

966,440.

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GLASS PRESS.
APPLICATION FILED NOV. 29, 1909.

966,440.

Patented Aug. 9, 1910.

5 SHEETS—SHEET 2.

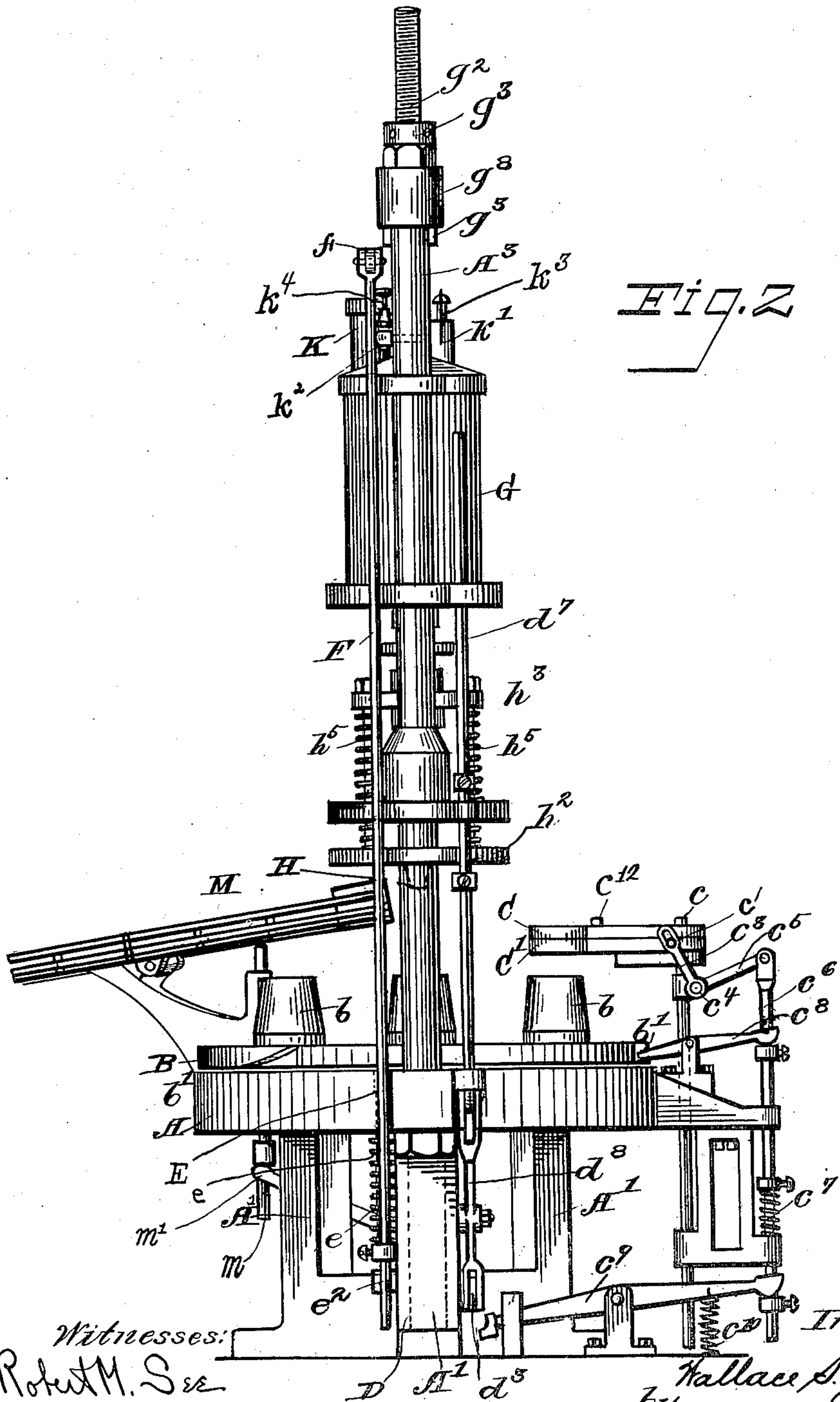


