

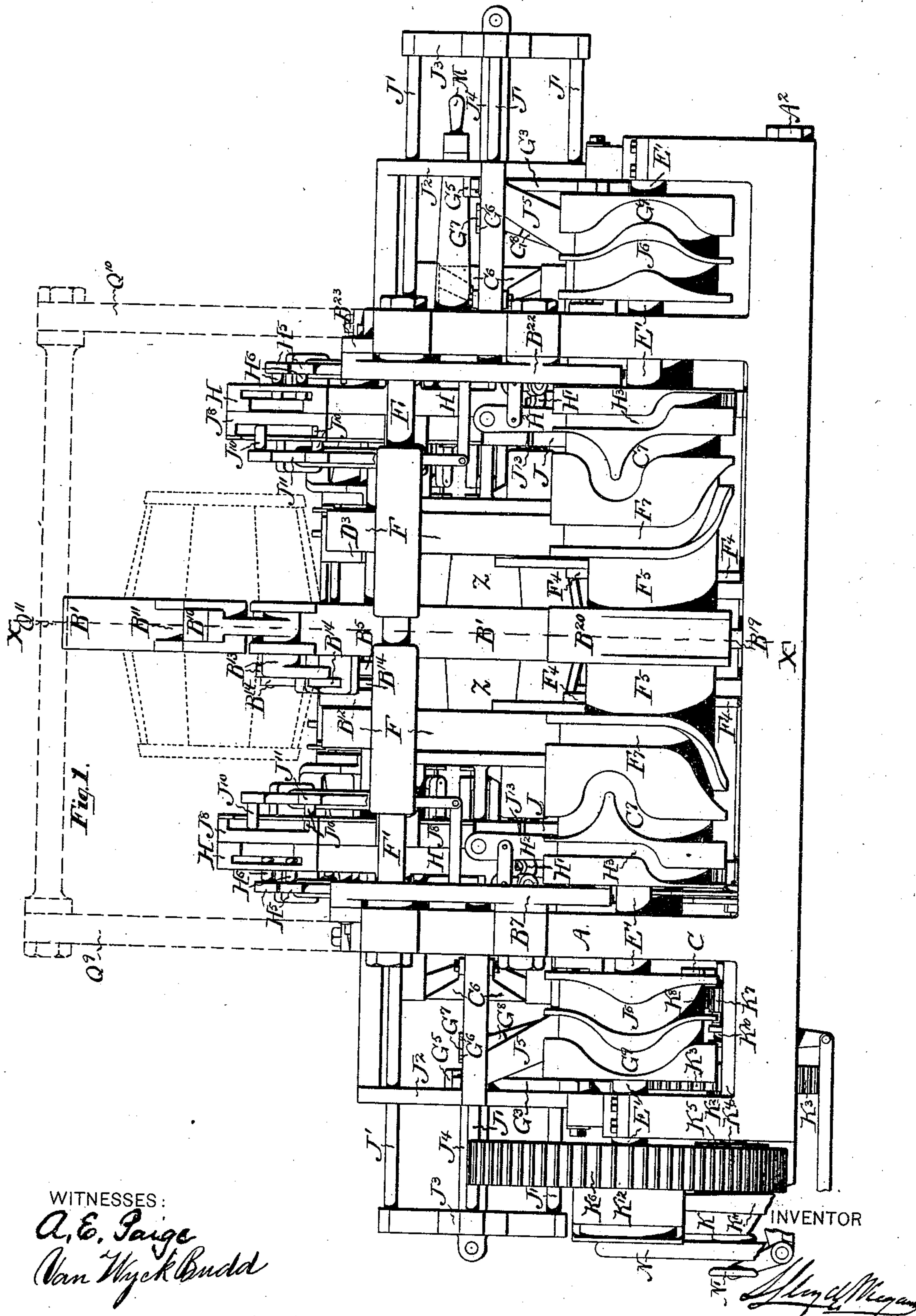
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13 Sheets—Sheet 1.

S. L. WIEGAND.  
CASK FORMING MACHINE.

No. 437,408.

Patented Sept. 30, 1890.



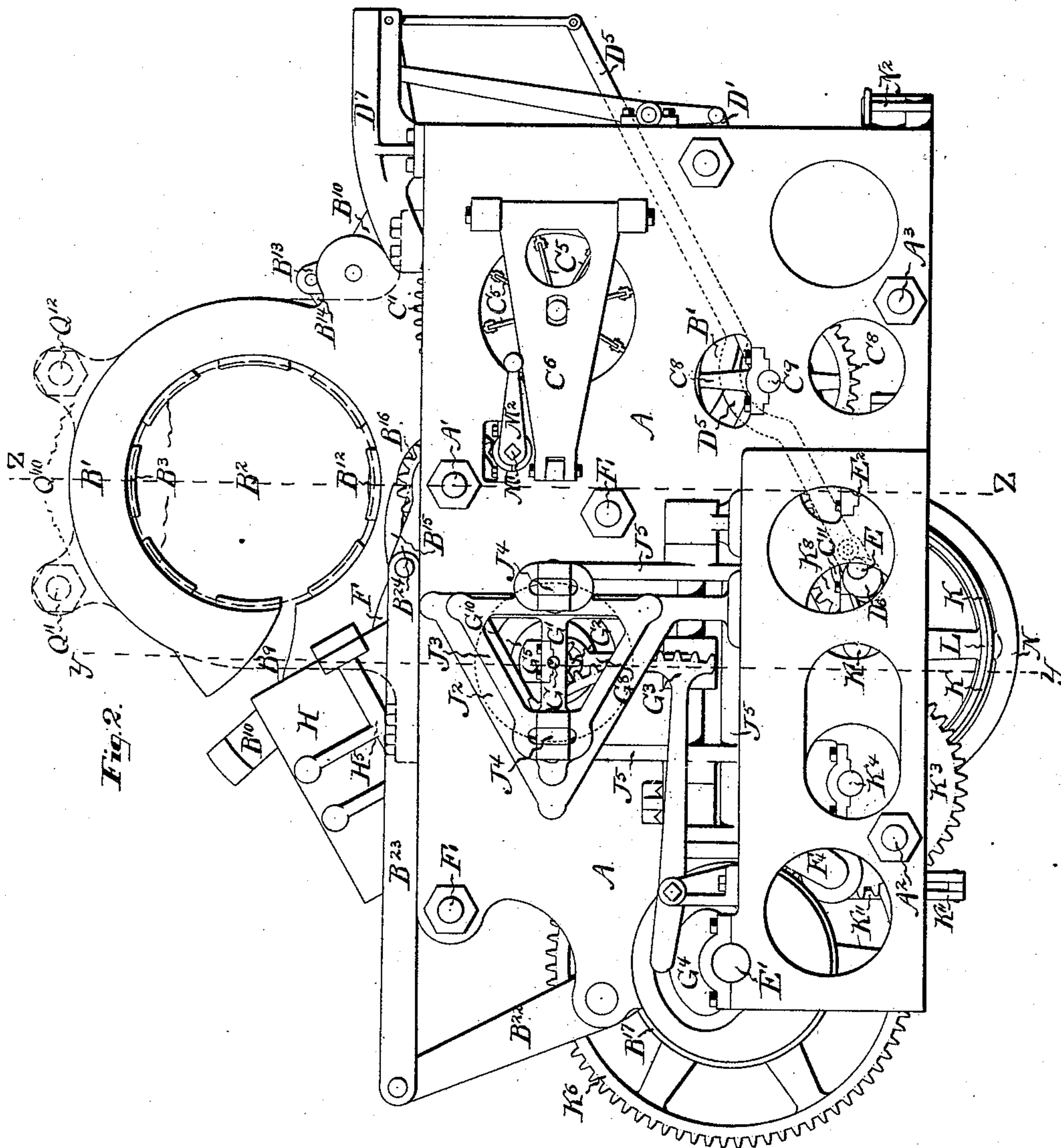
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WITNESSES:

