No. 889,513. PATENTED JUNE 2, 1908.

E. E. ELDER & J. G. POOL.

PLUG CUTTING MACHINE.

APPLICATION FILED MAR. 27, 1905.

5 SHEETS—SHEET 1.

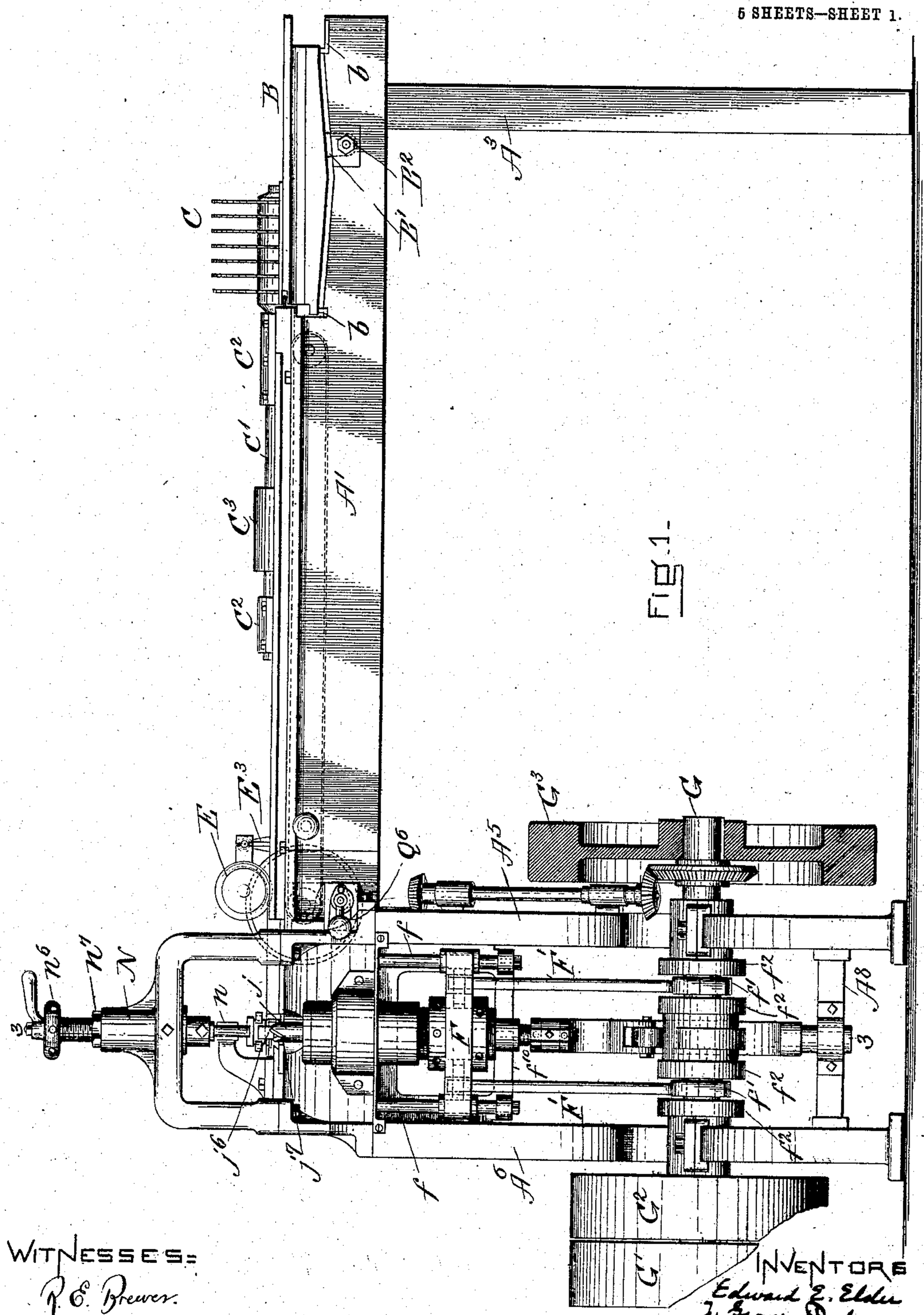

FIG. 1.

WITNESSES:

P. E. Brewer.

M. V. Foley

INVENTORS

Edward E. Elder

J. George Pool

by Chris Alley

Clarke, Raymond & Earle

No. 889,513.

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5 SHEETS—SHEET 2.

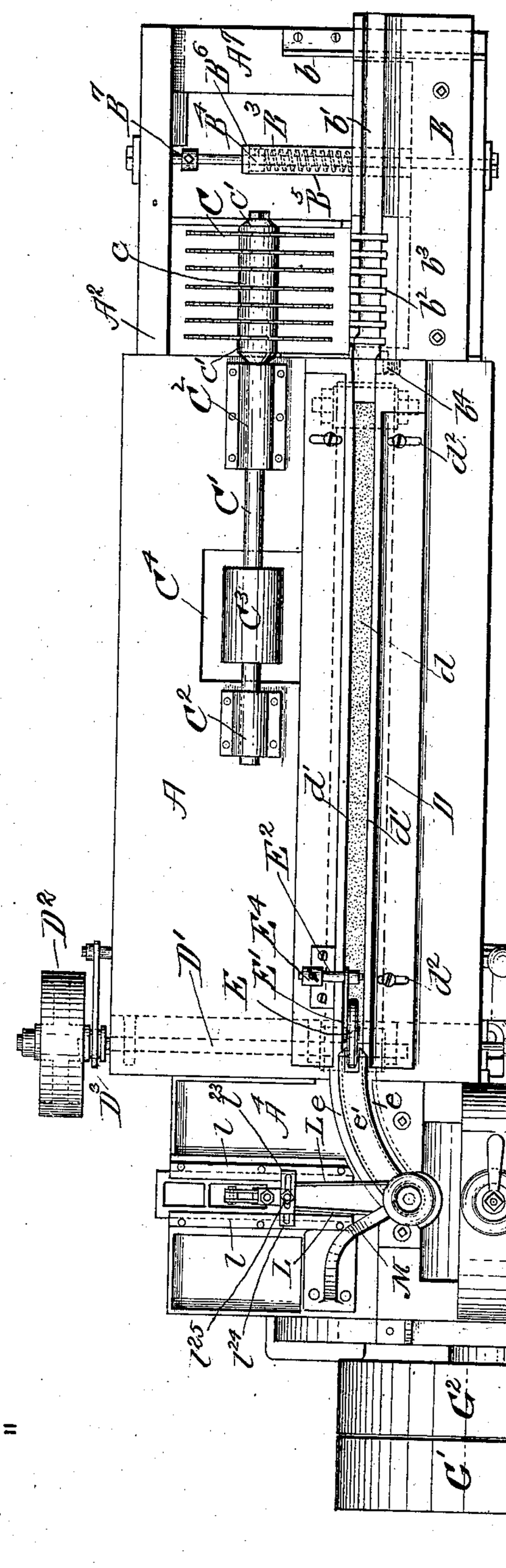

Fig. 2.