Fig. 2

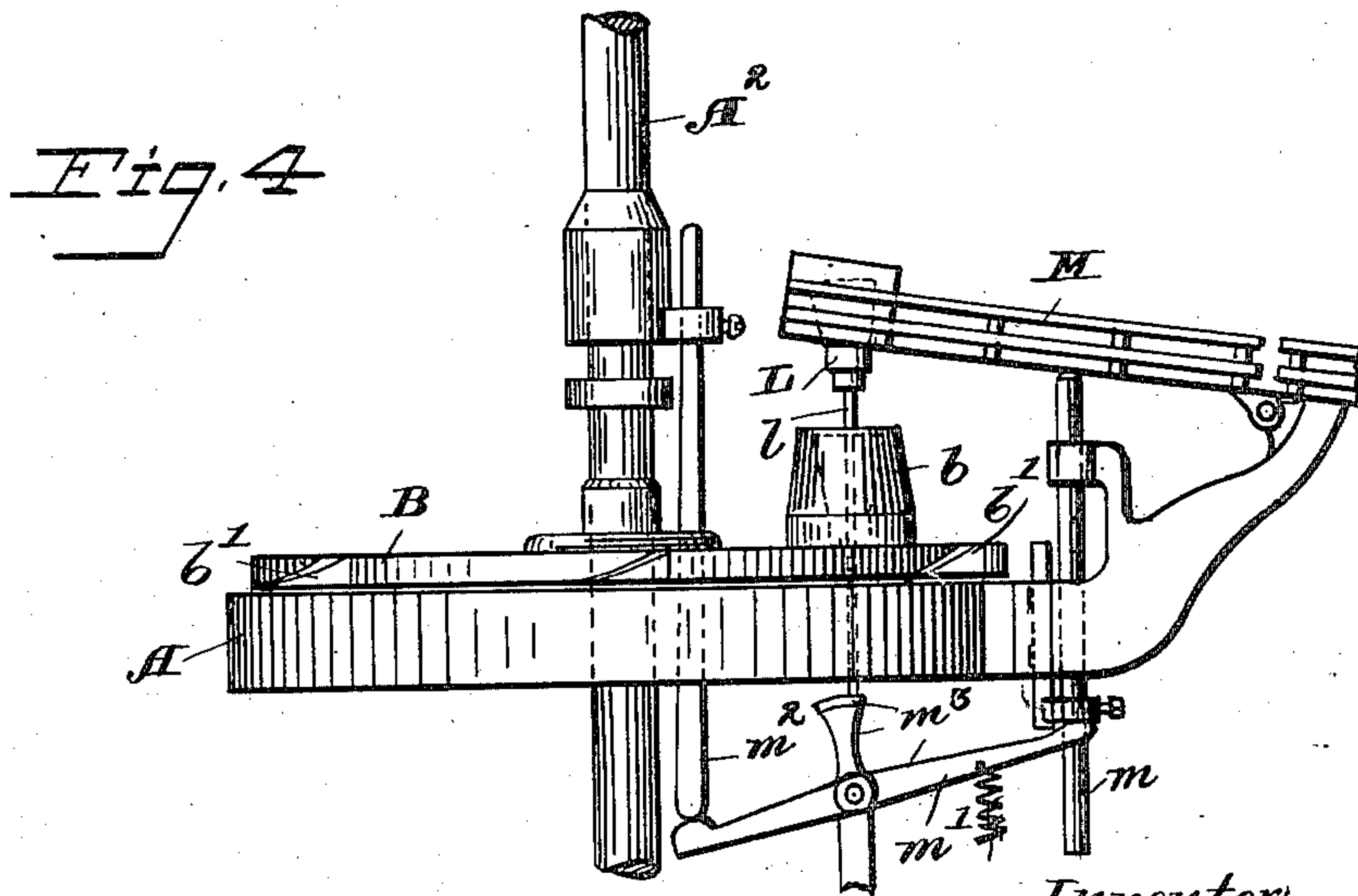
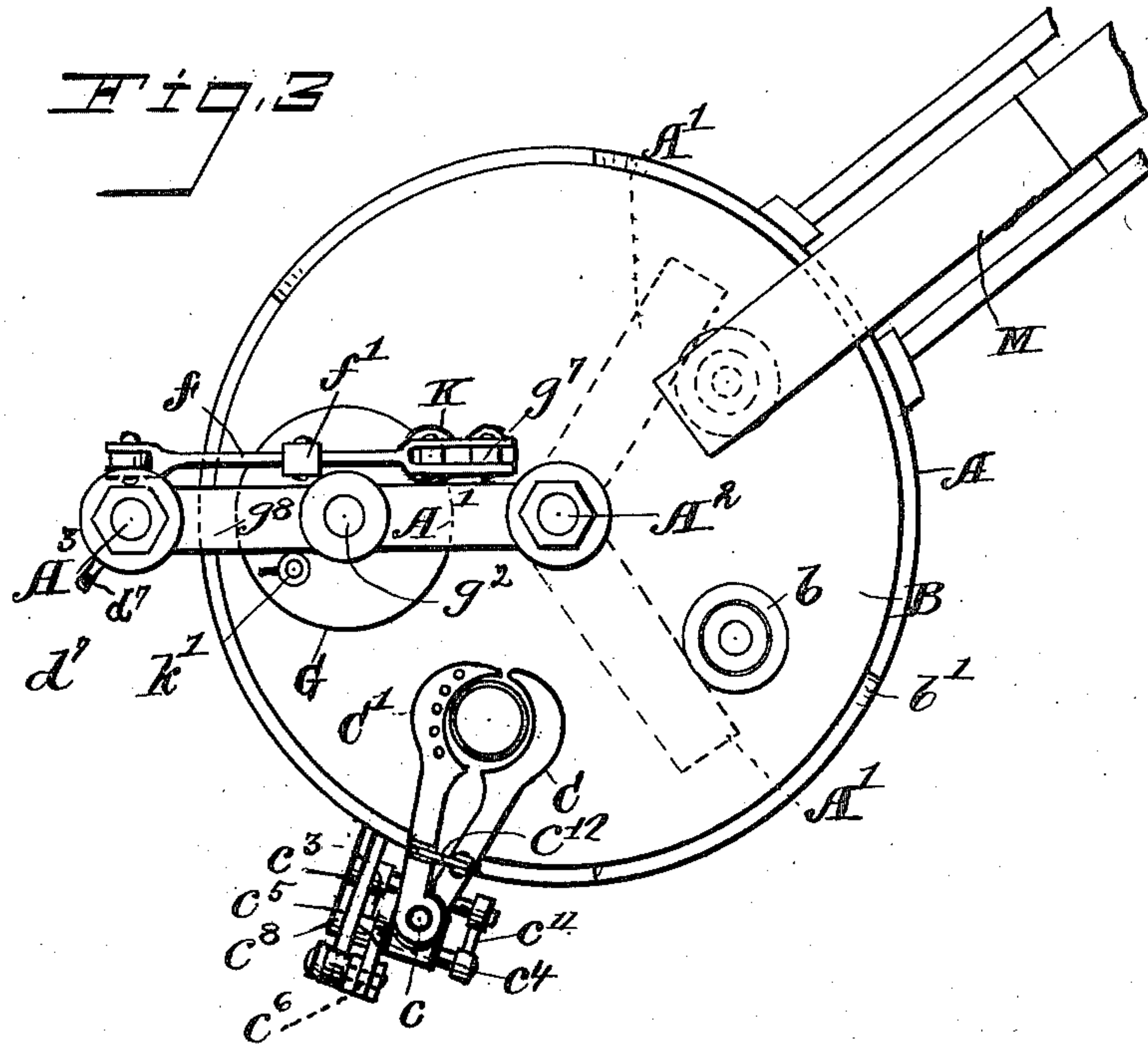
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6 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

