

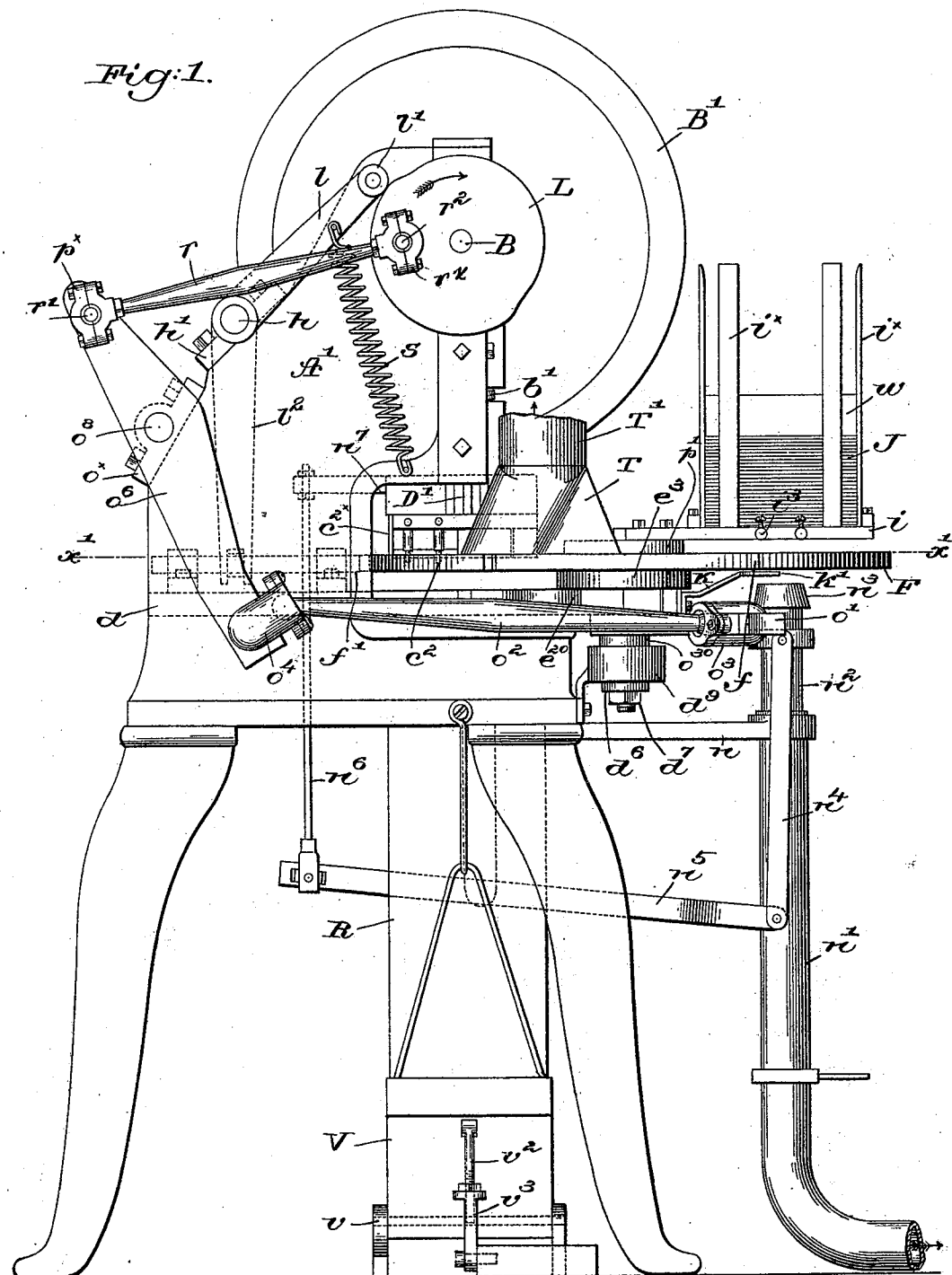
(No Model.)

4 Sheets—Sheet 1.

J. T. ROBINSON & H. J. CHAMBERLAIN.
MACHINE FOR FORMING BOX BLANKS.

No. 516,709.

Patented Mar. 20, 1894.



Witnesses.

