted upon by the dies of the first operation in alinement with the male-dies of the second operation.

15. A sheet-metal working press, having a pedestal with male-dies arranged in pairs opposite to each other, one set of pairs of opposite male-dies being of the first operation, and one set being of the second operation, a rotatable carrier, a plurality of pairs of female dies arranged on the carrier ra-

dially thereto, means for guiding a strip of sheet-metal intermediately between the dies, means located centrally of the carrier for actuating the dies on the same, means for
 5 actuating the male-dies, means for rotating the carrier so as to bring successively each pair of female-dies in alinement with the male-dies of the first operation and then together with that part of the strip acted upon
 10 by the dies of the first operation in alinement with the male-dies of the second operation, and means on said carrier securing the strip of metal thereto when being moved from the dies of the first operation to the
 15 dies of the second operation.

16. A sheet-metal working press, having a pedestal with male-dies arranged in pairs opposite to each other, a rotatable carrier, a plurality of female-dies arranged in pairs
 20 on the carrier radially thereto, means for guiding a strip of sheet-metal intermediately between the dies, means for actuating the dies, means for rotating the carrier so as to bring successively each pair of female-
 25 dies in alinement with the male-dies, and means on said carrier securing the strip of sheet-metal thereto, for moving the same therewith.

17. A sheet-metal working press, having
 30 a pedestal, comprising male-dies on the pedestal circularly arranged thereon, a carrier horizontally rotatable, female-dies on the same arranged concentrically circular to the circularly arranged pedestal dies, said male
 35 and female-dies being horizontally co-acting, means for actuating the dies, and means for securing on the carrier so as to be rotatable therewith, the material to be operated upon by the dies.

18. In a sheet-metal working press, the combination of a rotatable carrier having a plurality of female-dies circularly arranged thereon, and separate and additional means
 40 on said carrier adapted to engage with and securely hold in position thereon a strip of sheet-metal while being operated upon by the dies.

19. In a sheet metal working press, having a rotatable carrier, male dies and female
 50 dies, the combination of projections on the carrier, and pressers exterior to the male dies engaging with the projections of the carrier when the dies are in alinement with each other, said pressers and projections
 55 being adapted to clamp the material to be operated upon.

20. A sheet-metal working press, having a pedestal, with male-dies arranged in pairs opposite to each other, one set of the pairs
 60 of opposite dies being male-dies of the first operation and one set being second operation dies, a rotatable carrier, a plurality of pairs of female-dies, arranged radially to the carrier, means for actuating the female-
 65 dies, means for actuating the male-dies,

means for rotating the carrier so as to bring successively each pair of female-dies in alinement with the male-dies of the first operation and then together with that part of the metal acted upon by the dies of the
 70 first operation in alinement with the male-dies of the second operation, means for feeding singly the articles to be assembled with that part of the strip of sheet-metal acted upon by the dies of the first operation, inter-
 75 mediately between the registering dies of the second operation and holding them in position, and means for releasing the same prior to the actuation and engagement of the dies of the second operation.

21. A sheet-metal working press, having a pedestal, male-dies supported thereby, a rotatable carrier, a plurality of female-dies on the same adapted to be brought successively
 80 in alinement with the male-dies, a vertically reciprocating plunger located centrally of the pedestal, means operatively connecting the plunger and male-dies, means operatively connecting the plunger and female-
 85 dies, a driving-shaft exterior to the pedestal, and operating mechanism actuated by the driving-shaft for reciprocating the plunger and rotating the carrier.

22. In a sheet-metal working press, the combination with a female-die, comprising
 95 a movable cutting die having a beveled forming end, a stationary forming die concentric to the movable cutting die, and a stationary cutting die concentric to the forming die, of a male-die comprising a
 100 movable cutting die coacting with the movable female cutting die, and an outer die coacting with the forming die and with the stationary cutting die.

23. In a sheet-metal working press, the
 105 combination with a female-die, comprising a movable forming die having a beveled end, a stationary forming die concentric to the movable forming die and a stationary cutting die concentric to the forming dies,
 110 of a male-die comprising a movable cutting die co-acting with the movable female cutting die, and an outer die having a forming portion and a cutting edge co-acting with the movable female forming die and the sta-
 115 tionary female cutting die.

24. In a sheet-metal working press, the combination with a rotatable carrier, of a plurality of female dies on said carrier, each comprising a movable beveled cutting die, a
 120 stationary forming die concentric thereto, and a stationary forming and cutting die concentric to said forming die.

25. In a sheet-metal working press, the combination with a female-die, comprising
 125 a movable forming die having a beveled end, a stationary forming die concentric to the movable forming die, and a stationary cutting die concentric to the forming dies, of a male-die comprising an outer die co-
 130

acting with the stationary female cutting die and having a beveled inner portion, and a supporting die movable in the outer die.