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Van Wyck Budd

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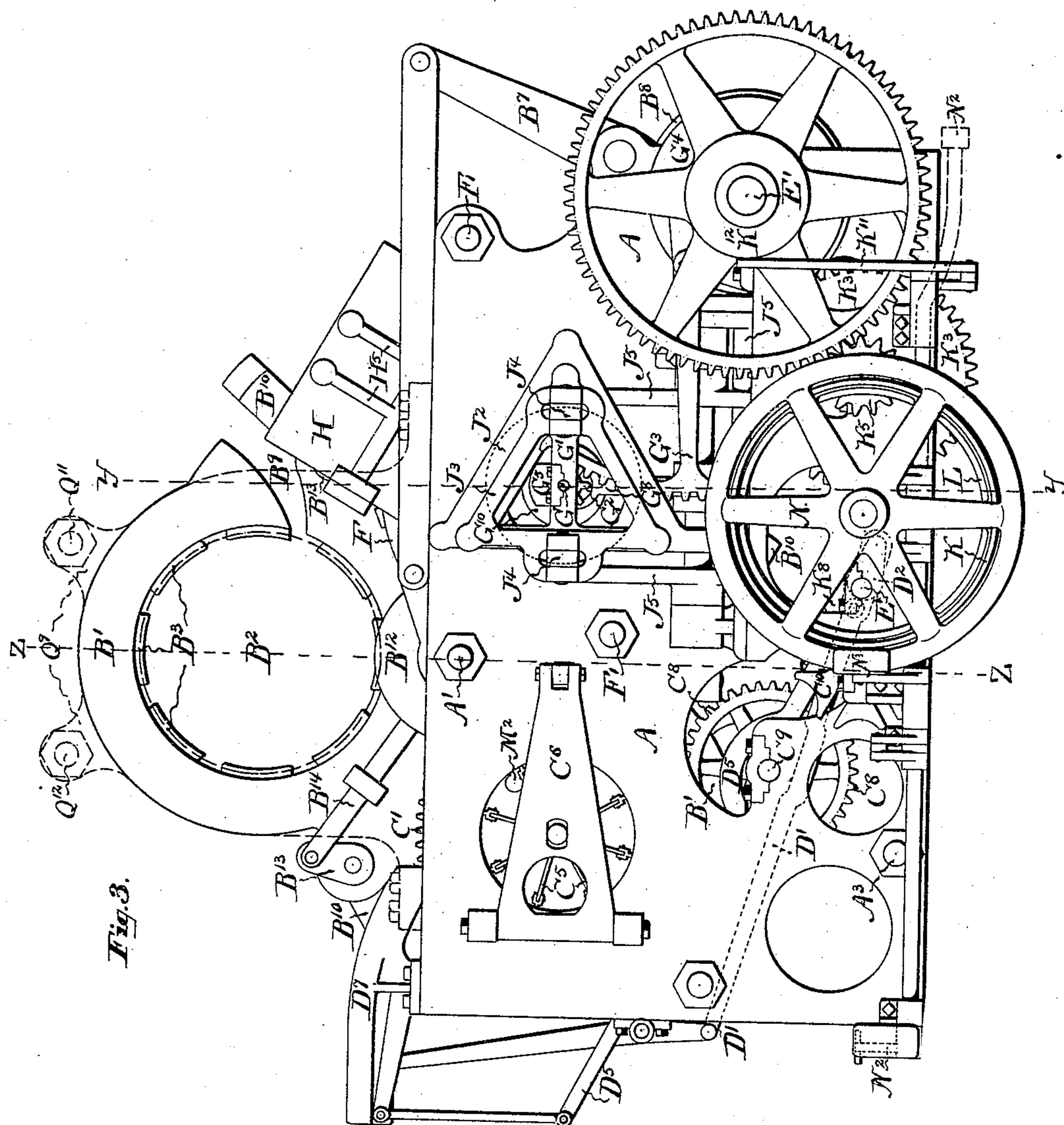