Fred S. Grindle af.
Louis N. Howell

Inventors

John T. Robinson
Henry J. Chamberlain
by Crosby & Gregory attys

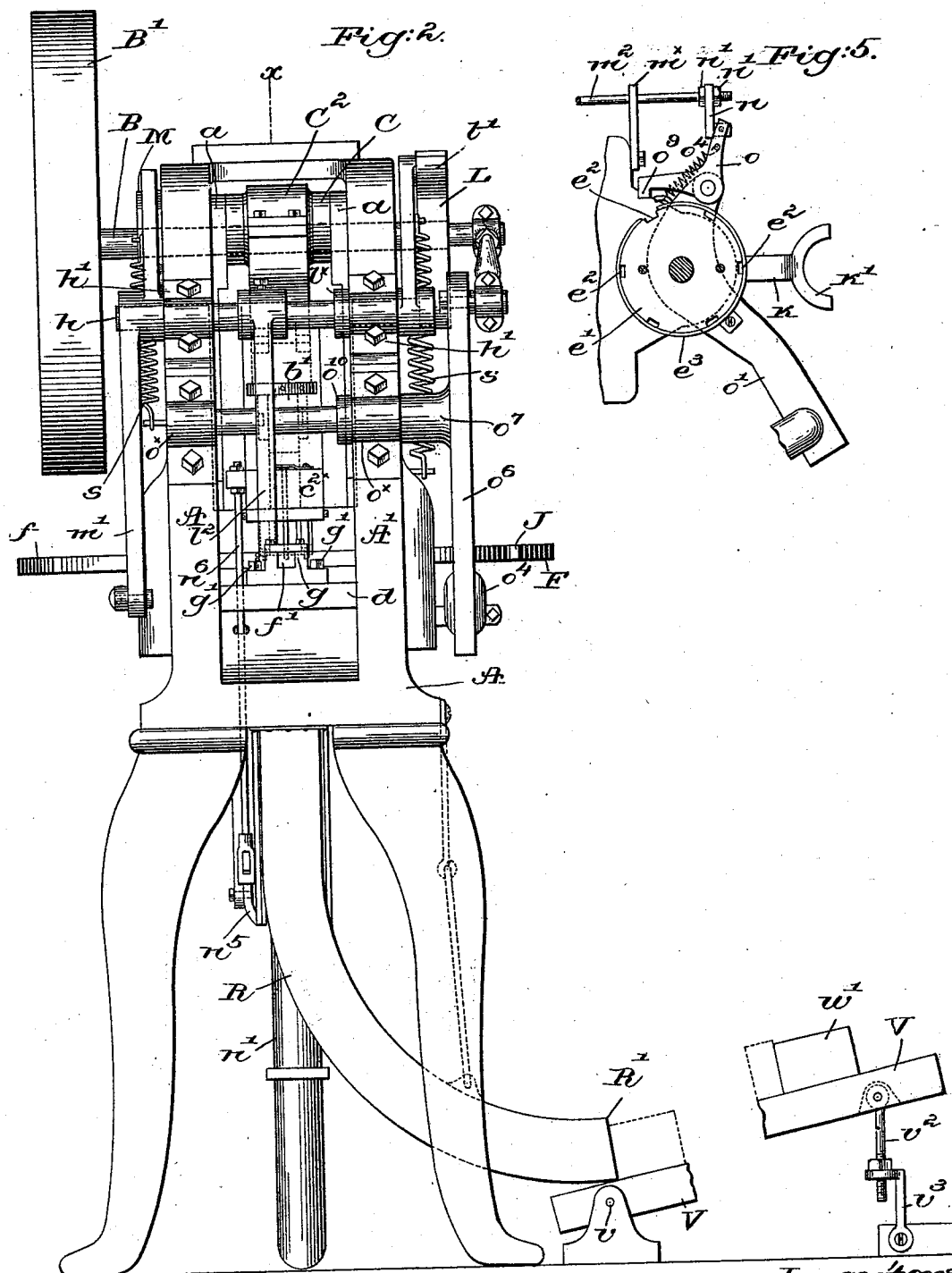
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Louis N. Sowell

Inventors

John T. Robinson.
Henry J. Chamberlain
by Crosby & Ingersoll Attys.

(No Model.)