Fig. 5

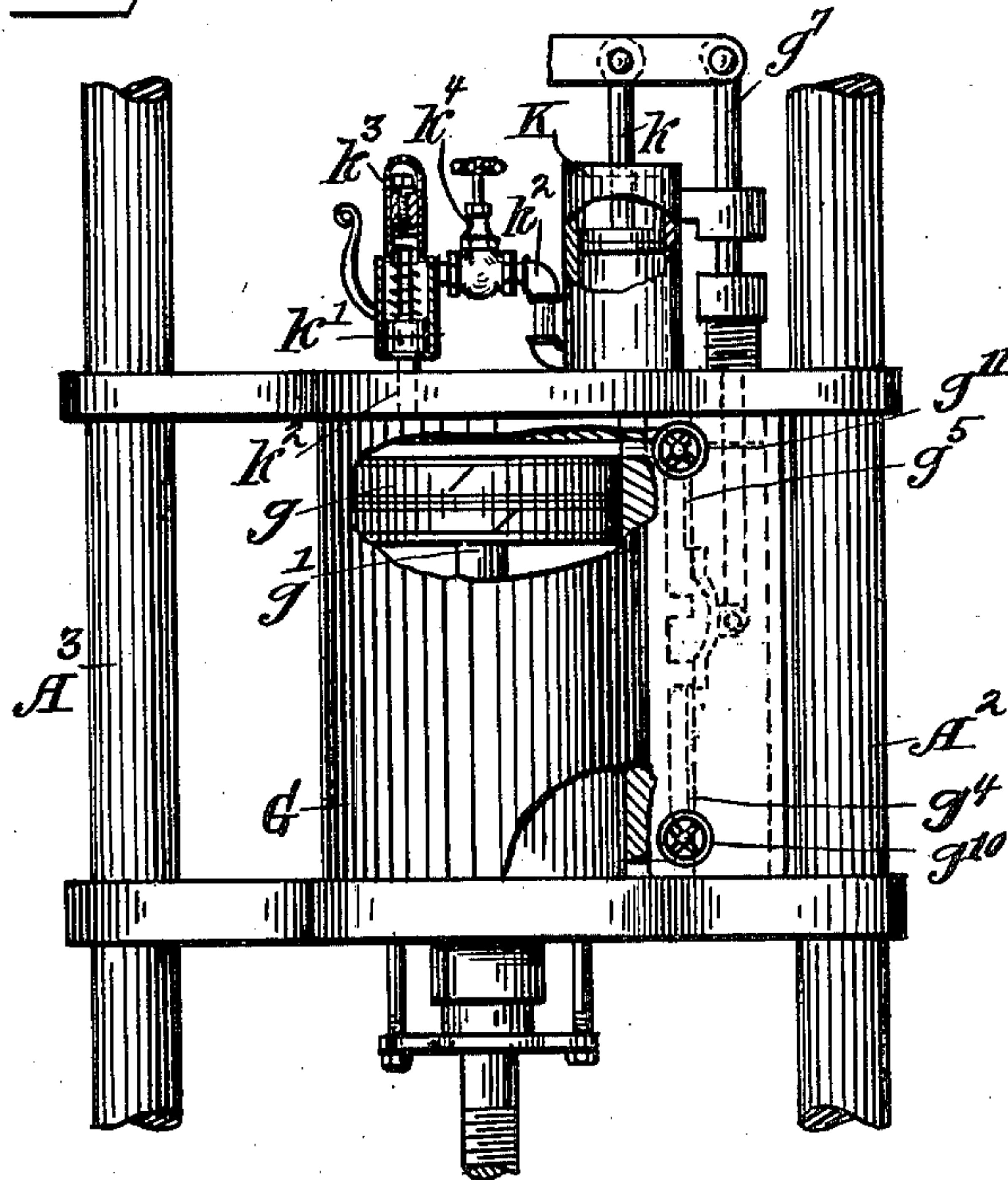
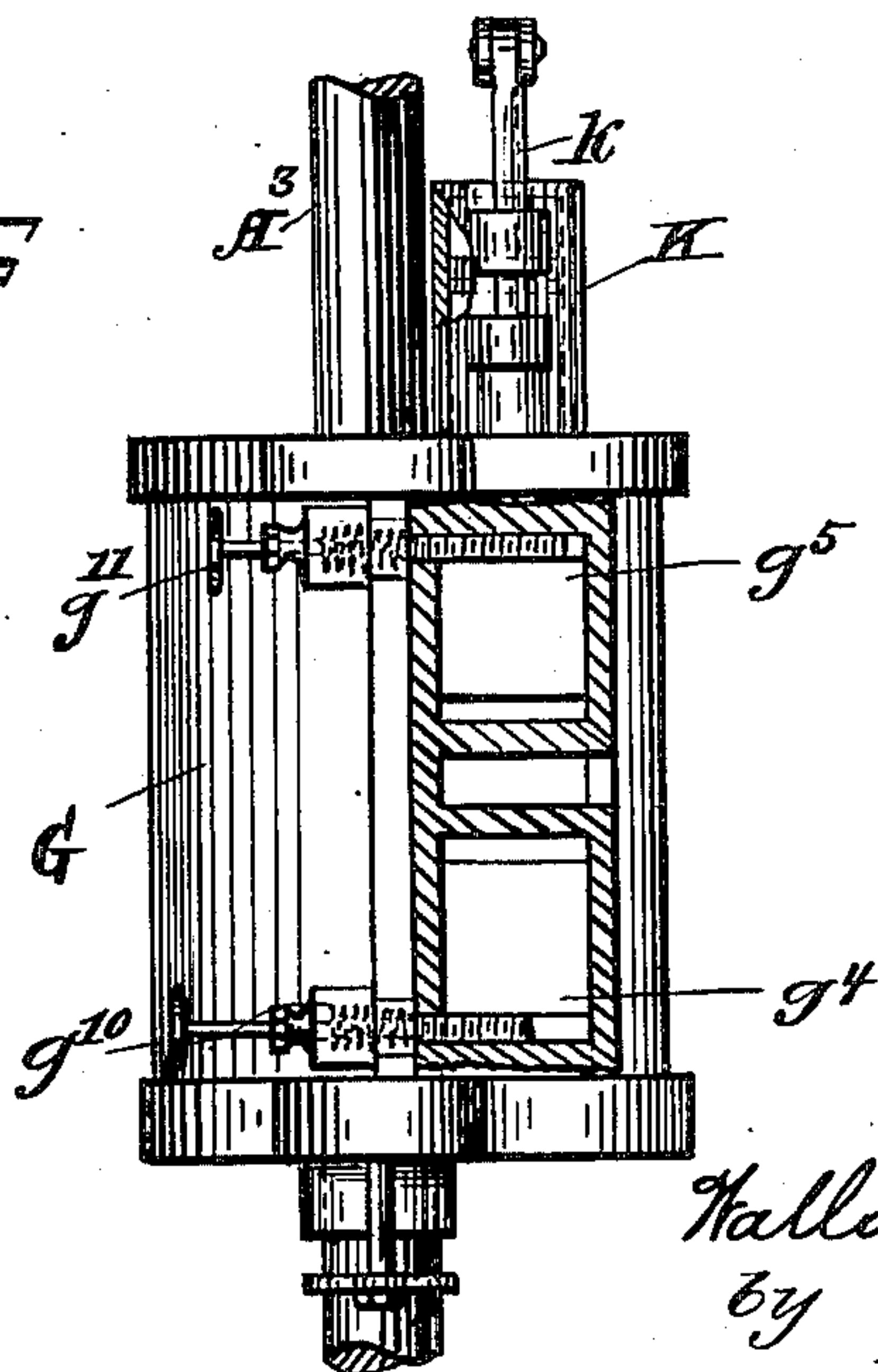