WITNESSES:

R. E. Brewer

M. V. Foley.

INVENTORS

Edward E. Elder

J. George Pool

by Clarke, Perry & Cole

Clarke, Perry & Cole

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6 SHEETS—SHEET 3.

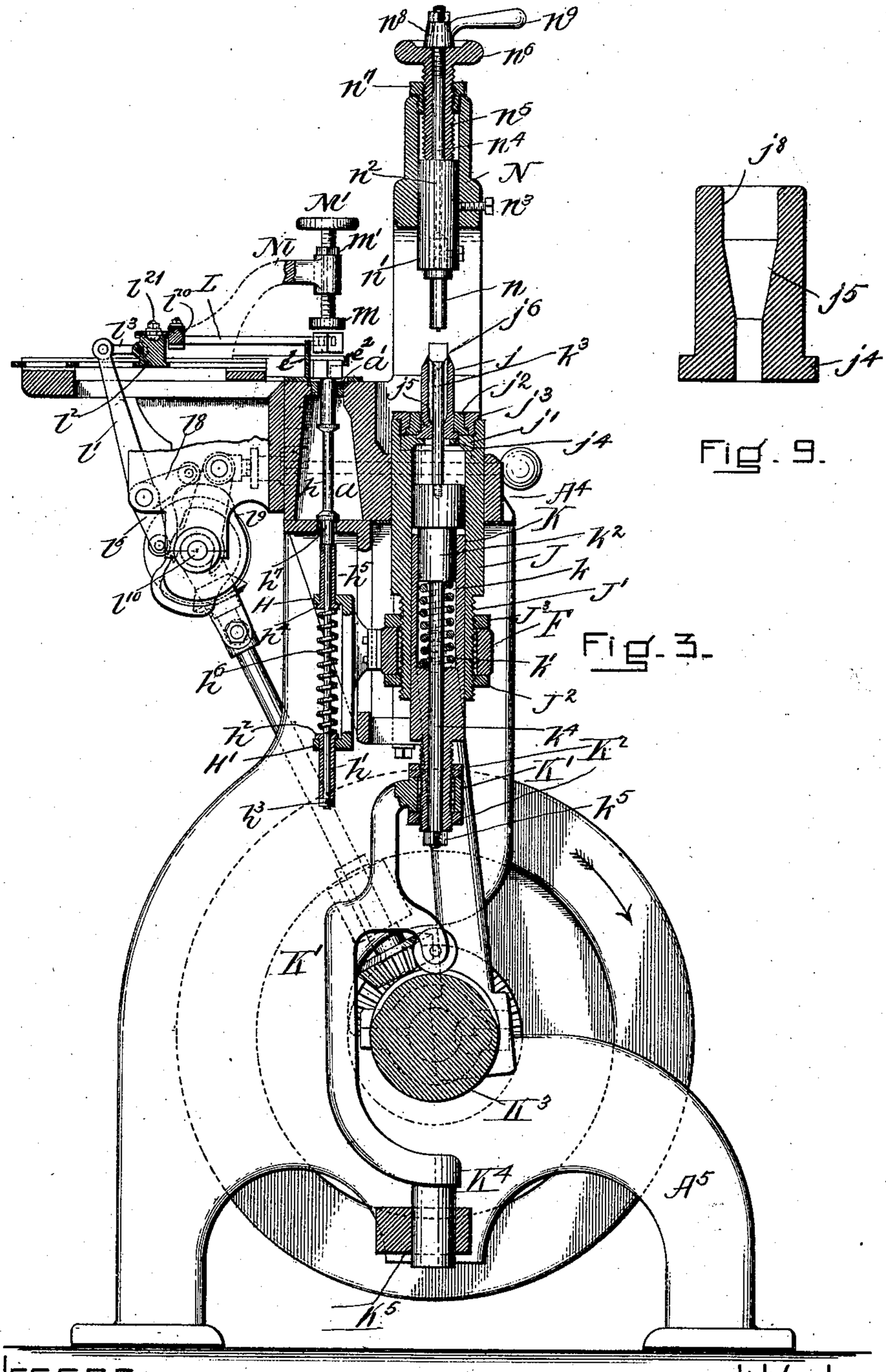


Fig. 3.




Fig. 9.

WITNESSES:

R. E. Brewer

M. V. Foley

INVENTORS

Edward E. Elder

J. George Pool

by their attys—

Clarke, Raymond & Cooke.

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5 SHEETS—SHEET 4.