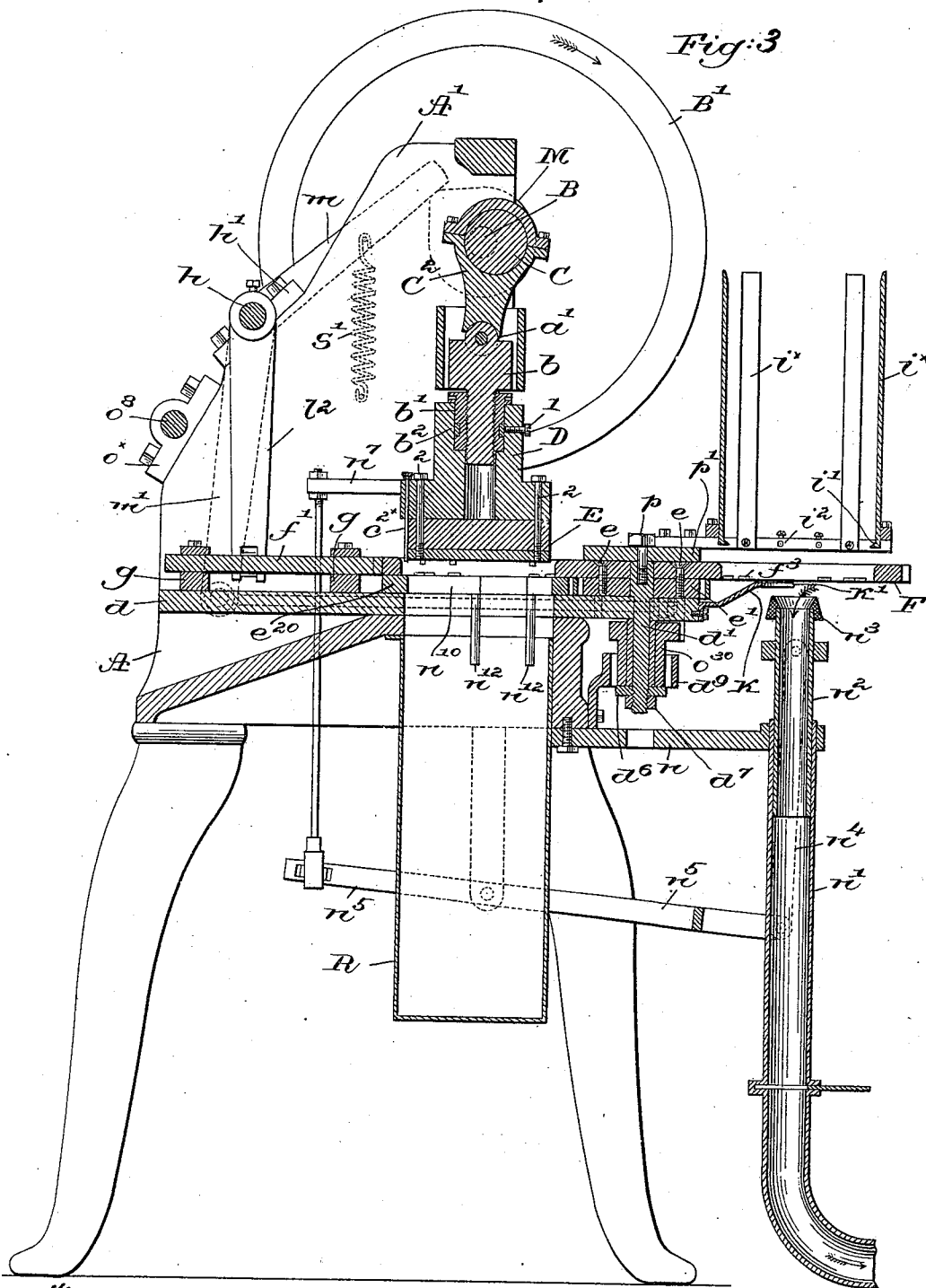
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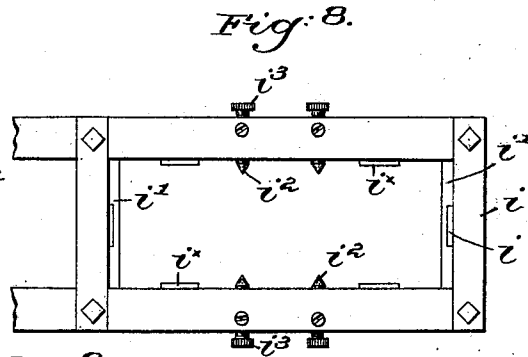
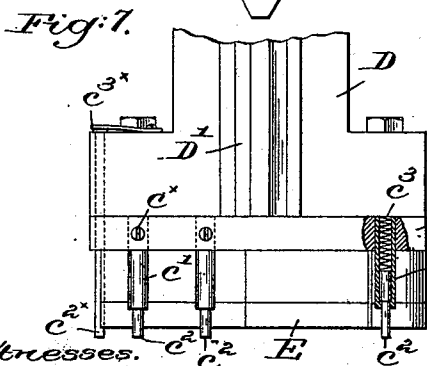
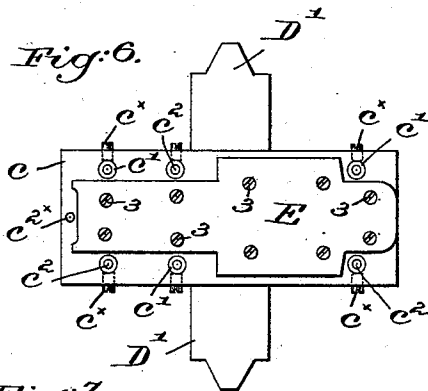
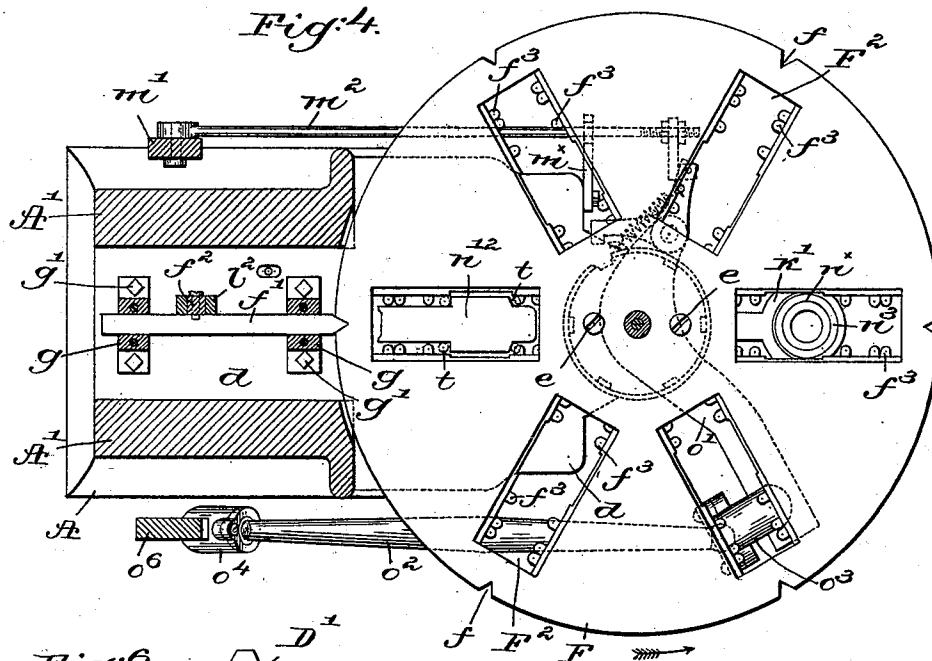
Inventors