Fig. 6



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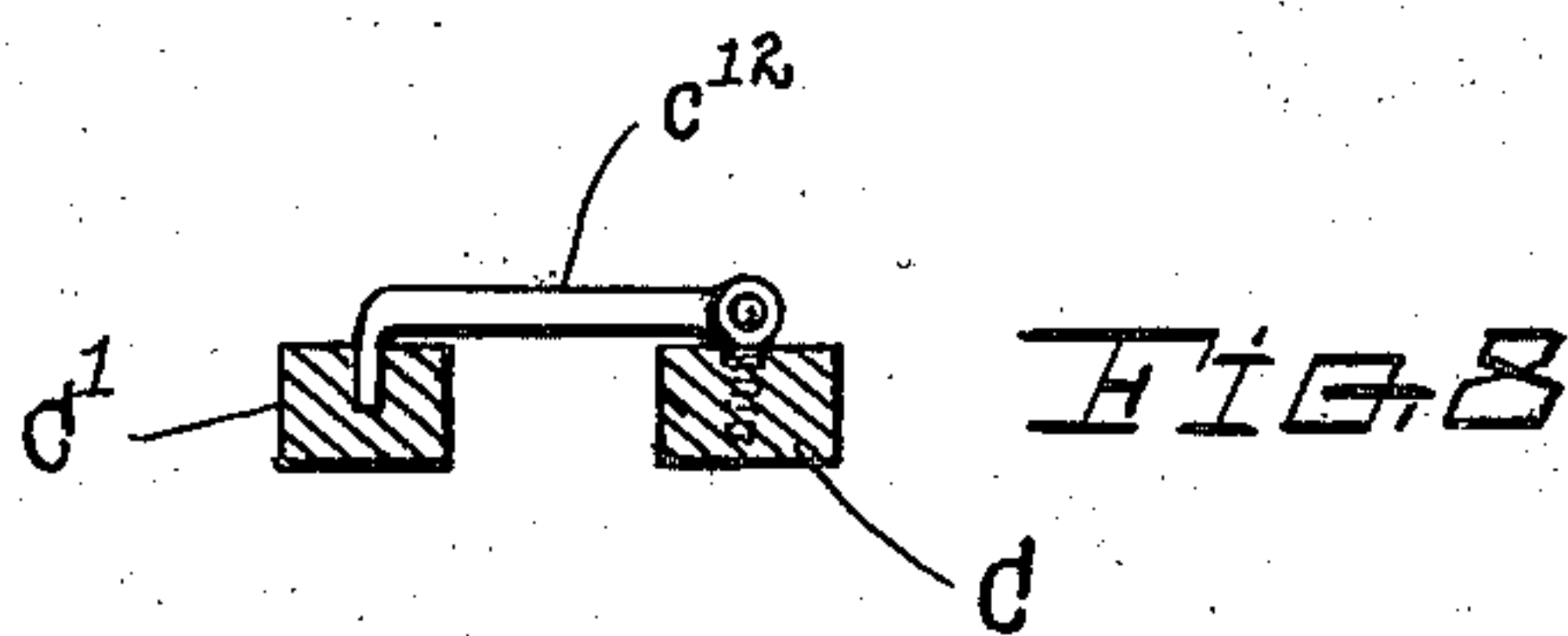
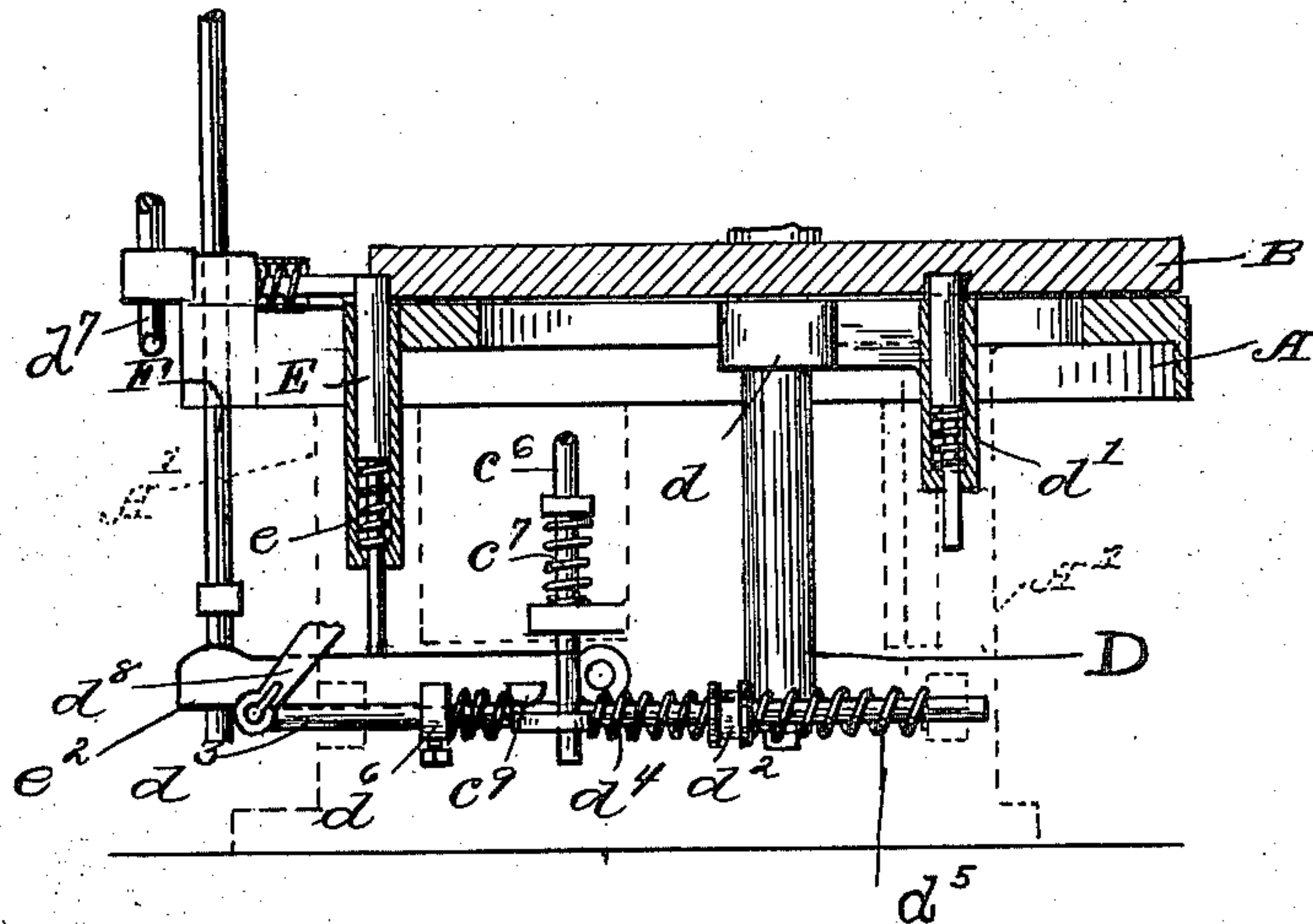
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5 SHEETS—SHEET 5.

FIG. 7



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UNITED STATES PATENT OFFICE.

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GLASS-PRESS.

966,440.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed November 29, 1909. Serial No. 530,321.

To all whom it may concern:

Be it known that I, WALLACE S. GRAHAM, a citizen of the United States, and a resident of Lancaster, county of Fairfield, and State of Ohio, have invented a new and useful Improvement in Glass-Presses, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to machines for the manufacture of articles of glass, and particularly to that type of machine in which the article is formed by pressing a die in a mold.

In general, the objects of my invention are to provide an automatic glass press which is adapted to perform a series of similar operations in succession, each complete operation comprising a sequence of individual operations.

Other objects of the invention will appear throughout the specification.

To the accomplishment of these and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the following claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a side elevation of my machine, partly broken away and partly in section; Fig. 2 is an end view thereof looking from the left in Fig. 1; Fig. 3 is a plan thereof; Fig. 4 is a detail of an ejector; Figs. 5 and 6 are views of a cylinder and associated parts, partly broken and partly in section; Fig. 7 is a detail of certain actuating mechanism with certain parts broken away, and certain parts shown in dotted line; and Fig. 8 is a detail of a catch holding the shears open.