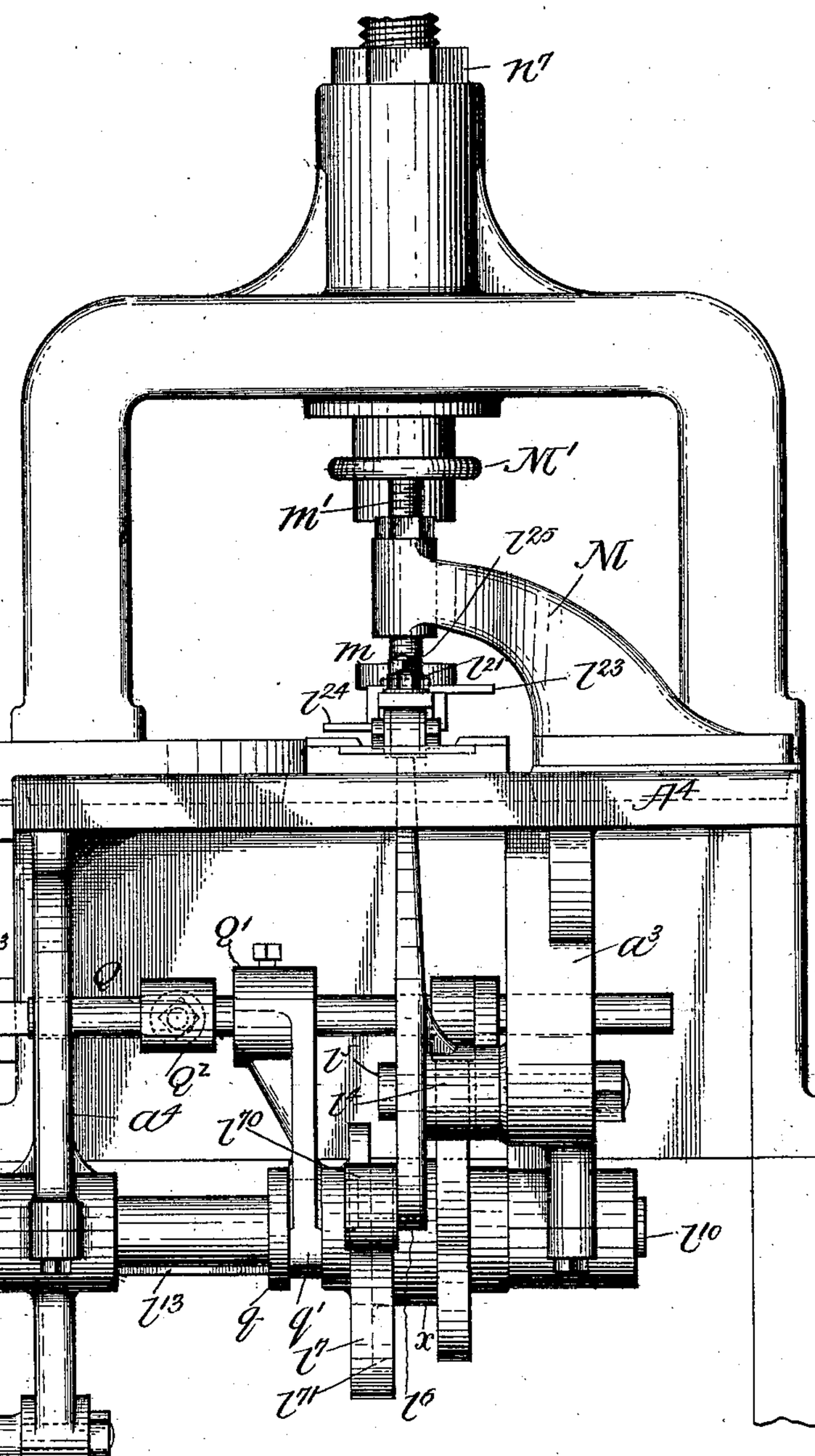


Fig. 4.

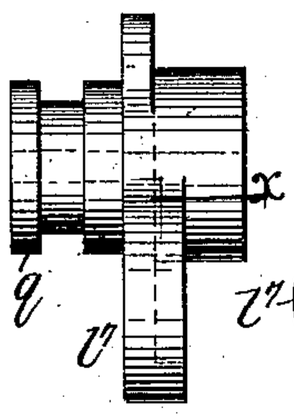


Fig. 10.

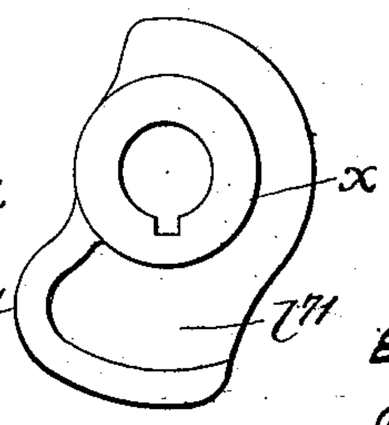


Fig. 11.

WITNESSES:

R. E. Brewer

M. V. Foley

INVENTORS

Edmund E. Elder

J. George Pool

by their attys

Clarke, Raymond & Cole.

No. 889,513. PATENTED JUNE 2, 1908.

E. E. ELDER & J. G. POOL.

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5 SHEETS—SHEET 5.

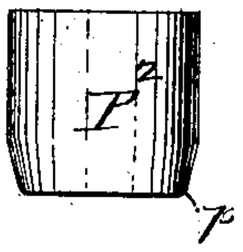


Fig. 8.


Fig. 7.

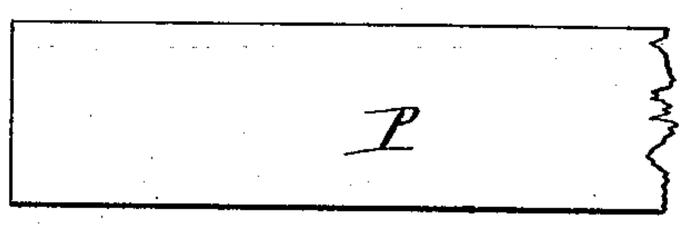


Fig. 6.