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UNITED STATES PATENT OFFICE.

JOHN T. ROBINSON AND HENRY J. CHAMBERLAIN, OF HYDE PARK, MASSACHUSETTS, ASSIGNORS TO JOHN T. ROBINSON & CO., OF SAME PLACE.

MACHINE FOR FORMING BOX-BLANKS.

SPECIFICATION forming part of Letters Patent No. 516,709, dated March 20, 1894.

Application filed November 19, 1892. Serial No. 452,497. (No model.)

To all whom it may concern:

Be it known that we, JOHN T. ROBINSON and HENRY J. CHAMBERLAIN, of Hyde Park, county of Norfolk, State of Massachusetts, have invented an Improvement in Machines for Forming Box-Blanks, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

Various articles of manufacture, such as cigarettes, druggists' prescriptions, dye powders, cutlery, &c., are put up for sale in paper boxes, the same being composed of a cover open at its ends and formed from a paper tube properly creased substantially as in an application, Serial No. 434,865, filed May 31, 1892, the inner or box part proper being formed from a blank properly creased, and thereafter punched out or cut to the required shape, the said blank then being turned up in the lines of the creases to form back, front, sides, bottom and top, the said box sliding in the before mentioned cover and being held in proper parallelogrammic form thereby.

This invention has for its object the production of a machine for punching or cutting out such blanks rapidly and accurately, the same being provided with means for feeding the blanks one by one to the action of the cutting or punching mechanism, and also with means for withdrawing the surplus material from the vicinity of the punching apparatus, the said blanks, after being cut or punched into their proper shape, being delivered at a convenient point in a compact form ready for removal in bulk.

Figure 1 of the drawings represents in side elevation a machine embodying our invention. Fig. 2 is an end elevation thereof. Fig. 3 is a vertical section taken on the line $x-x$ Fig. 2, looking toward the left. Fig. 4 is a plan view and partially in section, of a portion of the mechanism below the line $x'-x'$. Fig. 5 is a detail of the actuating pawl. Figs. 6 and 7 show in plan and elevation the punch or cutter-block. Fig. 8 is a detail view of a portion of the feeding mechanism. Fig. 9 is a diagram of the box blank.

We have herein shown the co-operating parts of the machine as supported upon a

rigid base A having at either side thereof uprights A' provided with suitable bearings for the main or driving shaft B having fast thereon a pulley B', to which motion is communicated from any suitable source. The shaft B is enlarged between the uprights A' to form an eccentric C, see Figs. 2 and 3, the ends of said eccentric abutting against the raised portions or projections a on the inner faces of the uprights A' to thereby prevent longitudinal movement of the shaft and its attached parts, and the said eccentric is reduced in diameter substantially at its central portion to receive therein and be embraced by a strap C² of usual construction.

Pivoted to the end of the strap at a' is a connecting rod b threaded at its lower end to receive thereon the internally threaded flanged sleeve b' , to which is secured by suitable set screws 1, the plunger head D recessed at its upper end to receive the sleeve b' snugly therein, best shown in Fig. 3, the threaded end of the connecting rod which projects beyond the sleeve entering a suitable recess in said head.

To permit rotation of the sleeve b' on the end of the connecting rod to thereby regulate the length of throw of the plunger and yet maintain the connection between the head and connecting rod, we have herein shown the sleeve as provided with an annular recess in which is loosely held a ring b^2 provided upon its outer face with depressions to receive the ends of the set screws 1. When it is desired to alter the throw of the plunger the set screws are slightly loosened and the sleeve b' turned in one or the other direction in usual manner, the inner ends of the set screws at such time, however, remaining in the depressions in the ring b^2 and maintaining the connection of the head D with the sleeve, as will be readily seen from an inspection of Fig. 3.