My machine comprises first a supporting plate A which is supported by three legs A', two spaced posts A² and A³ extending vertically from the support A. The supporting plate A is in general form circular, but is provided at certain points on its circumference with outwardly extending brackets, and is also provided with an annular aperture. A table B is mounted on plate A, and

is revoluble about the post A² as its axis. A plurality of molds *b* are disposed on the upper surface of table B, and on its periphery are provided a plurality of inclined projections *b'*.

Supported by the plate A, at the outer edge thereof, is a vertical post *c*, and pivoted on this post so as to be horizontally movable, are two coöperative knives C and C' which are adapted to lie substantially over the circle on which the molds *b* are arranged. A transverse shaft *c*⁴ is carried by the post *c*, and to this shaft are keyed two rocker arms *c*³ and *c*¹¹ which slidably engage two pins *c'* and *c*² which extend laterally from the knives C' and C. A rocker arm *c*⁵ extends outwardly from shaft *c*⁴ to which it is fixed, and at its outer end is pivoted to a vertically reciprocable rod *c*⁶ which is held in elevated position by a spring *c*⁷. A rocking lever *c*⁸ engages, at one end, a collar on post *c*⁶, and its other end extends to a point adjacent to the periphery of table B. Near the base on which the machine rests is a rocking lever *c*⁹, one end of which engages a collar on rod *c*⁶, that end being normally held in depressed position by a spring *c*¹⁰.

The post A² extends downwardly from the table and supporting plate to the base on which the machine rests, and on this portion of the post is rotatably mounted a sleeve D. This sleeve bears at its upper end a horizontal arm *d* provided at its outer end with a vertically reciprocable spring-pressed bolt *d'*; this bolt is adapted to enter spaced holes in the bottom of the table B. Keyed to sleeve D near its lower end is a rocker arm *d*² which, at its outer end, engages a horizontally reciprocable rod *d*³. Collars are provided on rod *d*³ on each side of arm *d*², collar *d*⁸ having a limited sliding movement, and on one side of the arm is a compression spring *d*⁴, and on the other side a tension spring *d*⁵. Adjacent to the post A³ is a vertically reciprocable rod *d*⁷. A bell crank lever *d*⁸ is fulcrumed on one of the legs A', and one of its arms engages the lower end of rod *d*⁷ while the other end engages the outer end of rod *d*³.

A vertically reciprocable bolt E is disposed below the table B and is adapted, in its elevated position, to enter holes provided on the under side of table B. The bolt E is normally pressed upwardly by a spring *e*, but is held in its lower position by a horizontally reciprocable spring-pressed catch *e'*.

A horizontal bar e^2 is secured to the lower end of bolt E. A vertically reciprocable rod F has its lower end disposed adjacent to bar e^2 and bears a collar which bar e^2 is designed to engage. A horizontal lever f is pivoted to the upper end of rod F and is supported intermediate its ends by a standard f' .

A cylinder G is disposed between the posts A^2 and A^3 and is attached thereto by a rod g^2 which is attached to the upper cylinder head, and is held by a cross arm g^8 . The rod g^2 is threaded so that by means of the nuts g^3 the cylinder may be vertically adjusted. A piston g reciprocates vertically in the cylinder, and secured thereto is a piston rod g' . To one side of the cylinder is a steam chest g^0 which may be connected in the usual manner with a steam supply. Ports g^4 and g^5 connect the steam chest with the lower and upper sides of the cylinder respectively, and the admission of steam through these ports is controlled by an ordinary slide valve g^6 . Furthermore, the ports g^4 and g^5 are controlled respectively by valves g^{10} and g^{11} whose stems extend transversely through the ports. It is evident that by means of the valve stems of valves g^{10} and g^{11} , the opening in the ports through which the fluid pressure may pass may be effectively controlled. The stem g^7 of the slide valve g^6 is pivoted to the end of lever f opposite the end to which rod F is pivoted. A small cylinder K is mounted on the upper cylinder head of cylinder G and has a piston vertically reciprocable therein, the piston rod k of which is pivoted to lever f on the same side of the fulcrum thereof that the valve stem g^7 is pivoted. A passage k^2 connects the upper side of cylinder G with the under side of cylinder K, and this passage is controlled by an upwardly opening valve k' . The valve k' is normally held to its seat by a spring; the casing is provided with an upper member k^3 threaded into the valve casing, and against which the upper end of the spring abuts. Obviously the tension of the spring may be varied by means of the member k^3 , so that the valve may be regulated to open at any predetermined pressure. In the passage k^2 is a needle valve k^4 , by which the size of opening in the passage may be definitely controlled. A plunger H is secured to the lower end of piston rod g' by means of the pivoted jaws h and nut h' which is threaded on the piston rod. A plate h^2 is supported adjacent to the plunger by means of a plate h^3 which is vertically adjustable upon the piston rod, bolts h^5 connecting plates h^2 and h^3 .

In each mold b is an ejector L which is secured to the upper end of a vertically reciprocable rod l , this head and rod being normally free to assume a position in which the head lies at the bottom of the mold. Supported by a bracket extending outwardly

from plate A is a hinged slideway M having its inner end adapted to lie substantially over the circle on which the molds are arranged. Arranged below slideway M is a vertically reciprocable rod m , and adjacent to post A^2 is a second vertically reciprocable rod m^2 . Rocking lever m' engages at its two ends these two rods m and m^2 , the end of the lever adjacent to rod m being normally depressed by a spring.