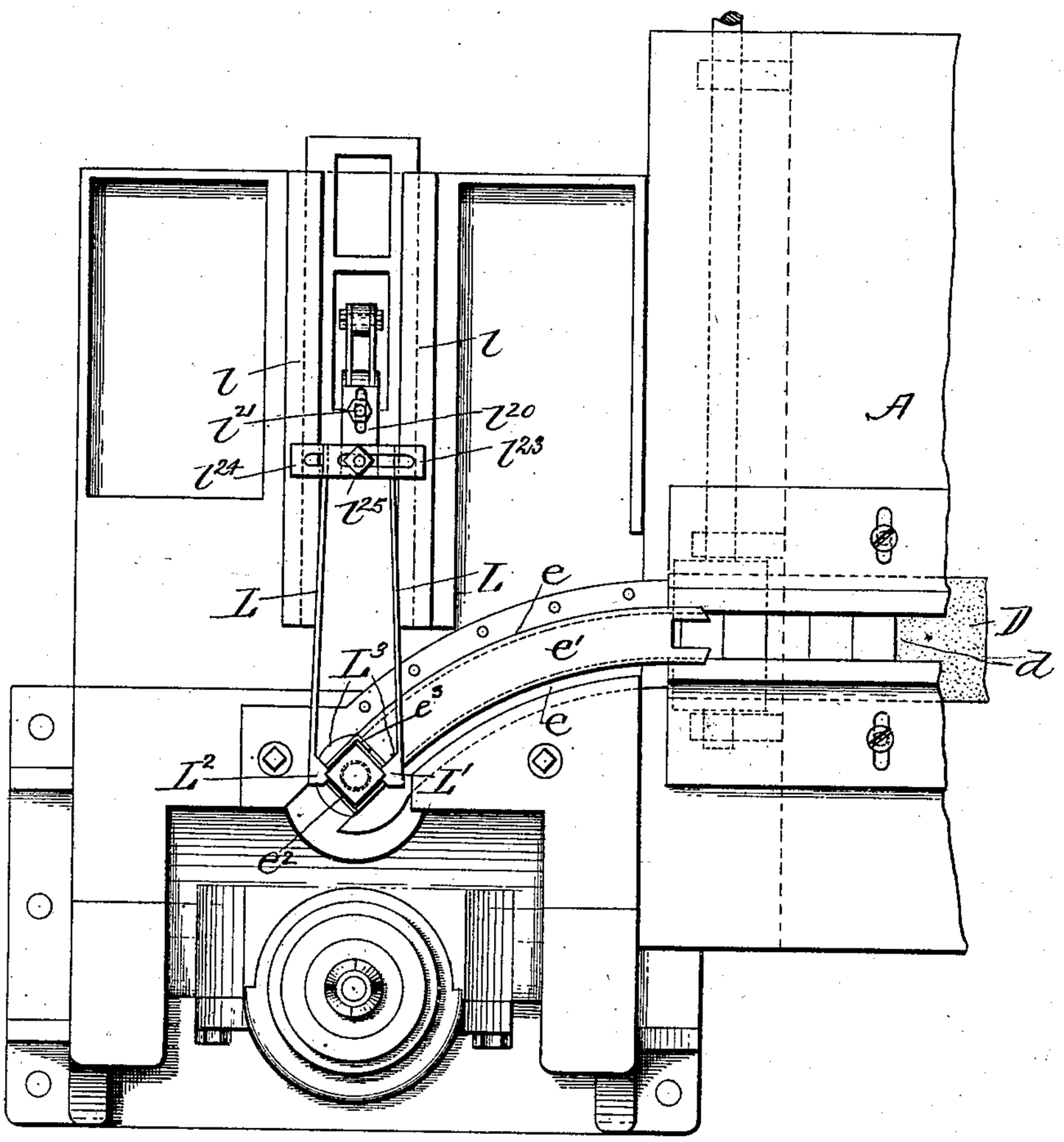


Fig. 5.

WITNESSES:
R. E. Brewer.
M. V. Foley.

INVENTORS
Edmund E. Elder
J. George Pool
by their attys
Clarke, Raymond & Coale.

# UNITED STATES PATENT OFFICE.

EDWARD E. ELDER AND JOHN GEORGE POOL, OF LYNN, MASSACHUSETTS, ASSIGNORS TO NATIONAL BUNG MANUFACTURING COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

## PLUG-CUTTING MACHINE.

No. 889,513. Specification of Letters Patent. Patented June 2, 1908.

Application filed March 27, 1905. Serial No. 252,320.

*To all whom it may concern:*

Be it known that we, EDWARD E. ELDER and JOHN GEORGE POOL, both of Lynn, in the county of Essex and State of Massachusetts, both citizens of the United States, have invented a new and useful Improvement in Plug-Cutting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention comprises an automatic machine for making plugs, stoppers or bungs, preferably of wood, of any required shape or length and either compressed in whole or in part or not as may be desired. We have represented the machine in the drawings as adapted to make partially compressed plugs from suitable blanks, but practically the same mechanism would be used in making bungs and stoppers as well, and either compressed in whole or in part or uncompressed, and herein we shall use the term "plug" as indicating not only plugs, but bungs, stoppers and similar shaped articles as well.

The invention involves blank making devices for forming from one or more strips of wood the blanks from which the plugs are made, a blank feeding mechanism for receiving the blanks from the blank making devices and for feeding them to the former, or means for shaping the plug, a plug former or shaping means of peculiar character, and means for delivering the formed plug from said former or plug shaping devices.

The blank making devices are adapted to simultaneously make a number of blanks of uniform length from one or more blank forming strips. The blank feeding devices comprise a means for receiving the blanks from the blank making devices and for feeding them to an independent blank transferrer, which also forms a part of the feeding devices and which receives in order each blank and transfers it to the plug shaping or forming devices. The plug shaping or forming devices comprise either a cutter or a die or mold or a combination of the two. The cutter is of peculiar shape and non-rotatable and when used in conjunction with a mold or die preferably is formed integral with it. By such a forming means the blank is first shaped by the cutter and then compressed by the mold and during the relative movements of the cutter and die with respect to the blank. The formed plug is freed from the die and cutter by the relative movements of both with respect to the plug, and it is removed from the machine by the feeding to the forming devices of the next blank in order by the blank transferrer.

It is desirable that the devices for forming the blanks from the blank strips shall have a movement governed by hand, in order that the supply of blanks may be regulated at will. It is also desirable that the blank transferrer shall be stopped or started at will and without stopping the operation of the remainder of the machine. The transferrer is stopped to permit the machine to gain momentum sufficient for continuous action before the first blank is fed to it and compressed and also to save parts, which might become clogged by blanks or chips, from injury.

While the machine is represented as adapted to form cylindrical or conical plugs from a square blank, we would say that other shaped blanks may be used and that with a modification of the feed, the blank transferrer and the plug forming devices are adapted to be used in feeding and forming blanks which are cylindrical in shape and which do not require to be first cut to shape by a cutter but simply to be formed to shape by compression in the die.

The construction and operation of the various parts of the machine will now be described, reference being had to the drawings, in which—

Figure 1 is a side elevation, and Fig. 2 is a plan of such a machine. Fig. 3 is a vertical section through the cutter head taken on the line 3—3 of Fig. 1. Fig. 4 is a detail enlarged showing the cam mechanism for operating the blank feed. Fig. 5 is a detail in plan of the blank feed and cutting mechanism. Fig. 6 shows the stock from which the blank is cut in side elevation. Fig. 7 is a blank. Fig. 8 is the finished plug. Fig. 9 shows a modification of the die. Fig. 10 is a view in end elevation, and Fig. 11 in side elevation of the cam for operating the blank transferrer and which is adapted to be connected and disconnected with it at will.

Referring to the drawings:—A is a table supported on side beams $A^1$, $A^2$. At one end these beams are supported by legs $A^3$. The other end rests upon the edge of the bed $A^4$ supported by the frames $A^5$, $A^6$, between which the cam shafts are hung, as will be ex-

plained below. The table A extends only a portion of the length of the beams which at one end support instead the separating mechanism. This mechanism consists of a feed table B and one or more circular saws C arranged with relation to each other as shown in Figs. 1 and 2. The table B is mounted on ways $b$ running from one beam $A^1$ towards the other $A^2$ and supported on cross beams $A^7$, the beam $A^1$ being cut away to provide for movement of the feed table as will be understood from Fig. 1.

The feed table B carries a plate $b^3$ in which is the feed groove $b^1$ in which the stock is to lie and across which there are slots $b^2$ equal in number to the number of saws. The feed table B is also provided on its under side with a lug $B^1$ through a hole in which passes the bolt $B^2$ which engages both side beams $A^1$, $A^2$, and which is surrounded by the spring $B^3$, one end of which engages the lug $B^1$, the other end being confined by a collar $B^4$ fast on the bolt $B^2$. A plate $B^5$ connects the lug $B^1$ with a second lug $B^6$ also perforated to allow it to ride upon the bolt $B^2$, and a collar $B^7$ is adjustable upon the bolt $B^2$ to serve with the lug $B^6$ as a stop to the movement of the feed table B. The purpose of this construction is to allow the feed table a limited movement towards the saws against the action of the spring for the purpose of cutting the blanks. When the blanks are cut the table will automatically return to its original position. The saws C are mounted on a shaft $C^1$ supported in bearings $C^2$ on a table A. Between the saws are collars $c$ to keep them at the required distance apart and at each end collars $c^1$ are also provided to keep the set of saws in proper relation to the end of the shaft. A nut serves to hold the outer collar $c^1$ in place. These saws are mounted to register with the slots $b^2$ in the feed table and when the machine is intended to be adjustable the collars between the saws may be made changeable for others of different thickness so that the saws may be set nearer to or farther from each other, and the plate $b^3$ may then be exchanged for one having a groove $b^1$ of proper width and in which the slots $b^2$ register with the new adjustment of the saws. Thus the machine may be made adjustable to make plugs of different width. Other adjustments in this case, however, are necessary as will be explained further on. The shaft $C^1$ carries a pulley $C^3$ projecting through an opening $C^4$ in the table A, which pulley may be connected up by a belt with any source of power.