26. In a sheet-metal working press, the combination with a female-die, comprising a movable forming die having a beveled end, a stationary forming die concentric to the movable forming die, and a stationary cutting die concentric to the forming dies, of a male-die comprising an outer die having a beveled inner portion and an outer cutting edge coacting with the stationary female cutting die, and a supporting die movable in the outer die.

27. In a sheet-metal working press, the combination with a female-die, comprising a movable forming die having a beveled end, a stationary forming die concentric to the movable forming die, and a stationary cutting die concentric to the forming dies, of a male-die comprising an outer die having a beveled portion and an outer cutting edge co-acting with the female-cutting die, a supporting die movable in the outer die, and means thereon adapted to support the articles to be operated upon.

28. In a sheet-metal working press, the combination, with a rotatable carrier, having a central opening, and a vertically reciprocating plunger movable in said opening, having a plurality of cams, a plurality of horizontal female - dies arranged in pairs radially to the carrier, each consisting of a stationary forming and cutting die, a stationary forming die interior and concentric thereto, and a cutting die, of horizontally reciprocating plungers, each having a cam at one end adapted to be engaged by the cams of the vertically reciprocating plunger, and the other end secured to one pair of female cutting dies for reciprocating the same in the stationary forming dies.

29. In a sheet-metal working press, the combination, with a rotatable carrier, having a central opening, and a vertically reciprocating plunger movable in said opening, having a plurality of cams, a plurality of female-dies arranged in pairs radially to the carrier, of horizontally reciprocating plungers, each having a cam at one end adapted to be engaged by the cams of the vertically reciprocating plunger, and the other end secured by one pair of female cutting dies for reciprocating the same.

30. In a sheet-metal working press, the combination, with a rotatable carrier, having a central opening, and a vertically reciprocating plunger movable in said opening, having a plurality of cams, a plurality of horizontal female-dies arranged in pairs radially to the carrier, each consisting of a horizontally arranged stationary forming and cutting die, a stationary forming die interior and concentric therewith, and a cutting die, of horizontally reciprocating plungers, each

having a cam at one end adapted to be engaged by the cams of the vertically reciprocating plunger, and the other end secured to one pair of female cutting dies for horizontally reciprocating the same in the stationary forming dies.

31. In a sheet-metal working press, the combination, with a rotatable carrier, having a central opening, and a vertically reciprocating plunger movable in said opening, having a plurality of cams arranged around the circumference thereof, a plurality of female-dies arranged in pairs radially to the carrier, each consisting of a stationary forming and cutting die, a stationary forming die interior and concentric therewith, and a cutting die, of horizontally reciprocating plungers, each having a cam at one end adapted to contact with the cams of the vertically reciprocating plunger, and the other end secured to one pair of female cutting dies for horizontally reciprocating the same in the stationary forming dies.

32. A sheet-metal working press, having a pedestal, dies on the same circularly arranged, a carrier horizontally rotatable, dies on the same arranged concentrically circular to the circularly arranged pedestal dies, and adapted to be brought in alinement with the dies on the pedestal, both sets of dies being horizontally co-acting, and means adapted to feed articles to be operated upon intermediately between the respective dies in alinement with each other.

33. In a sheet-metal working press, a feed mechanism comprising a hopper containing articles to be operated upon interacting jaws pivoted thereto having their upper ends engaging each other, said jaws being so arranged that by the actuation of one the other is simultaneously actuated, and means adapted to engage the hopper for permitting one article at a time to drop into the jaws prior to their opening.

34. In a sheet-metal working press, a feeding mechanism, comprising a hopper provided with holes, movable guide-pins for supporting articles in the hopper and intermittently releasing individually one article after the other and adapted to engage the holes, jaws pivoted to the lower end of the hopper, one of which is provided with a projection, and means adapted to engage the projection so as to open the jaws.

35. In a sheet-metal working press, the combination of a pedestal, having guide-ways, a feed hopper supported by the same, having guide-holes, a lower set and an upper set, jaws pivoted to the lower end of the hopper, a reciprocating slide movable in the guide-ways of the pedestal and having guide-pins adapted to engage one set of guide-holes of the hopper, a yoke supported by said slide having guide-pins adapted to engage the other set of guide-holes of the

hopper, and means on said slide adapted to open the jaws on the forward movement of the same.