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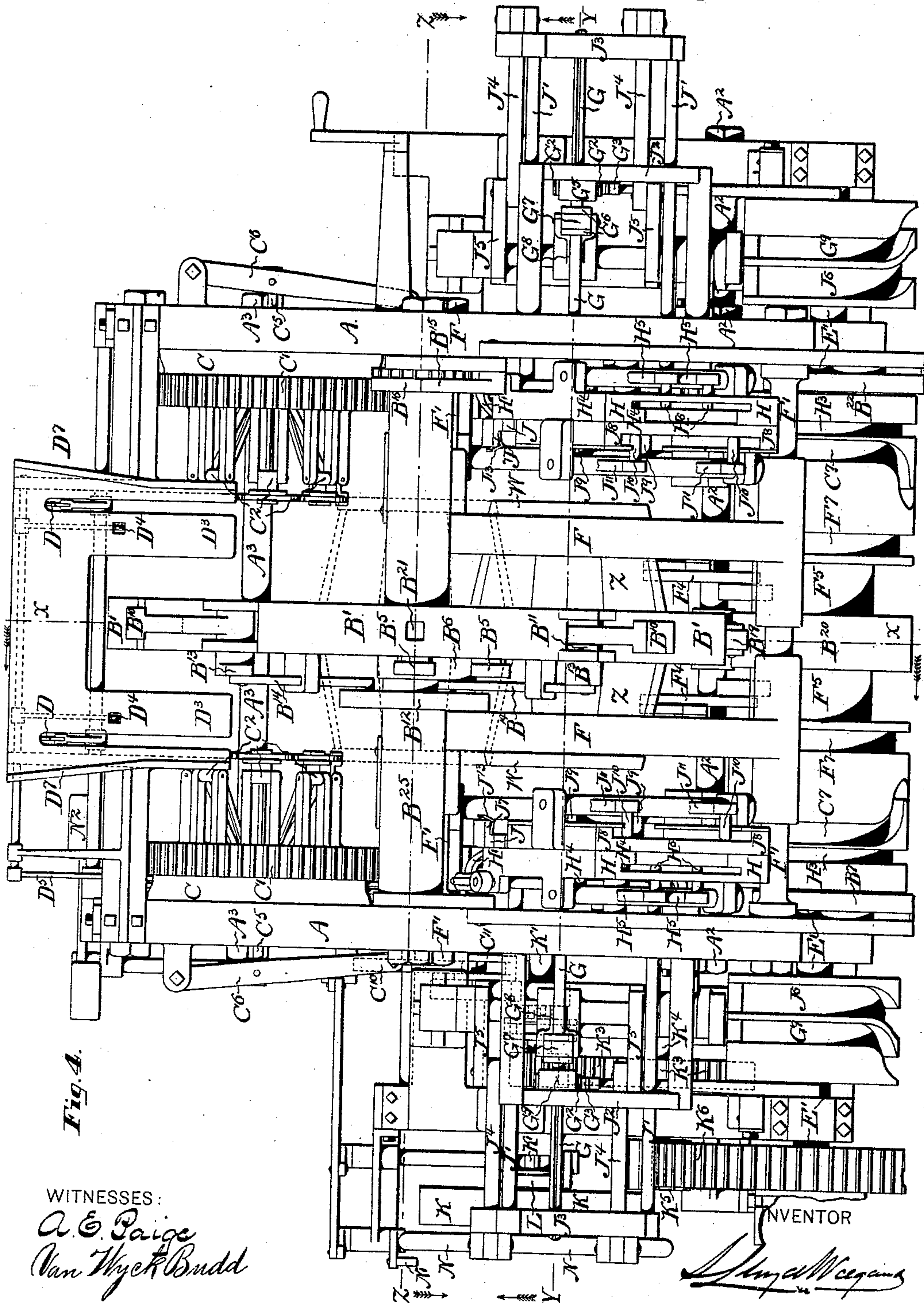
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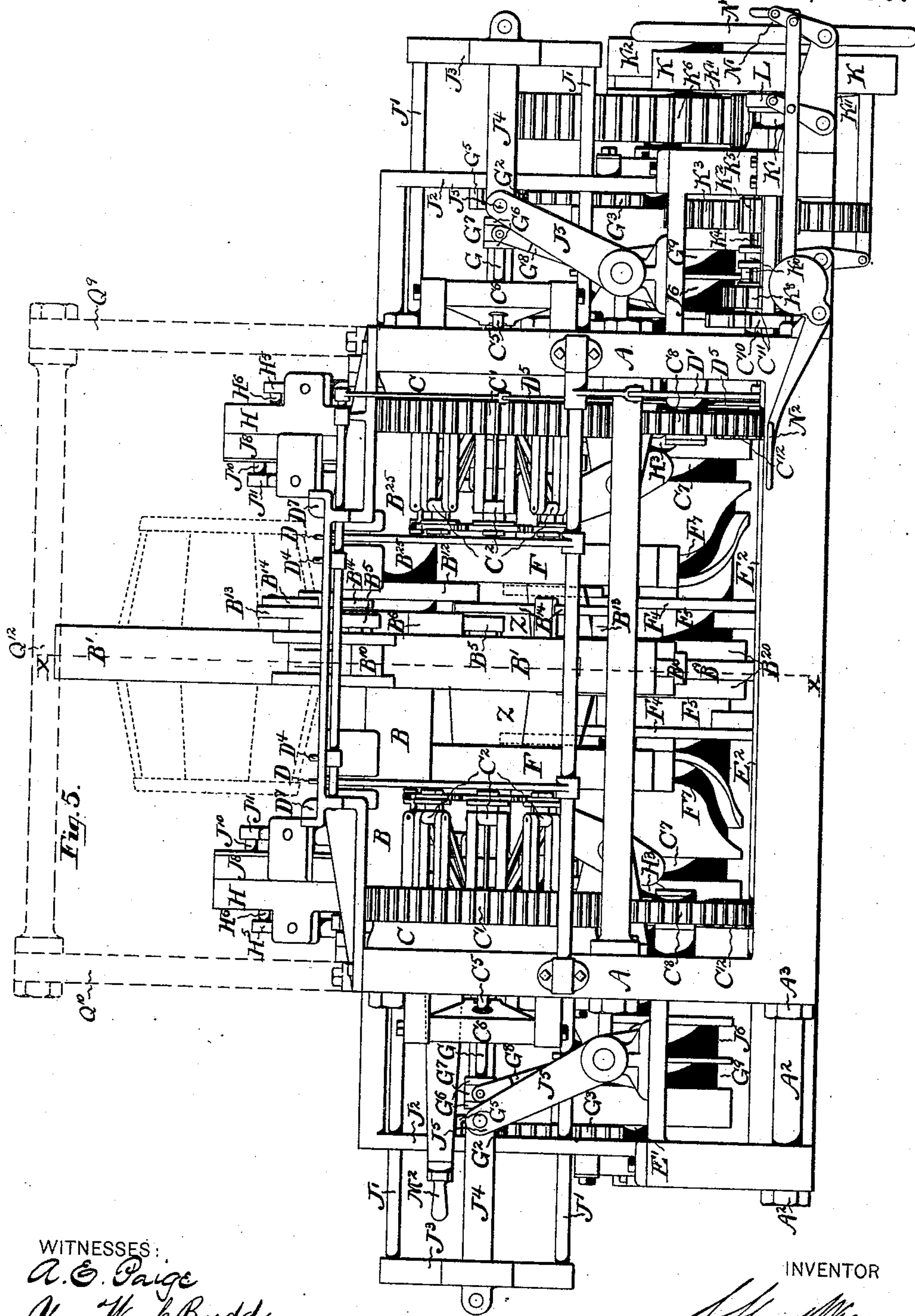