The groove $b^1$ in the table is of a width to hold the size stock from which the blanks are to be cut and as the plugs to be formed are circular in cross section it is evident that the width of the groove should conform somewhat to the width of the spaces between the saws, or in other words, that the width of the stock should be proportioned to the size of the blanks to be cut from it.

The groove $b^1$ registers very nearly with a groove $d$ of the same widtn in the table A (as will be seen from Fig. 2) when the feed table is in its rearward position, the edge of the table A serving as a stop or guide for the operator in pushing the stock into place to present it to the saws. At the corner which serves as a stop we prefer to place a yielding finger $b^4$ mounted on the front strip $d^1$ on the table A and held normally in its forward or projecting position as shown in Fig. 2 by means of a spring or in any other convenient way, this finger by yielding exposing the edge of the strip which serves as the stop above referred to, and also serving when in its outer position to direct into the groove $d$ the blanks which have been cut and are pushed forward in feeding a fresh length of stock into the groove $b^1$.

The sides of the groove $d$ are formed by strips $d^1$ which are attached to the table A by screws $d^2$ passing through slots therein so that the width of the groove $d$ may be adjusted according to circumstances. The bottom of the groove for the greater part of its length is composed of a conveyer belt D passing at each end over suitable pulleys, the pulley at one end of the belt being mounted on a shaft $D^1$ carrying at its outer end a pulley $D^2$ to which power is transmitted by a belt and which may be connected to and disconnected from the shaft $D^1$ by a clutch mechanism of any suitable kind indicated at $D^3$. The conveyer pulleys and shaft $D^1$ may be hung in bearings below the table A in any suitable way.

The groove $d$ terminates in a passage of the same width as the groove $d$, the side walls of which are shown at $e$, preferably curved to allow for the convenient arrangement of the other parts of the machine and covered as at $e^1$. At the entrance of this passage is an idler E arranged to insure the entrance of the blanks into the passage. For this purpose its axis is mounted on an arm $E^1$ carried by a stud $E^2$ mounted in a post $E^3$ supported on one of the strips $d^1$ and held in place by set screw $E^4$. It will be noted that while passing through the groove $d$ the blanks are moved by the conveyer D but when they reach the passage $e$ they are fed by the movement of the blanks behind them, this feeding movement being insured by the idler E which is adjusted to press the blanks as they pass beneath it against the conveyer so that they are obliged to move forward.

On leaving the passage $e$ the blanks are delivered to a lifter, which lifts each blank in turn into position to be caught by jaws by which it is delivered to the cutting tool. These various mechanisms will now be described.

F is a cross head which slides vertically on

rods *f* depending from the under side of the bed $A^4$ and supported at their lower ends by the brace $f^{10}$. A pitman $F^1$ on each side of the cross head connects it with crank pins $f^1$, each connected at each end with a crank disk $f^2$ mounted on the shaft G. This shaft is mounted in the frames $A^5$, $A^6$ and carries at one end fast and loose pulleys $G^1$, $G^2$, and at the other end a balance wheel $G^3$. Thus by the rotation of the shaft G the cross head F is caused to reciprocate. From the rear of the cross head projects a yoke comprising two arms H, $H^1$, which furnish supports and operating means for the lifter. The lifter comprises a rod *h*, the lower end of which slides in a sleeve $h^1$ carried in the lower arm $H^1$ of the yoke and having a flange $h^2$ which rests on the arm $H^1$. A nut $h^3$ on the end of the lifter *h* causes the lifting of the sleeve $h^1$ when the rod *h* is lifted. Between the flange $h^2$ and a similar flange $h^4$ on a similar sleeve $h^5$ which passes up about the lifter and through the arm H is a spiral spring $h^6$ which surrounds the lifter *h*. The lifter also has a collar $h^7$ located just above the sleeve $h^5$ so that as the cross head is raised, lifting the yoke, the sleeve $h^5$ is lifted being supported upon the spring $h^6$ and lifts the collar $h^7$ and the lifter *h*, until the lifter strikes an obstruction above it, as will be described below, when the spring $h^6$ yields allowing the yoke to continue its upward movement. The bed $A^4$ is chambered at *a*, the upper end of the chamber being closed by a throat plug $a^1$ through the opening in the middle of which the upper end of the lifter *h* moves, the throat piece serving as a floor for the extreme end of the passage *e*, or rather as a platform upon which the blanks are delivered in turn from the passage *e*. This platform is provided with a retaining wall $e^2$ which serves as a stop and gage to the blank as it is pushed out onto the platform, being shaped to conform to and receive the blank, prevent it from being pushed too far, and hold it in place over the lifter.

The cross head F in addition to moving the lifter *h* raises also the cutter *j* carried by the reciprocating slide J attached to the cross head. The cutter is mounted upon a platform $j^1$ and is held in place by a collar $j^2$ and nut $j^3$, the cutter itself being provided with a shoulder $j^4$ at its lower end so that it may be bound in place by the various means referred to. This construction enables the cutter to be exchangeable for a cutter of another size by using a platform $j^1$ and collar $j^2$ of appropriate size. Moreover, the location of the cutter with relation to the other parts of the machine may be adjusted for the reason that the lower portion of the slide J is threaded as at $J^1$ and it passes through an opening in the cross head and is set in place by means of the nuts $J^2$ and $J^3$. By this means it will be noted that its height may be adjusted according to the thickness of the block to be cut. The slide and cross head are splined to prevent the turning of the slide.

The slide J passes through a suitable guiding opening in the bed $A^4$.