The plunger head has lateral extensions D', see Figs. 6 and 7, suitably shaped to enter guide-ways in the inner faces of the uprights A', and to the face of the head D we have secured as by bolts 2, 2, a backing c , to which is rigidly attached, as herein shown, by screws the punch or cutter block E of a shape corresponding to the finished blank. As best

shown in Figs. 6 and 7, we have secured in suitable recesses in the backing *c* a series of guides shown as tubes *c'* in which are plungers *c²* preferably maintained in their outermost position as shown in Fig. 7, by springs *c³* between the inner ends of the plungers and the bottoms of the tubes *c'*, although the heads of the plungers may be made heavy enough to act by gravity. The guide tubes or casings are located, as best shown in Fig. 6, upon opposite sides of the punch, for a purpose to be hereinafter described, and near its ends, and are held in the backing *c* by screws *c^x*. The plunger *c^{2x}* located at the rear end of the punch and herein shown as extended through an opening in the plunger head and backing, is acted upon at its upper end by a suitable spring *c^{3x}*.

Attached to the base *A* by any suitable means is a bed-plate *d*, herein shown as reduced in width and prolonged at one end to extend between the uprights *A'* of the base, and the opposite end of the said bed-plate has a bearing therein to receive the shank of a pivot pin *d'*, supporting a rotatable carrier *F* shown in Fig. 4 as circular and having its periphery provided with a series of notches *f* adapted to be entered one at a time by a suitable locking bolt *f'* adapted to be reciprocated in guides *g*, secured to the bed-plate *d*, by suitable screws *g'* extended through said bed-plate and into the framework of the machine.

Referring to Figs. 1 and 2, a rock-shaft *h* is shown as extended through bearings *h'* secured to the uprights, the said rock-shaft having fast thereon at one end beyond the upright *A'*, an arm *l* carrying a suitable roller or other stud *l'* held in contact with a cam *L* fast on the shaft *B* by a suitable spring *S*. The hub of the arm *l* abuts against the outer face of the upright, and a collar *l^x*, secured to the shaft *h* at the inner side of and contacting with the same upright, prevents longitudinal movement of the rock-shaft. A second arm *l²*, shown in dotted lines Fig. 1, is also secured to the rock-shaft *h* in any suitable manner, said arm having its end recessed or cut away to engage a roller or other suitable stud *f²* secured to the bolt *f'*, a partial rotation of the shaft *h* through the cam *L* swinging the arm *l²* and thereby reciprocating the bolt *f'*.

Referring now to Figs. 2, 3, 4 and 5, the outer end of the said rock-shaft *h* has secured thereto a two-armed lever, one of whose arms, as *m*, is held against the surface of a cam *M*, see dotted lines Fig. 3, fast upon the shaft *B*, the short arm *m'* being pivotally connected at its lower end to a link *m²* extended through a suitable guide *m^x* attached to the bed-plate, see Figs. 4 and 5, the outer end of said link being threaded to receive thereon an ear *n* held in adjusted position by set nuts *n'*, *n'*, the said ear being pivotally connected to one arm of a dog *o* mounted upon a suitable stud extended from the upper side of a lever *o'*

having its hub *o³⁰* mounted loosely upon the stud *d'* forming the pivot of the carrier *F*. This lever *o'* is oscillated by a link *o³* connected at its ends by suitable universal joints *o³*, *o⁴*, respectively to the said lever *o'* and to the lower end of a lever *o⁶*, provided with a hub *o⁷* preferably secured to the projecting end of a rock-shaft *o⁸* held in suitable bearings *o^x* secured to the uprights *A'* and prevented from lateral movement by a suitable collar *o¹⁰*.

To the upper end of the lever *o⁶* is connected at *r'* one end of a link *r*, the other end of said link being connected to a crank pin *r²* on the cam *L*. The ends of the link are provided with suitable boxes *r^x* of well known construction.

Secured to the carrier *F* by screws *e*, we have herein shown a ratchet wheel or plate *e'* having six squared notches or depressions *e²* in its periphery, corresponding in number to the notches *f* on the carrier and in the same radial lines therewith, the said notches or depressions being adapted to be entered by the squared tooth *o⁹* of the dog *o* when acted upon by the spring *o¹⁴* secured to said dog and to a suitable point on the lever *o'*.

We have herein shown a dust guard *e³* composed of a split ring or band, see Fig. 5, surrounding the ratchet wheel and having its ends separated sufficiently to expose one notch *e²* at a time, the said guard being rigidly attached to the lever *o'* and moving therewith, so that as the said lever is moved upon its pivot the guard will be also moved from one to the next succeeding notch on the wheel *e'*, uncovering the notch just as the tooth *o⁹* of the dog has been brought into position by the lever *o'* to enter said notch, the lever in its reverse movement rotating the ratchet wheel *e'* and therewith its attached carrier *F* from one to another notch. At the end of such return movement the lever *m* is acted upon by the cam *M*, and the link *m²*, forming part of a tripping device, is moved into the position shown in Figs. 4 and 5, turning the dog *o* upon its pivot against the action of the spring *o¹⁴* and lifting the tooth *o⁹* from out of the notch *e²*. The locking bolt *f'*, however, prior to the withdrawal of the tooth, having been moved forward positively until its end entered one of the notches *f* of the carrier corresponding to the particular notch *e²* of the ratchet wheel just released, is maintained in engagement with such notch *f* by the cam *L* until the lever *o'* is again moved into position for the dog to engage the next notch, and is then withdrawn from the locking notch simultaneously with the engagement of the notch by the tooth *o⁹* of the dog. It will thus be seen that the dust guard *e³* covers all of the notches *e²* but one, thereby maintaining them free from dirt, scraps, &c., which might collect in the notches if unprotected and interfere with the proper working of the machine.