The mode of operation of my machine may now be described. In its inoperative state, the knives are opened, being so held by a suitable manually operable catch. The inner end of lever c^0 is thereby held in raised position and engages collar d^6 on rod d^3 so that the springs on that rod are held in set position. The bolt E is held in its depressed position, the rod F is depressed, and the slide valve is thereby admitting steam to the lower port so that the piston is at the top of its stroke and the plunger is raised. The piston in small cylinder K is also in raised position. The operator of the machine now drops a sufficient amount of glass into one of the molds which is disposed directly beneath the knives, and at the same time he releases the catch which is holding the knives in open position. The closing of the knives severs the glass in the mold from the mass from which it is supplied. The closing of the knives, by means of the rocker arms, raises rod c^6 which depresses the inner end of lever c^0 , thus releasing the springs on rod d^3 . The action of the springs is to swing the rocker arm connected therewith, and thus rotate sleeve D which by its bolt at its upper end engages and rotates the table B a portion of a revolution. During this revolution of the table, one of the cam projections b' engages and raises the inner end of lever c^8 , thus depressing rod c^6 . The knives are thus opened again, and the lever c^0 is again reset. At the end of its partial revolution, one of the cam projections slides back the catch e' and the bolt E rises and engages and stops the table B. At the same time by means of the bar attached thereto it elevates rod F which depresses the slide valve and admits steam through the upper port. The plunger is thus depressed into the mold, forming the article which is being manufactured. When the required pressure to thoroughly press the plunger into the mold is exerted, any excess pressure in the cylinder will open the passage way into the small cylinder and raise the piston therein. This in turn raises the slide valve so that the upper port of the main cylinder is closed, steam is admitted on the under side, and the plunger is raised. When the plunger was depressed, rod d^7 which is attached to the cross head was depressed, and by means of the bell crank lever moved the rod d^3 inwardly, where the collar d^6 was caught and

held by lever c^3 . When the plunger was raised, the rod d^3 was moved outwardly again, compressing the springs, thus setting the springs for the next operation. The machine has thus completed the cycle of its operation and the result is, for instance, a common tumbler which, however, the operations so far described have left in the mold. During the next cycle of operation similar to the one described, the mold into which the plunger has been depressed during the last cycle will be advanced a partial revolution of the table. During this advance, the rod l is engaged and raised by an inclined bracket m^3 which is carried by a lever m' . The rod and ejector push the tumbler up from the mold into the end of slideway M . When the plunger is being depressed into the following mold, the cross head carries downwardly with it the rod m^2 which by means of the lever and second rod raises the pivoted slideway M so that the tumbler slides off into any suitable receptacle.

It is finally to be noted that my improved machine lends itself to accurate adjustment in several ways. It is important that the speed with which the plunger descends or rises from the mold be accurately controlled. The glass must be made to flow into its molded form within a proper time. If the flow should be too rapid, defective pressure marks in the resulting article will be caused, and if too slow, the glass will chill too rapidly and an imperfect article will be produced. The valves in the inlet ports to the cylinder render the speed of descent and elevation of the plunger entirely subject to the operator's control. Furthermore, the plunger must not only press the glass into the mold at the proper speed referred to, but it must exert its pressure in the glass in the mold a correct length of time, and no shorter time, nor longer time will produce a perfect article. If the pressure should be exerted through too long a period, the heat conductivity from the glass being molded will tend to crack the glass, while if too short, the insufficient heat loss will cause a consequent distortion of the article. The period during which the plunger thus exerts its pressure upon the glass may be accurately predetermined by regulation of the valve k' , so that when any given pressure is exerted by the plunger, an excess of pressure in the cylinder will open the valve and raise the piston. Finally, the needle valve k^4 permits adjustment of the passage k^2 so that the period of time may be predetermined in which such excess pressure may escape through said passage and raise the piston in the secondary cylinder.

It is seen, then, that my machine is adapted to completely form any required article from molten glass into a finished article. Its operations are entirely automatic with

the exception of the manually operable catch which holds the knives in open position. It is desired that this be manually operable in order that the operator may have complete control of the machine, and although this machine is adapted to perform this cycle of operations entirely automatically, it has been so designed and arranged as to avoid much of the complexity which is usual in automatic machines.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means; means operable by revolution of the table and adapted to return the severing means to its normal position during such revolution; means operable by revolution of the table for stopping such revolution; and vertically reciprocable plunger means above the table.

2. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means; means operable by revolution of the table and adapted to return the severing means to its normal position during such revolution; means operable by revolution of the table for stopping such revolution; a vertically reciprocable plunger adapted to be depressed by operation of the stopping means; and means for elevating the plunger.

3. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means, revolution of the table being adapted to return the severing means to its normal position during such revolution; means operable by revolution of the table for stopping such revolution; a vertically reciprocable plunger adapted to be depressed by operation of the stopping means; and means for elevating the plunger.

4. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means, revolution of the table being adapted to return the severing means to its normal position during such revolution; means operable by revolution of the table for stopping such revolution; a vertically reciprocable plunger adapted to be depressed by operation of the stopping means; and means for elevating the plunger, reciprocation of the plunger being adapted to return the means for revolving the table to its normal position and elevation of the plunger being adapted to render the stopping means inoperative.