Within the slide J, which is chambered for the purpose, is a movable bearing K which is chambered as at *k* to receive a spring $k^1$ upon which is mounted a splined plunger $k^2$ carrying at its upper end a discharging rod $k^3$ and at its lower end a guide rod $k^4$. The spring lies around the rod $k^4$ and rests upon the bottom of the chamber *k* holding the plunger $k^2$ slightly above the top of the bearing K. The rod $k^4$ extends through the bearing K, its lower end being held from pulling through the plunger by a nut $k^5$. It will be noted that as shown the plunger has a slight movement with relation to the bearing and the cutter has a considerable movement with relation to it. The lower end of the bearing K is threaded and passes through the upper end of a yoke $K^1$ being held therein by set nuts $K^2$, the bearing and yoke being splined together. The cam is shown at $K^3$ in Fig. 3 and serves to give to the discharging rod a slight movement with relation to the cutter when the cutter is in its lowest position. For this purpose the yoke is C-shaped, its lower end $K^4$ sliding in a socket $K^5$ on the cross bar $A^8$ and serving as a guide to give it the necessary vertical movement. The socket $K^5$ and end $K^4$ are splined to prevent the yoke $K^1$ from rotating.

The cutter is lifted by the movement given to the cross head F while the discharge rod has only a slight movement due to the shape of the cam $K^3$, sufficient to allow it to receive the blank from the feed and hold it against the punch while the cutter rises. It remains in this position during the movement of the cutter while cutting and pressing the blank and makes its descent with the cutter. It reaches its lowest position before the cutter so that the further movement of the cutter causes the discharge rod to discharge the plug from the tube within the cutter.

The blank is fed to the cutter by means of a pair of spring jaws L mounted on slide $l^2$ sliding in ways *l* carried by the bed $A^4$, these spring jaws having a movement from a position above the lifter *h* to a position over the cutter *j*. We prefer to give the jaws the necessary reciprocations by means of a lever $l^1$ connected to the slide $l^2$ by means of links $l^3$. The lever has a hub $l^4$ which rocks on a stud $l^5$ projecting from a hanger $a^3$ below the bed $A^4$. The lower arm $l^6$ of the lever $l^1$ carries a cam roll $l^{70}$ resting on the cam $l^7$ and in addition the hub carries a second arm $l^8$ having a cam roll which rests on the cam $l^9$. These cams are suitably shaped and set to act upon the two arms $l^6$ and $l^8$ and give the jaws the proper reciprocation. The cams $l^7$, $l^9$ are mounted on the shaft $l^{10}$ hung in hang-

ers below the bed $A^4$ and are rotated by means of a shaft $l^{11}$ having at each end a bevel gear, the gear at one end meshing with a bevel gear $l^{12}$ on the cam shaft $l^{10}$, and the other upon a bevel gear on the cam shaft G.

The spring jaws L themselves are provided with notches $L^1$, $L^2$ to receive the corners of the blank. In order that they may be adjusted accurately to their work we provide a block $l^{20}$ having a slotted plate which rests on top of the slide $l^2$ and is adjustably attached thereto by the screw $l^{21}$. Each jaw formed at the end of a leaf spring is attached to the block $l^{20}$ by means of an L-shaped finger so mounted upon it that the long arm $l^{23}$, $l^{24}$ of the jaw L is at right angles to the length of the spring. These long arms are slotted and the fingers are so shaped that one of the long arms $l^{23}$ will rest on top of the block $l^{20}$ and the other lie beneath it, the fingers and block being held in adjustable relation by means of the screw $l^{25}$. The jaws are located slightly above the level of the cutting edge of the cutter when in its lowest position in order that they may be able to receive a blank from the lifter and deliver it properly to the cutter. To prevent the block from being lifted too high by the lifter we provide an arm M carrying at its end a vertical screw $M^1$ having a gage plate $m$ at its lower end, and a set nut $m^1$. Upon its upward movement the lifter $h$ carries the block upward until it engages the under surface of the gage $m$ and holds it there until the jaws grip it. The spring jaws L upon their return movement after placing a block upon the cutter will be sprung upon the blank and they are so shaped as at $L^3$ as to engage the corners of the blank which at this moment is held between the lifter $h$ on the bottom and the gage $m$ on the top with a force depending upon the strength of the spring $h^6$ and also by an angular projection $e^3$ from the top $e^1$ of the curved feeding passage which prevents the blank from yielding horizontally while the jaws crowd past it. The surfaces $L^3$ of the jaws slide over the corners of the blank and engage the notches $L^1$, $L^2$ against the blank, and thereafter the lifter begins its descent and the blank is left suspended between the spring jaws. The spring jaws now carry the blank to the cutter and for this purpose are given a movement which properly centers the block over the cutter. The discharge rod now rises and engages the upper surface of the blank against the punch $n$. This punch is held in a socket in the holder $n^1$ which is adjustable in the inverted U-shaped frame N mounted on the bed $A^4$. We prefer to adjust its position in the frame in the following manner. The holder $n^1$ is provided with a spline $n^2$ fitting into a groove in the frame N. A set screw $n^3$ holds it in place when properly adjusted. The upper end of the holder is reduced in diameter as at $n^4$ and passes up through a sleeve $n^5$, which is threaded on its exterior and terminates in a wheel $n^6$. A nut $n^7$ engages the threads on the exterior of the sleeve $n^5$ and is provided with threads on its exterior to engage threads on the interior of the frame N. A nut $n^8$ provided with a handle screws on to the upper end of the part $n^4$ and serves as a check nut, being held from turning more than a fraction of a turn by a stop nut. By loosening the handle $n^9$ the sleeve $n^5$ may easily be turned in either direction to raise or lower the punch and when adjusted the handle $n^9$ is again turned to join the parts together.

We have shown in Fig. 6 a piece of stock P from which has been cut the blank $P^1$, Fig. 7, and at Fig. 8, is shown the preferred form of plug $P^2$, which it will be noted, has a compressed or smaller surface $p$ at the bottom than at the top. In order to cause this compression the lower part of the chamber within the cutter may be beveled inward as at $j^5$ to form a die so that as the blank is driven down into this lower portion of the cutter by the punch the pressure which tends to drive it down and cause the cutting operation to take place will also cause its lower end to be compressed into this beveled surface.

In case for any reason it is desired to stop the feeding of the blank to the cutter without stopping the machine as a whole, this may be accomplished by the mechanism shown in Figs. 3 and 4, in which Q is a slide rod sliding at one end in the hangers $a^3$, $a^4$, having an arm $Q^1$ fixed thereto and also having a collar $Q^2$ which is connected by a pitman $Q^3$ with the crank disk $Q^4$. This crank disk $Q^4$ may be turned by means of a rod $Q^5$ hung in bearings under the frame and having a suitable handle $Q^6$ at its outer end. The turning of this rod will move the slide rod Q in either direction according to circumstances. The cam $l^7$ is slidable lengthwise upon the shaft $l^{10}$, $l^{13}$, there being a feather enabling it to be moved lengthwise and at the same time turn with the shaft. The cam $l^7$ has a grooved hub $q$, adapted to receive the end of the arm $Q^1$, so that when the arm is moved by the longitudinal movement of the slide rod Q it will move the cam $l^7$ from under its cam roll to a position out of connection therewith, thus disconnecting the spring jaws from their source of forward movement, while cam $l^9$ remains in action on arm $l^8$, which draws jaws L to rear position (see Fig. 3), where they remain, while cam $l^7$ is out of action. This cam $l^7$ can be thrown either in or out of action while the machine is running owing to the peculiar construction of the cam. This construction will now be described.