The carrier *F* is provided with a series of blank-holding openings *F²* herein shown as

six in number, each opening being located on a radius passing through one of the notches e^2 and its corresponding locking notch f , the object of such arrangement being that one opening at a time shall be brought opposite to the locking device and positively held thereat during the descent of the plunger to cut out the finished blank, as will be described. Each opening at its lower edge is provided with a series of lugs or projections f^3 arranged on opposite sides of said openings and herein shown as arranged in groups near the ends.

A blank supporting device, shown in Figs. 1, 3 and 8, has a rectangular open base i provided at its ends with inturned lips or ledgers i' , the sides of the said frame being provided with like adjustable supports shown as headed screws i^2 having pointed ends i^2 projecting from the inner side of the frame, as best shown in Fig. 8. Secured to the said frame are usual guides i^x to receive between them and hold a pile of superposed blanks J , see Fig. 1, the blanks being supported by the ledgers i' and projections i^2 , as described, and a suitable block or weight w is preferably placed upon the top of the pile of blanks to normally force them downward.

The frame i is secured to the bed plate by a suitable bolt p extended into the top of the pivot d' of the carrier, a suitable washer p' being interposed between the top of the carrier F and the said frame to prevent displacement of the latter in the rotation of the carrier.

We have provided a bracket k , bent upwardly and curved at its outer end as at k' , and substantially flush with the under side of the rotatable carrier F to act as a stripper in conjunction with the feeding devices now to be described. A suitable arm or bracket n is rigidly attached to the base of the machine and supports a tube or conduit n' , in the upper end of which is snugly fitted to slide telescopically a short section of tubing n^2 provided at its upper open end with a mouth-piece n^3 , preferably of rubber, and having its upper edge reduced in thickness as at n^x , the said section n^2 being moved up and down in the tube n' by links n^4 connected at one end to the bifurcated end of a lever n^5 , the opposite end of said lever being in turn connected by a link n^6 to an ear n^7 moving in unison with the plunger E . A current of air is drawn through the tubes n' , n^2 , by any suitable mechanism in the direction of the arrows, see Fig. 3, and as the plunger descends the section n^2 is raised through one of the openings F^2 of the carrier until the reduced edge n^x of the flexible mouth contacts with the undermost blank of the pile, the suction through the tubes exhausting the air therein and causing the lowermost blank to firmly adhere to the mouth n^x , which is then moved downward by the rising of the plunger, and connections, as described, taking with it the blank, until the same rests

against the projections f^3 in the opening F^2 of the carrier and the end of the stripper k , further downward movement of the section n^2 past the bracket, drawing the edge of the cap away from the under side of the blank and leaving it resting upon the said projections f^3 , the blank bending sufficiently to pass by the ledgers i' and rests i^2 in its downward movement. The carrier is then rotated one-sixth of a turn, as herein shown, by the mechanism hereinbefore described, and a new opening F^2 brought beneath the bottom of the blank supporting frame i , whereupon the upward movement of the section n^2 is repeated, and the next blank is removed from the bottom of the pile, and placed upon the projections of such opening F^2 . This operation is repeated for every successive part of a revolution of the carrier, the undermost blank of the pile being removed each time by the movable section n^2 of the exhaust pipe or conduit, and left on the projections of the particular opening F^2 . Supposing now a blank J , oblong in shape, as shown in Fig. 9, creased in the lines $u, u', u^2, u^3, u^4, u^5$, and held upon the projections f^3 in one of the openings F^2 , has been brought into the path of movement of the punch, and the carrier locked as described. Upon the descent of the plunger-head D the plungers c^2 and c^{2x} , shown in Fig. 7, as normally projecting a short distance below the face of the punch or cutter block E , will first come in contact with the upper surface of the blank, as shown by the dotted lines t Fig. 4, holding the blank firmly against the projections f^3 of the carrier. As the plunger-head continues to descend, the punch E will come in contact with the upper surface of the blank and will punch or cut out a portion thereof corresponding in shape to the punch E , or the dotted lines in Fig. 9, carrying the same below the projections f^3 through a similarly-shaped opening n^{10} in the bed-plate and between guide pins n^{12} projecting into the upper end of the delivery chute R . The punch is then raised by the plunger head, and the plungers c^2 and c^{2x} are finally removed from engagement with the waste portion of the blank still left resting upon the projections f^3 . The carrier is then rotated, as described, and the opening containing such waste or scraps is brought under an open-mouthed hood T , see Fig. 1, having its lower edge substantially flush with the top of the carrier and connected by a tube T' ,—only a portion of which is shown,—to a suitable air exhaust device, whereby the waste or scraps from the blank are drawn up through the hood T and pipe T' to any suitable place away from the machine, thus removing the waste material from the vicinity of the machine immediately after each blank has been punched out. As one finished blank after another is punched out and delivered to the delivery chute R as described, they will fill and pack in the same and will finally begin to appear at its open upturned end R' , and in order to provide