36. A sheet-metal working press, comprising a pedestal having male-dies arranged in pairs diametrically opposite to each other, one set of pairs of diametrically opposite male-dies being of the first operation dies, and one set being of the second operation dies, a rotatable carrier, a plurality of pairs of female-dies arranged on the carrier radially thereto, means for guiding a strip of sheet-metal intermediately between the dies, means for actuating the dies, means for rotating the carrier so as to bring successively each pair of female-dies in alinement with the male dies of the first operation and then together with that part of the strip acted upon by the dies of the first operation in alinement with the dies of the second operation, and means for changing the position of the strip of sheet-metal relatively to the carrier so as to cause that part of the strip of sheet-metal not acted upon by the first operation dies to be placed in proper position intermediately between the dies of the set diametrically opposite thereto.

37. A sheet-metal working press, having a pedestal having dies, a rotatable carrier having dies, means for guiding a strip of sheet-metal intermediately between the dies, means for actuating the dies, and means for changing the position of the strip of sheet-metal relatively to the carrier.

38. In a sheet-metal working press, having a plurality of dies, guide-brackets adapted to guide a strip of sheet-metal intermediately between the dies, each of said brackets consisting of circular walls, concentric and spaced some distance apart, and one of said guide-brackets being adapted to act as a by-pass so as to change the position of the strip of sheet-metal relatively to the dies.

39. In a sheet-metal working press, having a pedestal, the combination of a plurality of horizontally reciprocating dies on the pedestal, a plurality of movable female-dies, co-acting with the reciprocating dies, and means for actuating the dies for operating on material fed between the dies, said dies being adapted to stamp and cut the material at one operation, and assemble and clench said cut out material to an article fed thereto, at a second operation.

40. In a sheet-metal press, having a pedestal, the combination of a plurality of horizontally reciprocating dies on the pedestal, a plurality of movable female-dies, co-acting with the reciprocating dies, and means for actuating the dies for operating on material fed between the dies, said dies being adapted to stamp and cut the material at one operation.

41. In a sheet-metal working press, having a pedestal, the combination of a plurality of

horizontally reciprocating dies on the pedestal, a plurality of movable female-dies, co-acting with the reciprocating dies, and means for actuating the dies for operating on material fed between the dies, said dies being adapted to assemble articles fed intermediately between the same and clench one article to the other.

42. In a cap-hemming machine, a plurality of simultaneously operating active dies having different functions, in combination with a plurality of identical receptive dies each comprising a plurality of relatively movable members having different functions, to co-act with different active dies, and means for causing said receptive dies to co-act with the active dies successively, substantially as described.

43. In a cap-hemming machine, a plurality of active dies, a co-acting receptive die, means for intermittently feeding sheet solder across the path of one of said active dies, means for delivering a cap in the path of another of the active dies, and means for bringing said receptive die in alinement with said active dies in rotation, substantially as described.

44. In a cap-hemming machine a step by step rotative cap and die carrier, a die thereon, a cap holding and releasing device comprising a pair of opening and closing members, arranged above said die carrier; a plunger movable toward and from the carrier, and means carried by the plunger for opening said members during a stationary phase of the carrier, substantially as described.

45. In a cap-hemming machine, a plurality of multiple part dies revoluble about a center, non-rotative dies, adapted to co-act therewith in different positions, and a non-rotative member determining the action of the members of the rotative dies, whereby each rotative die is caused to perform successive functions, substantially as described.

46. In a cap-hemming machine, a plurality of outer dies each comprising a plurality of relatively movable parts, in combination with a plurality of inner dies each comprising a plurality of relatively movable parts and adapted to co-act in different relations with each outer die successively; substantially as described.

47. In a sheet-metal working press having a rotatable carrier with dies, and a plurality of stationary dies adapted to coöperate with the carrier dies, said dies being arranged in sets of first and second operation dies; means stationary to the rotatable carrier for guiding the strip of sheet-metal to be acted upon by the dies, comprising uprights, one located in position before the strip is acted upon by the dies, one intermediate between one set of first and second operation dies and the adjacent set, serving to change the position of

the strip relatively to the carrier, and one at the exit of the strip from the press after having been operated upon by the dies.

48. In a sheet metal working press having
5 a rotatable carrier, male dies and female dies, the combination of means on the carrier, and means exterior to the carrier engaging with the means on the carrier when the dies are in alinement with each other,
10 said means when coöperating being adapted to clamp the material to be operated upon.

49. In a sheet metal working press, dies horizontally reciprocatory circularly ar-

ranged, rotatable dies arranged concentric-
ally circular to the circularly-arranged dies 15
and adapted to coöperate therewith, said dies coacting when brought in alinement with each other.

In testimony, that we claim the foregoing as our invention, we have signed our names 20 in presence of two subscribing witnesses.

EDWIN NORTON.

LOUIS C. KRUMMEL.

Witnesses:

PAUL GOEPEL,
C. P. GOEPEL.