By the arrangement of cams and levers as

above described, the cam $l^7$ acting upon the lower arm $l^6$ of the lever $l^1$ serves exclusively to move slide $l^2$ forward, to place the blank over the die, while cam $l^9$ acting upon lever arm $l^8$ serves exclusively to return slide $l^2$ back over the lifter. These cams acting together serve to carry the slide $l^2$ backward and forward at proper intervals and without lost motion. Thus it will be seen that when the cam $l^7$ is withdrawn from its connection with arm $l^6$ of the lever, the lever will be carried back to its rear position and there remain. In order that this cam $l^7$ may be thrown either in or out of action while the machine is running, we have adopted the following method of construction:—

The cam roll $l^{70}$ on arm $l^6$ is made longer or with a wider tread than that of lever $l^8$. The object of this will be explained below. On cam $l^7$ and on the side facing cam $l^9$ is formed a hub or boss $x$ of such diameter as will co-incide on its periphery with the lowest depression in the face or tread of cam $l^7$. This hub or boss must be of such length from face of cam that it shall remain in the path of roll $l^{70}$ when cam $l^7$ is withdrawn from same. This then acts as a stop to motion of lever $l^1$ when it is returned to its rear position by the continued action of cam $l^9$ on arm $l^8$. Starting from hub or boss above mentioned all of the front or driving face of cam $l^7$ together with all or part of such surface as shall lie concentric with the axis of motion and in immediate connection with forward or driving face of cam $l^7$ is made wider or thicker than the remaining receding and concentric portions by a considerable amount, preferably not less than $\frac{1}{4}$ inch. It is also preferable to give this wider portion the form of a rim allowing it to lie wholly upon that side of the cam on which is placed the boss $x$ above referred to. Such rim to be effective must be at such a distance from the surface of the boss above mentioned (except where it runs down the leading face of cam to meet the boss) as to allow the cam roll to freely enter the space formed between it and the boss above mentioned. The cam roll is made equal in width to the widest portion of the face of the cam and the sidewise motion of cam must be greater than its greatest width in order that this mechanism shall be satisfactory in its operation. The operation of these parts is described thus: Cam shaft $l^{10}$ being in rapid revolution and carrying cams $l^7$ and $l^9$ the handle $q^6$ is turned which by above described means causes cam $l^7$ to slide laterally on shaft $l^{10}$ in the direction of lever $l^1$. This brings the side of the thin part of cam $l^7$ in contact with the end of cam roll $l^{70}$ where it meets a smooth plane surface on which it slides until the cam by its revolution presents its leading or driving surface to the roll. This surface, however, starts at a point on the boss of cam $l^7$ on which the roll $l^{70}$ now rests and also a portion of its surface due to its wider face lies in a direct path with a portion of the cylindrical surface of the roll $l^{70}$ which it easily and properly engages and starts the slide $l^2$ on its forward movement, when this proper engagement of the cam $l^7$ and cam roll $l^{70}$ occurs. Continued pressure on the handle $q^6$ readily causes the cam to slide completely under the roll before the narrower or thinner portion of the cam reaches it and the cam remains in full operation. Of course merely withdrawing cam $l^7$ by a reverse movement of handle $q^6$ disconnects the motion. The handle $q^6$ is made to perform a half revolution in performing its work and is held in a horizontal position in either direction by fixed stops and is weighted by a ball or knob formed on the end of same so as to insure its being carried to its limit in either direction.

When starting up the machine it is also desirable to disconnect the feeding mechanism from the other running parts in this way so that the cutter may acquire some momentum before feeding to it the plug to be cut. This is especially desirable when a very hard wood or a large sized plug is to be cut.

While the operation of the machine may be understood without describing it in detail it may be well to say that, the stock being shoved by hand into the groove $b^1$ until it strikes the edge of the table A, the feed table is pushed toward the saws which divides the blanks. The feed table being released returns to its original position and in feeding the next portion of the stock against the edge of the table A, the separated blanks are pushed into the groove $d$ from which they eventually pass under the idler E and into the passage formed by the walls $e$ and at last one by one are fed to the jaws L by the lifter. Each in turn is seized by the jaws at the end of its rearward movement and carried under the punch against which it is pressed by the discharge rod and later by the cutter which now rises past the end of the discharge rod and as the punch is stationary it drives the blank down into the cutter and compresses its lower end against the surface $j^5$ of the chamber within the cutter. When this has taken place, the cutter is withdrawn, the discharge rod and cutter holding the plug until it has been forced out from the cutter by the discharge rod on which it rests until knocked off by the next block brought forward by the jaws.

While the movements given to the various parts are simple and may be given to the various instrumentalities in other ways than those shown and while the parts themselves may be changed in form, the machine as described above has proved successful in practice, simple in construction and in all respects economical and therefore is the best embodiment of our invention now known to

us. We prefer to make the cutter cylindrical and having advancing points $j^6$ at opposite sides which enter the wood and retreating edges $j^7$ therefrom so that the plug is cut by what may be termed a draw cut.

We have shown in Fig. 9 a section of a die intended to be used without a cutter, that is to say, the upper edge of the die instead of being a cutting edge has a plain smooth finish and the die is intended for the purpose of compressing a plug which has been previously rounded in some manner. For this purpose the die is suitably shaped to be substituted for the cutter $j$, being provided for this purpose with a shoulder $j^4$ at its lower end. Such at least is the simplest manner of using such a die. It will be noted from Fig. 9 that the interior surface of the die as shown is partly cylindrical as at $j^8$ and partly conical as at $j^5$, thus forming cylindrical and conical chambers, respectively. In practice it is desirable that the cylindrical surface $j^8$ shall be as long as, or slightly longer than the length of the plug to be compressed, and this is desirable also in cases where the upper edge of the die is provided with a cutting surface. The cylindrical portion forming as it does a receiving chamber for the blank engages the lateral surfaces of the blank and prevents any tendency on the part of the blank from disintegrating when submitting to the heavier pressure of the compression chamber. When such a die is used in our machine the feeding to the die may take place in the ordinary manner and the operation of the machine will be as above described. The blank being fed into the cylindrical portion of the die is crowded by the upward movement of the die into its conical portion $j^5$ and there compressed and then is discharged therefrom as above described by means of the discharge rod.