for the convenient removal of said finished blanks in bulk, we have pivoted a platform V at v under the open end of the delivery tube R, and have applied to another part of the said platform a device herein shown as a screw v^2 adjustable in a bracket v^3 adapted to rest on the floor, whereby the inclination of the said platform may be changed by raising or lowering said screw v^2 , the greater the inclination of the platform, the more compression will be exerted upon the finished blanks yet in the tube R by those upon the outside thereof resting upon the platform, as shown in dotted lines Fig. 2, and we may increase such pressure, as desired, by any suitable weight w' placed against the outermost blank as a follower. The blanks can then be rapidly removed in bundles compactly pressed together, by simply removing any desired quantity of the said blanks from between the block w' and the open mouth of the tube R. By this means the delivery of the finished blanks requires but little attention, the blanks are delivered in a compact and readily handled form, and they act as a species of cushion to receive the blow of the punch, for in practice the tube R is never empty of blanks, and, as has been described, the resistance of this pile of blanks may be varied by the weight w' and the inclination of the platform V.

The platform V is shown in Fig. 2 as broken out to save space on the drawings.

Referring to Fig. 3, the shank of the stud d' is shown as reduced in diameter to form a shoulder which rests against the top of the bed-plate d , and the shank below said bed plate is surrounded by a bushing d^5 , and a washer d^6 abuts against the lower end of said bushing, and to the threaded portion of said shank we have applied a nut d^7 , rotation of the said nut upon the shank pressing the washer d^6 and holding the stud d' in rigid engagement with the bed-plate d , the shoulder formed by its reduced shank preventing said stud from being drawn down so as to compress the carrier F and interfere with its rotation. Upon the outer side of the bushing d^5 and resting upon the washer d^6 is the extended hub o^{30} of the pawl-carrying lever o' , free to rotate upon said bushing, and as the bushing is shown of greater length than the said hub, rotation of the nut d^7 cannot act to also compress or hold the hub between the washer d^6 and under side of the bed-plate d .

In case it should be desired to remove the stud d' without allowing the lever o' to drop, we have provided a bracket d^9 secured to the base or frame-work and having an opening loosely surrounding the said hub o^{30} , so that when the washer and nut are removed, the hub o^{30} and its lever o' will drop only a short distance and rest upon the top of said bracket d^9 .

As the ratchet wheel e' is herein shown as secured to the under side of the carrier between it and the bed-plate d , we have pro-

vided an auxiliary plate or support e^{20} having an opening registering with the opening n^{10} of the bed-plate constituting a die corresponding in shape to, and through which the punch block E descends when punching out the blank, and we have secured the guide-pins n^{12} to such auxiliary plate e^{20} .

We do not desire to restrict our invention to the precise construction and arrangement of parts as herein shown and described, for the same may be somewhat departed from and yet come within the scope of our invention, the gist of which consists in automatically removing a blank from the bottom of a pile and placing it in position upon a positively rotatable carrier adapted to move the said blanks one by one into position to be acted upon by a punch or die, each blank as it is punched, acting upon the previously punched blanks to positively and automatically deliver them at a predetermined point.

We are aware that heretofore blanks have been taken from the top of a pile of blanks by a pneumatic suction device, said device with its blank being then swung around to place the blank in position to be acted upon by a plunger, but such construction we do not herein claim, and so far as we are aware the undermost blank from a pile has never been removed therefrom by pneumatic means prior to our invention.

We claim—

1. In a machine for forming box blanks, a movable carrier provided with blank holding openings, a reciprocating punch, and means to move the carrier and bring said openings into the path of the punch, combined with a blank support to sustain a pile of blanks adjacent to the carrier, a suction device reciprocable to and away from the bottom of said support, to engage and move in succession each undermost blank from the pile into one of the openings in the carrier, and means to reciprocate the suction device, substantially as described.

2. In a machine for forming box blanks, a movable carrier provided with blank holding openings, a reciprocating punch, and means to move the carrier and bring said openings into the path of the punch, combined with a blank support to sustain a pile of blanks adjacent to the carrier, a suction device adapted to pass through said openings successively and engage the undermost blank of the pile and draw it therefrom into an opening, and means to move the suction device to engage the blank and to thereafter remove said device from the path of the carrier, substantially as described.

3. In a machine for forming box blanks, a movable carrier provided with blank holding openings, a reciprocating punch, and means to move the carrier and bring said openings into the path of the punch, combined with supports to engage the edges of the undermost blank of a pile of blanks and sustain them above the carrier, and means to move

in succession each undermost blank from the pile into one of the openings in the carrier, substantially as described.