5. In a machine of the class described, the combination of a suitable support; a revoluble table provided on its periphery with cam projections; a plurality of molds carried by the table; normally inoperative means for revolving the table; cooperative knives pivoted above the table about a vertical axis, a vertically reciprocatory rod adjacent to the axis, a transverse rotatable shaft, levers fixed thereon and connected with said knives, a lever fixed on said shaft and connected with said rod, a spring tending to raise said rod and thereby close said knives, a lever connected at one end with said rod and adapted to have its other end raised by the cam projections on the table, a lever attached at one end to said rod and its other end being adapted, when said rod is depressed, to hold the means for revolving the table inoperative, and a catch adapted to hold the knives in open position; means operable by revolution of the table for stopping such revolution; a vertically reciprocable die adapted to be depressed by operation of the stopping means; and means for elevating the plunger, reciprocation of the plunger being adapted to return the means for revolving the table to its normal position and elevation of the die being adapted to render the stopping means inoperative.

6. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; a rotatable shaft, an arm fixed to the shaft and adapted to engage the table in one direction, a horizontally reciprocable rod, an arm fixed to said shaft and slidably connected with said rod, a spring on said rod tending to move said arm, means connecting said arm with the severing means and adapted to allow movement of the arm only on operation of the severing means, and revolution of the table being adapted to return the sev-

ering means to its normal position; means operable by revolution of the table for stopping such revolution; a vertically reciprocable plunger adapted to be depressed by operation of the stopping means; means for elevating the plunger; and a rod reciprocable with said plunger and adapted to reciprocate said horizontal rod.

7. In a machine of the class described, the combination of a suitable support; a revoluble table provided on its periphery with cam projections; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means, revolution of the table being adapted to return the severing means to its normal position; a vertically reciprocable rod adapted in its upper position to retain the table against revolution, and a catch operable by said cam projections and normally retaining said rod in its lower position; a second vertically reciprocable rod adapted to be elevated by the first rod and to depress the first rod by its own depression, a lever pivoted at one end to said second rod, a fluid pressure cylinder, a piston reciprocable therein, a piston rod provided with a plunger at its lower end, said cylinder being provided with inlet ports above and below the piston, a slide valve controlling said ports, and a stem for the valve pivoted to the other end of said lever; means for elevating the valve, means operable by reciprocation of the plunger and adapted to return the means for revolving the table to its normal position.

8. In a machine of the class described, the combination of a suitable support; a revoluble table provided on its periphery with cam projections; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means, revolution of the table being adapted to return the severing means to its normal position; a first vertically reciprocable rod adapted in its upper position to retain the table against revolution, and a catch operable by said cam projections and normally retaining said rod in its lower position; a second vertically reciprocable rod adapted to be elevated by the first rod and to depress the first rod by its own depression, a lever pivoted at one end to said second rod, a fluid pressure cylinder, a piston reciprocable therein, a piston rod provided with a plunger at its lower end, said cylinder being provided with inlet ports above and below the piston, a slide valve controlling said ports, a stem for the valve pivoted to the other end of said lever, a second cylinder connected with the first cylin-

der above the piston, a piston reciprocable therein, and a rod secured thereto and pivoted to said lever adjacent to said valve stem; and means whereby the reciprocation of said first rod returns the means for revolving the table to its normal position.

9. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table; means for operating the last named means and adapted to be rendered operative by operation of the severing means, means operable by revolution of the table and adapted to return the severing means to its normal position; means operative by revolution of the table for stopping such revolution; a vertically reciprocable plunger; means operative by the stopping means for depressing said plunger; means for elevating the plunger, reciprocation of the plunger being adapted to return the means for revolving the table to its normal position, and elevation of the plunger being adapted to render the stopping means inoperative; rods reciprocable through said molds and normally tending to assume their lowermost positions, a pivoted guide having its free end adjacent to one position of said molds, a lever having one end depressible by depression of said plunger, a rod connected with said guide and with the other end of said lever, and an inclined track provided on said lever and adapted to engage said first rods.

10. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; a fluid pressure cylinder, a piston therein, said cylinder being provided with inlet ports above and below the piston and with an outlet, a rod attached to the piston and provided with a plunger at its lower end, a slide valve controlling said inlet ports, a lever, a stem for said valve and pivoted to one end of said lever, a second cylinder, a piston therein, a rod attached to the piston and pivoted to said lever adjacent to said valve stem, a passage connecting the first cylinder above the piston with the second cylinder below the piston, a valve in such passage opening toward the second cylinder, means for regulating the opening in said passage, and means for elevating the

such passage opening toward the second cylinder, and means for elevating the free end of said lever.

11. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; a fluid pressure cylinder, a piston therein, said cylinder being provided with inlet ports above and below the piston and with an outlet, means for varying the opening through said ports, a rod attached to the piston and provided with a plunger at its lower end, a slide valve controlling said inlet ports, a lever, a stem for said valve and pivoted to one end of said lever, a second cylinder, a piston therein, a rod attached to the piston and pivoted to said lever adjacent to said valve stem, a passage connecting the first cylinder above the piston with the second cylinder below the piston, a valve in such passage opening toward the second cylinder, means for regulating the opening in said passage, and means for elevating the free end of said lever.

12. In a machine of the class described, the combination of a suitable support; a revoluble table; a plurality of molds carried by the table; normally inoperative glass severing means arranged above the table; normally inoperative means for revolving the table and adapted to be rendered operative by operation of the severing means; means operable by revolution of the table for stopping such revolution; a vertically reciprocable plunger adapted to be depressed by operation of the stopping means; means for elevating the plunger; rods reciprocable through said molds and normally tending to assume their lowermost positions, a pivoted guide having its free end adjacent to one position of said molds, a lever having one end depressible by depression of said plunger, a rod connected with said guide and with the other end of said lever, and a cam provided on said lever and adapted to engage said first rods.

Signed by me this 29 day of October, 1909.

WALLACE S. GRAHAM.

Attested by—

W. H. CUTTER,
ROBERT L. FRINK.