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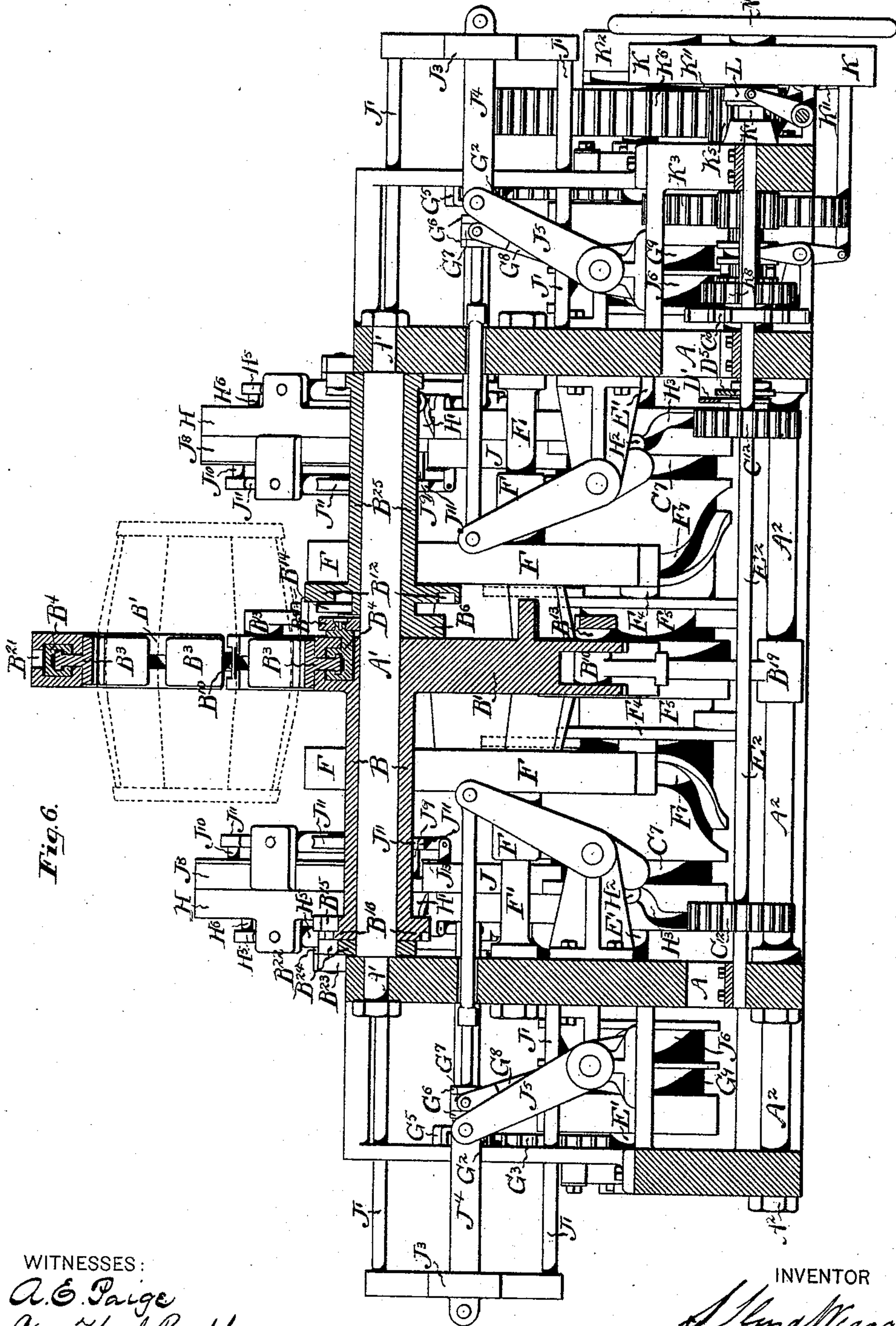
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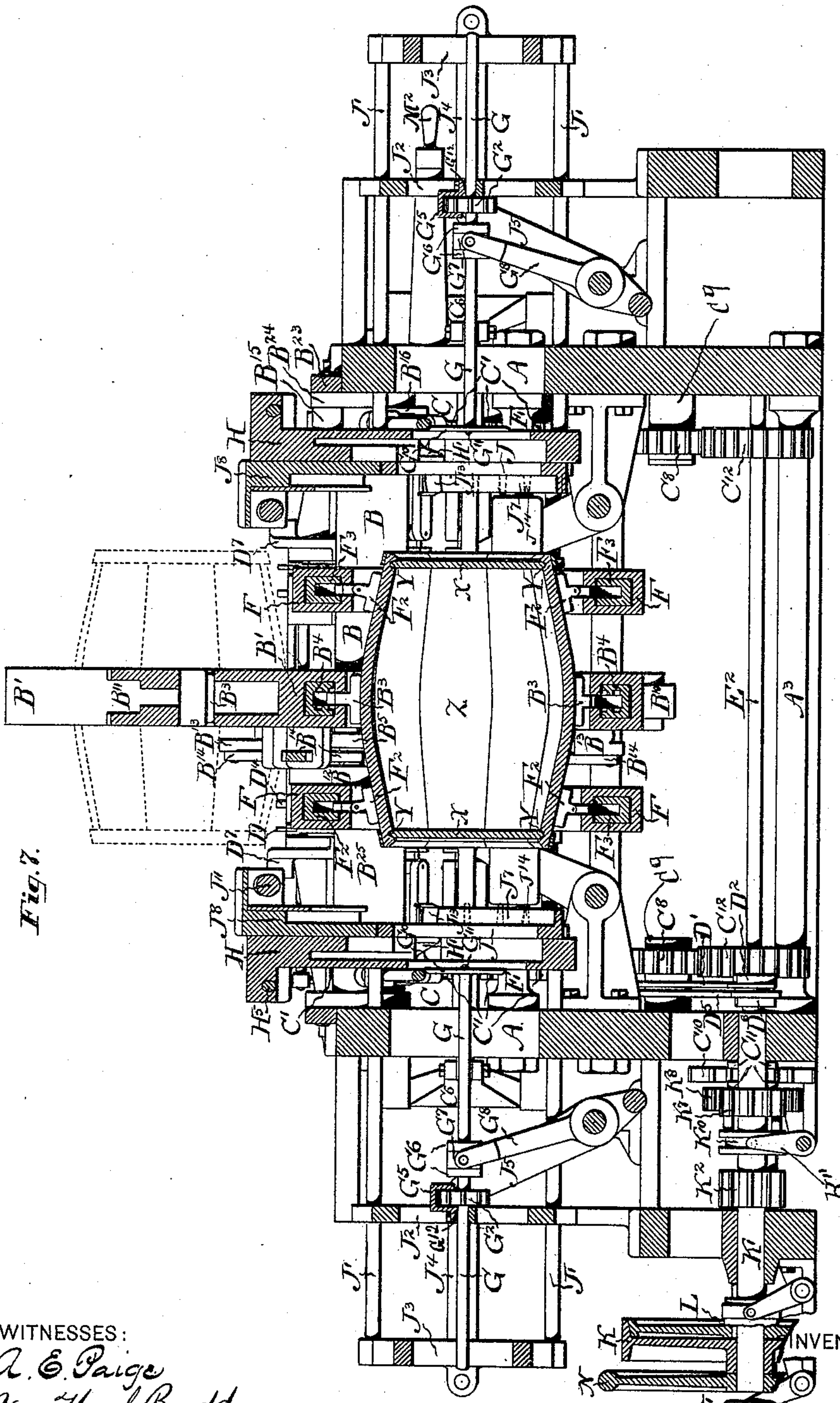