4. In a machine for forming box blanks, a movable carrier having openings therein, means to retain the blanks in said openings, and a support to sustain a pile of blanks adjacent to the carrier, combined with a suction device adapted to pass through said openings successively and engage the undermost blank of the pile and draw it therefrom into an opening, and means to move said suction device to engage the blank, and thereafter to remove said device from the path of the carrier, substantially as described.

5. A rotatable blank carrier, having a series of peripheral locking notches, and a reciprocating locking bolt positively actuated to engage said notches successively, combined with a wheel secured to the carrier and provided with radial notches, an oscillating lever pivoted concentric with said wheel and carrier, a dog pivoted on said lever and having a tooth to intermittently engage said radial notches, means to oscillate the lever and thereby rotate the wheel and carrier step by step, when the dog is in engagement with a notch and a positively and independently actuated tripping device to turn the dog on its pivot to withdraw it from a notch and maintain it in inoperative position during retrograde movement of the supporting lever, substantially as described.

6. In a machine for forming box blanks, a rotatable carrier having openings therein, provided with projections to support a blank at its edges, a punch to cut out the blank, and yielding plungers movable with said punch and adjacent thereto, and means to bring the openings of the carrier into the path of the punch, the yielding plungers co-operating with said projections to hold the blank during the descent of the punch therethrough, substantially as described.

7. In a machine for forming box blanks, a reciprocating punch, its support, and a series of yielding plungers adjacent to said punch and normally projecting beyond the face thereof, combined with a blank carrier provided with projections to support the blank and adapted to be brought into the path of said yielding plungers, substantially as described.

8. In a machine for forming box blanks, a rotatable carrier provided with blank receiving openings, each having projections to support a blank, a punch and means to rotate the carrier and present the blanks one by one to the punch, combined with a conduit having its open end adjacent to the face of the carrier, and means to exhaust the air from said conduit, the projections on the carrier supporting the refuse portions of the blank and presenting them to the conduit to be carried away by the exhaust, substantially as described.

9. In a machine for forming box blanks, a

punch and die, a conduit, a carrier having blank holding openings and rotatable between said punch and the mouth of said conduit, and guides in said conduit, combined with a feeding device to feed the blanks one by one into said openings, mechanism to rotate the carrier to present the blanks to the punch, and means to regulate the pressure of the blanks in said conduit, the punch forcing the blanks when cut through the openings in the carrier and into the mouth of the conduit, superimposed blanks forming a cushion for the punch, substantially as described.

10. In a machine for forming box blanks, a punch, and movable devices to convey to and sustain a blank beneath it, combined with a suction device to take the undermost blank from a pile of blanks and deposit it on the supporting devices, an exhaust to remove the surplus portions of the blank from the supporting devices after the same has been acted upon by the punch, and means for moving said devices beneath the punch and adjacent to the exhaust successively, substantially as described.

11. In a machine for forming box blanks, a rotatable carrier, a notched wheel secured thereto, a dog adapted to engage said wheel intermittently, a pivoted lever for said dog, and a guard provided with an opening and movable with said support and surrounding said notched wheel, combined with means to oscillate said lever and move the guard to expose a notch of the wheel, whereby the dog is free to enter the exposed notch, and a tripping device to positively withdraw the dog from engagement therewith, substantially as described.

12. In a machine for forming box blanks, a carrier having peripheral notches, radial blank receiving openings therein, and a ratchet wheel or plate secured thereto provided with squared notches radially in line with said openings and peripheral notches, combined with a locking device to co-operate with said peripheral notches, a dog to engage the ratchet wheel intermittently, an oscillating carrier for the dog, and a dust guard for the ratchet wheel or plate, substantially as described.

13. A support to engage the undermost blank of a pile of blanks near its sides and ends, and a carrier movable beneath said support and having an opening therein, combined with a feeding device comprising a fixed conduit and a reciprocating conduit therein, and means to exhaust the air from said conduits, the movable conduit being adapted to ascend through the opening in the carrier and engage the undermost blank of the pile of blanks, and deposit it in the said opening in the carrier by the descent of the conduit, substantially as described.

14. In a machine for forming box blanks, a suction feeding device for the blanks, comprising a fixed conduit, a movable conduit secured thereto by a telescope joint, and a mouth piece for said movable conduit having

a flexible annular lip, combined with a support for a pile of blanks, means to bring said mouth piece into engagement with the undermost blank of the pile, and an air exhausting device for said conduits, substantially as described.

15. A support for a pile of blanks, a carrier to present said blanks singly to a punch, a punch to shape the blanks, and a suction device to engage in succession each undermost blank of the pile and deposit it on the carrier, combined with a stripper to remove the blank from the suction device, substantially as described.

15 16. A plunger, a punch secured thereto, and

a series of guides secured to said plunger adjacent to the punch, combined with a series of independent yielding plungers movable in said guides and normally extended beyond the face of the punch, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN T. ROBINSON.

HENRY J. CHAMBERLAIN.

Witnesses:

GEO. W. GREGORY,

EMMA J. BENNETT.