We have described the cutter adapted to cut a circular plug as that shape is the more often used. By changing the shape of the cutter, however, plugs of other shapes may be cut. Moreover, whatever their shape the plugs may be compressed or not as described. If the plugs are to be compressed the lower section of the chamber within the cutter will be made smaller than the upper section either by a gradual or rapid decrease according to the amount of compression to be given to the plug, or the chamber may be made of the same size all the way down, in which case the plug will not be compressed. The same results may be obtained by properly proportioning the relative movements of the cutter and discharge rod so that the plug, for example, will be discharged before it reaches the diminished section of the chamber within the cutter. It is evident that these same remarks apply as well where the compressing die is used without a cutting edge as is above described.

What we claim as our invention is:—

1. In a plug making machine; the combination with a chute and means for feeding blanks therethrough with their edges in contact, said chute having a curved extension causing the blanks to make a partial turn in their passages therethrough, means for pushing a blank, as it emerges from the end of said curved extension, transversely to the plane of its movement through said chute to a different plane, to expose its edges, and a blank transferring or carrying device reciprocating across the plane of movement of the blanks in the said chute and also across the plane of movement of the said pushing means, and arranged to engage the corners of a blank which has been forced away from the said extension.

2. In a plug making machine, the combination with a chute and means for feeding blanks therethrough with their side edges in contact, said chute having a curved extension causing the blanks to make a partial turn in their passage therethrough, means for pushing a blank, as it emerges from the end of said curved extension, transversely to the plane of its movement through said chute to a different plane, to expose its edges, a blank transferring or carrying device reciprocating across the plane of movement of the blanks in the said chute and also across the plane of movement of the said pushing means, and arranged to engage the corners of a blank which has been forced away from the said extension, and means for throwing the said blank-transferring or carrying device into and out of operation while the machine is running.

3. In a plug cutting machine, the combination with a cutting device comprising a hollow cutter and a coöperating punch, of operating means for the said cutting device, a yieldingly mounted discharging rod or ejector within said hollow cutter and longitudinally movable relatively thereto, said discharging rod or ejector, in coöperation with said punch, serving as a clamp to hold the blanks for the cutting operation, a guideway through which the blanks are fed, a lifting and clamping device by which the blanks are individually seized as they emerge from said guideway and moved from the line of said guideway and momentarily clamped, and a reciprocating transferring or carrying device which engages the blanks while thus lifted and clamped and carries them forward to the said cutting device.

4. In a plug cutting machine, the combination with a cutting device comprising a hollow cutter and a coöperating punch, of operating means for the said cutting device, a yieldingly mounted discharging rod or ejector within said hollow cutter and longitudinally movable relatively thereto, said discharging rod or ejector, in coöperation with said punch, serving as a clamp to hold

the blanks for the cutting operation, a guideway through which the blanks are fed, a lifting and clamping device by which the blanks are individually seized as they emerge from said guideway and moved from the line of said guideway and momentarily clamped, a reciprocating transferring or carrying device which engages the blanks while thus lifted and clamped and carries them forward to the said cutting device, and means for throwing the said blank transferring or carrying device into and out of operation while the machine is running.

5. In a machine of the character specified, the combination with a cutter, of a feed for the blanks, means for receiving the blanks as they are fed and separating them from the line of their feed, a reciprocating carrier adapted to grip said blanks when separated as aforesaid and carry them to the cutter, a lever operating said reciprocating carrier, cams positively operating said lever both forward and backward or towards and away from said cutter, and means whereby the cam serving to move said lever in the direction of said cutter may be manually thrown into an inoperative position during the operation of said machine.

6. In a machine of the character specified, the combination with a cutter, of means for receiving the blanks as they are fed and separating them from the line of their feed, a reciprocating carrier adapted to grip onto said blanks when separated as aforesaid and carry them to said cutter, a lever operating said reciprocating carrier, arms carried by said lever, cam rolls carried by said arms, a cam shaft, cams arranged upon said shaft and adapted to engage respectively with said rolls for moving said lever and reciprocating carrier towards and from said cutter, means whereby the cam causing the reciprocation of said carrier towards said cutter may be moved at will laterally along said cam shaft into an operative or inoperative position with respect to its cam roll during the operation of the machine, and means whereby the cam roll of said laterally-moving cam, upon restoring it from an inoperative to an operative position, may engage gradually with the operating face of said cam.

7. In a machine of the character specified, the combination with a cutter, of means for receiving the blanks as they are fed and separating them from the line of their feed, a reciprocating carrier adapted to grip onto said blanks when separated as aforesaid and carry them to said cutter, a lever operating said reciprocating carrier, arms carried by said lever, cam rolls carried by said arms, a cam shaft, cams arranged upon said shaft and adapted to engage respectively with said rolls for moving said lever and reciprocating carrier towards and from said cutter, means whereby the cam causing the reciprocation of said carrier towards said cutter may be moved laterally along said cam shaft into an operative or inoperative position with respect to its cam roll during the operation of the machine, and means, movable with said cam, forming a stop preventing any undue backward movement of said lever after cutting out the cam causing the forward movement thereof.

8. In a machine of the character specified, a reciprocating cutter adapted to shape a blank, a chambered slide carrying said cutter, a shaft from which said slide is reciprocated for reciprocating said cutter and means for such reciprocation, means to clamp a blank while being cut by said cutter comprising a clamp member against which the blank may be held, and coöperating therewith a rod located within said cutter, a sliding member inside the chamber of said slide carrying said rod, a yielding support within the chamber of the slide for said sliding member within the same, and means whereby the sliding member within said slide may be operated from said shaft.

9. In a machine of the character specified, the combination with a cutting device, of a chute or guideway for the blanks, means for feeding the blanks through said chute or guideway, a lifting and clamping device which seizes the blanks as they emerge from said chute or guideway and carries them out of their plane of movement through said chute or guideway and momentarily holds them, said lifting and clamping device comprising a reciprocating spring-supported lifting rod and an opposing adjustable stop or gage, and a reciprocating spring-jawed transferring or feeding device for carrying the blanks from said lifting and clamping device to said cutting device.

10. In a machine of the character specified, the combination with a cutting device, of a chute or guideway for the blanks, means for feeding the blanks through said chute or guideway, a lifting and clamping device which seizes the blanks as they emerge from said chute or guideway, and carries them out of their plane of movement through said chute or guideway and momentarily holds them, said lifting and clamping device comprising a reciprocating spring-supported lifting rod and an opposing adjustable stop or gage, a reciprocating spring-jawed transferring or feeding device for carrying the blanks from said lifting and clamping device to said cutting device, and means for throwing the said transferring or feeding device into and out of operation while the machine is running.

EDWARD E. ELDER.
J. GEORGE POOL.

In the presence of—
F. F. RAYMOND, 2d.,
J. M. DOLAN.