Fig. 7.

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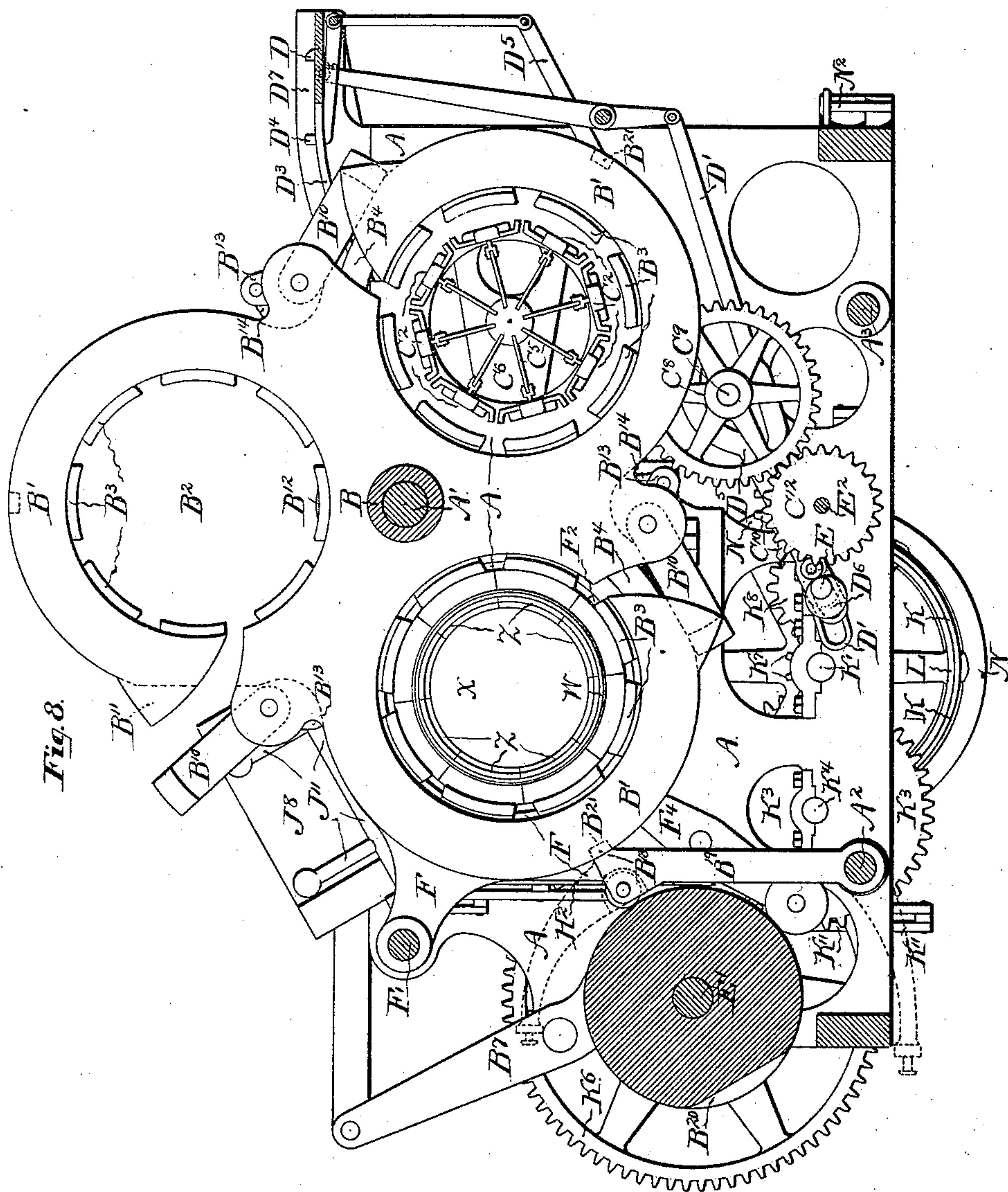
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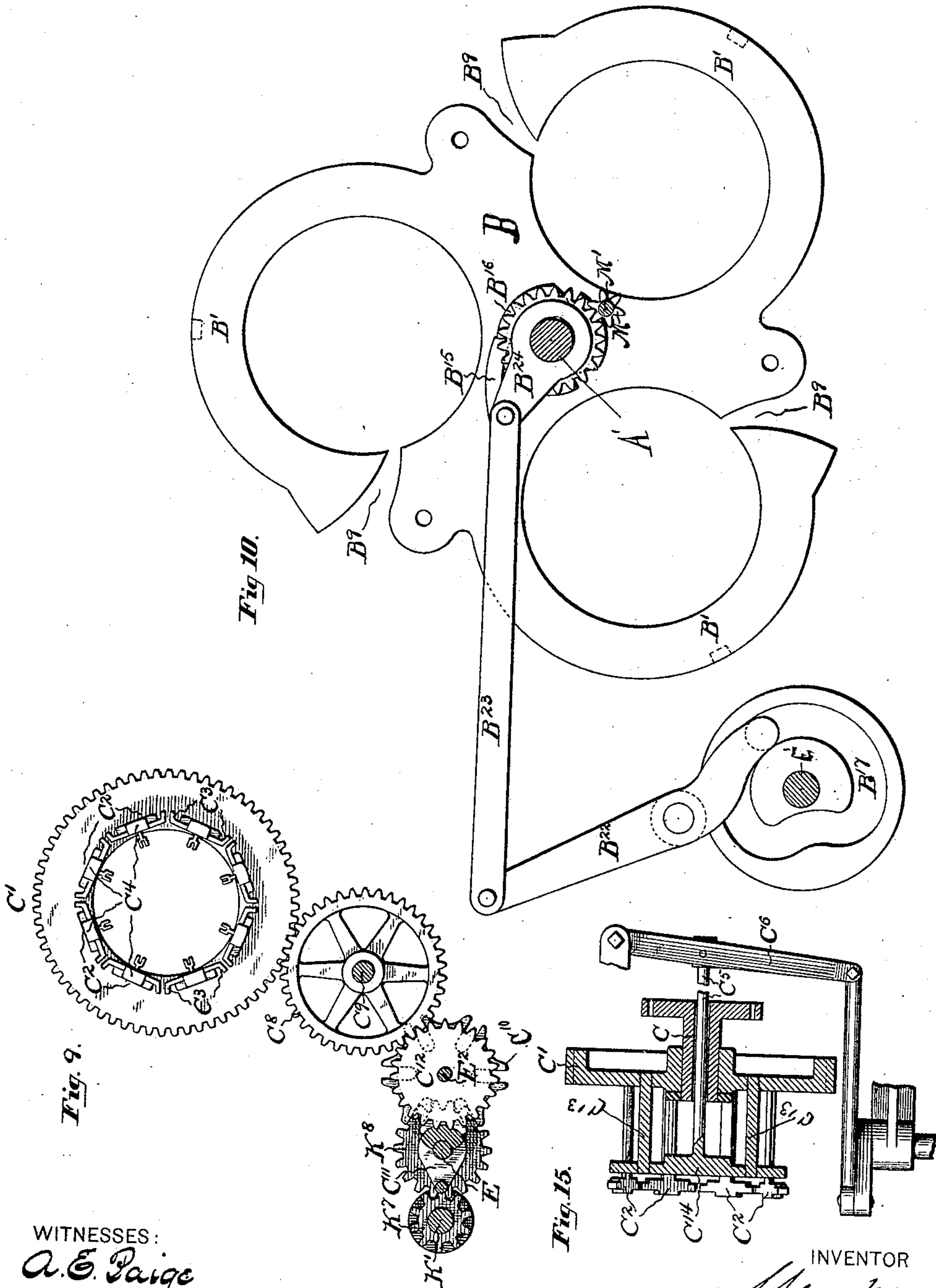
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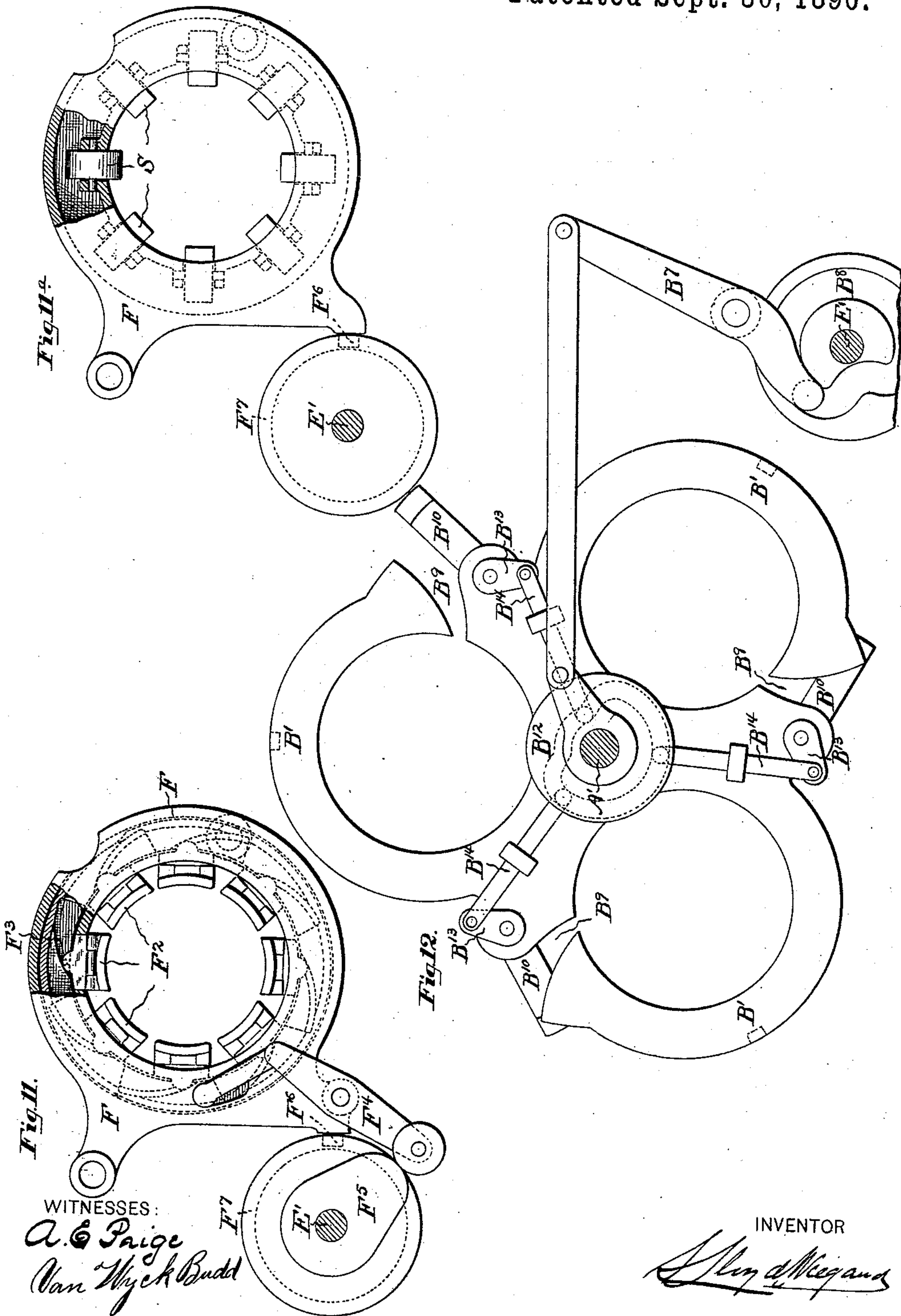
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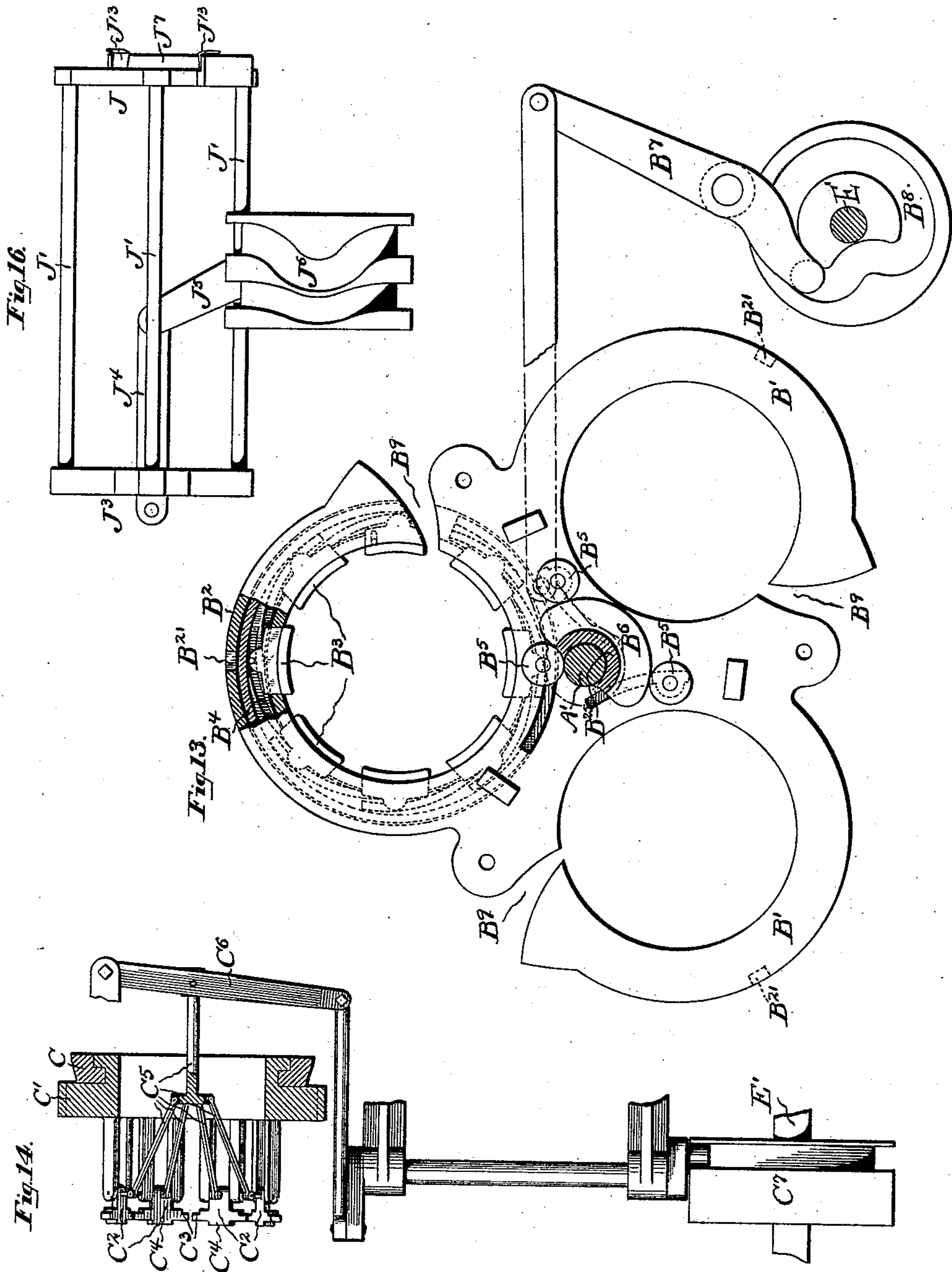
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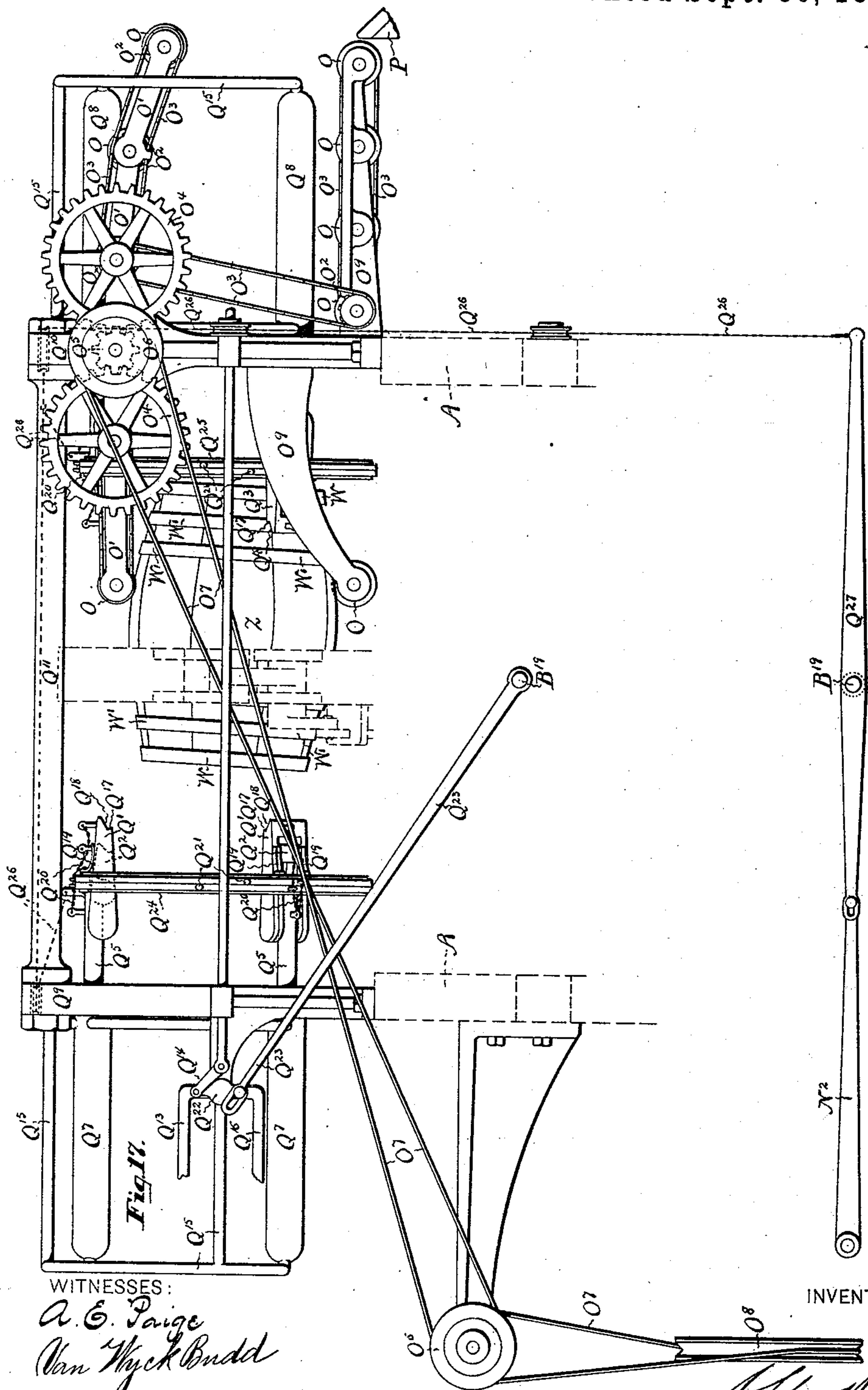
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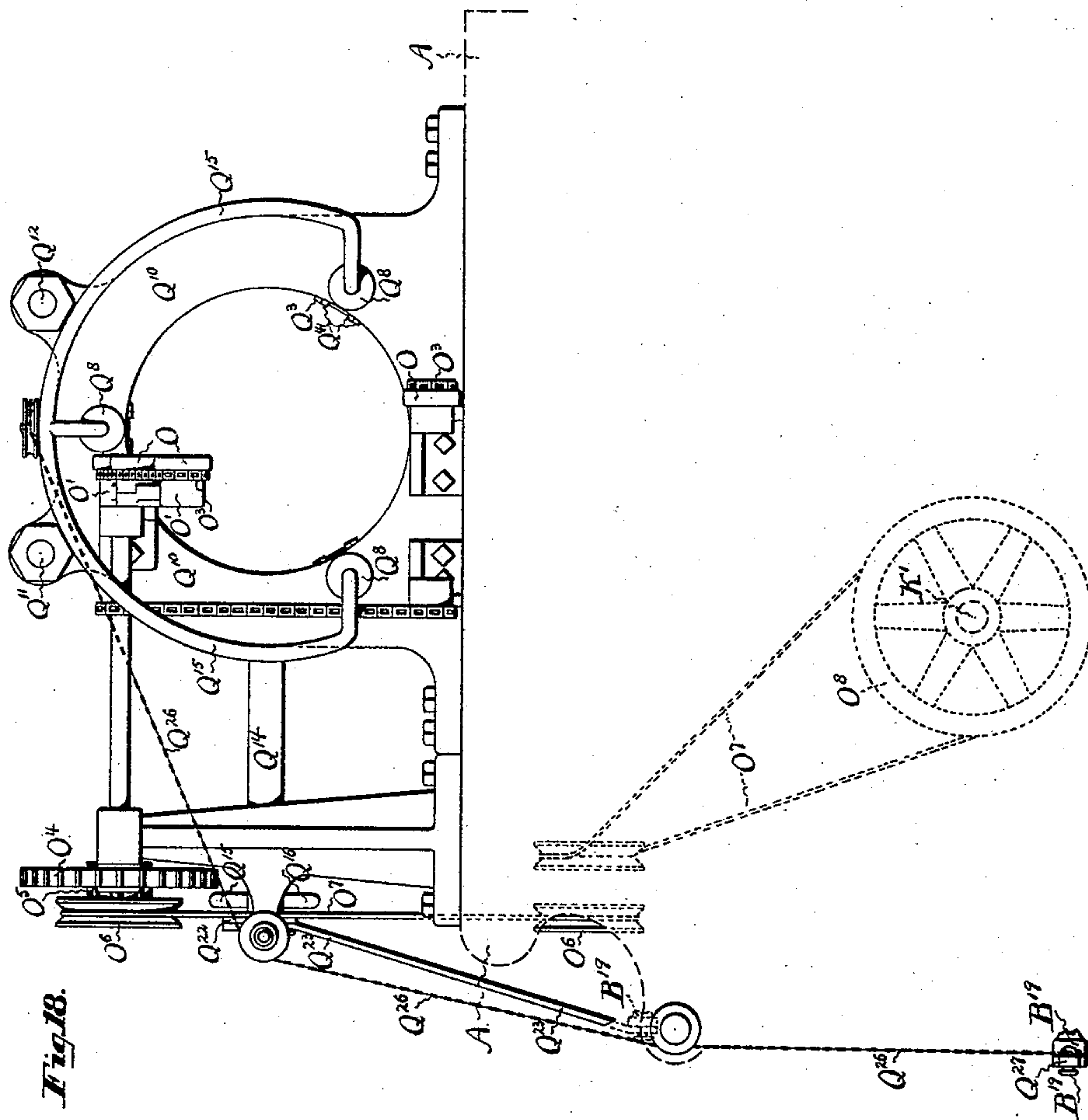
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# UNITED STATES PATENT OFFICE.

S. LLOYD WIEGAND, OF PHILADELPHIA, PENNSYLVANIA.

## CASK-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 437,408, dated September 30, 1890.

Application filed September 12, 1887. Serial No. 249,523. (No model.)

*To all whom it may concern:*

Be it known that I, S. LLOYD WIEGAND, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Cask-Forming Machines; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof to enable others skilled in the art to make and use the said invention.

This invention relates to the manufacture of casks from staves and heads previously dressed, and has for its object the easy and rapid assembling of the staves with the heads and the securing of the parts together by means of hoops, which may afterward be tightened by a suitable machine, or may be forced on tightly in the machine which is the subject of this invention.

The nature of this invention consists, first, in a mechanism for guiding the staves into a contractible central clamp; second, in a series of such central clamps so arranged that while one is receiving staves another filled with staves may receive the heads and hoops; third, in a mechanism for guiding and conveying the heads into proper position in the cask; fourth, in a mechanism for contracting the ends of the staves upon the heads; fifth, in a mechanism for guiding and placing the end hoops upon the casks; sixth, in the arrangement of mechanism by which the cask as assembled and secured by the end hoops may either while held in the machine receive the other hoops or be discharged from the machine without delaying the other operations in progress automatically in other parts of the machine upon succeeding casks; seventh, in an arrangement of mechanism whereby the casks are automatically discharged from the machine; eighth, in the combination of the several mechanisms hereinbefore stated in one machine, and, ninth, in the construction of the actuating mechanisms for causing the several operations to proceed in proper succession.

I will now proceed to describe this invention particularly, and its mode of operation, referring in so doing to the drawings annexed and the letters of reference marked thereon.

Figure 1 shows a rear elevation of the machine; Fig. 2, an elevation of the right end thereof as shown in Fig. 1; Fig. 3, an elevation of the left end thereof as shown in Fig. 1; Fig. 4, a top view or plan thereof; Fig. 5, a front elevation; Fig. 6, a partial section in the plane indicated by the dotted line  $z z$  in Figs. 2, 3, and 4; Fig. 7, a partial section in the plane indicated by the dotted line  $y y$  in Figs. 2, 3, and 4; Fig. 8, a section in the plane indicated by the dotted line  $x x$  in Figs. 1, 4, and 5. Fig. 9 shows in a detached view the intermittently-rotating train of mechanism for placing and holding the staves during the assembling thereof. Fig. 10 shows in a detached view the mechanism for rotating the series of central clamps. Figs. 11 and 11<sup>a</sup> show in detached views the mechanism for contracting the end clamps and modifications thereof. Fig. 12 shows in a detached view the mechanism for opening and closing the gap or cleft in the central clamps. Fig. 13 shows in a detached view the mechanism for opening and closing the jaws or segments of the central clamps. Fig. 14 shows in a detached view the mechanism for placing and retracting the gages or fingers for receiving and placing the staves in the central clamps. Fig. 15 shows a modification of the mechanism thereof. Fig. 16 shows in detached view the mechanism for placing and forcing the end hoops on the casks. Figs. 17 and 18 show in side and end views the mechanisms for placing and forcing the intermediate hoops on the cask and for discharging the same from the machine when completed.

The same letters of reference apply to the same parts in the several figures.

A represents the frames of the machine, having strong bolts or braces  $A^1$ ,  $A^2$ , and  $A^3$  passing through them and firmly uniting them. Upon the brace  $A^1$  is placed a sleeve or hub B, susceptible of rotation thereon and having three arms  $B^1$ , each containing a circular clamp  $B^2$ , having jaws  $B^3$ , which contract or expand concentrically in each clamp by the action of a series of cams  $B^4$ , operated by a roller  $B^5$ , reciprocated at intervals by a cam  $B^6$ , partially turning to and fro on the sleeve  $B^{25}$ , such motion being produced partly by the turning of the clamps around the cam



B<sup>6</sup> and partially by a lever B<sup>7</sup>, worked by a cam B<sup>8</sup>.

The sleeve B, arms B', and clamps B<sup>2</sup> are rotated through an arc of one hundred and twenty degrees upon the brace A' in the interval of the time between the insertion of the set or series of staves for each cask by a pawl B<sup>15</sup>, operating on a wheel B<sup>16</sup> and moved by a lever B<sup>24</sup>, link B<sup>23</sup>, and lever B<sup>22</sup>, operated by a cam B<sup>17</sup> on the shaft E', and is between the intervals of such motion firmly locked by a projection B<sup>18</sup> on a lever B<sup>19</sup>, operated by the cam B<sup>20</sup>, engaging in notches B<sup>21</sup> in the arms B'.

Upon each of the frames A is formed a bearing C concentric with the axes of the foremost one of the clamps B<sup>2</sup>, on which rotates slowly or intermittently a wheel or ring C', bearing a series of arms C<sup>2</sup>, with gages or fingers C<sup>3</sup> and C<sup>4</sup> to receive staves Z, introduced through a cleft or opening B<sup>9</sup> in the clamp B<sup>2</sup>, with the sides of the staves Z and the croze Y thereof respectively resting upon the gages or fingers C<sup>3</sup> and C<sup>4</sup>, so that the several staves Z are received through the cleft B<sup>9</sup> and conducted in such relative position to each other that when the staves are compressed and sprung together they all fit evenly with the croze Y upon the cask-heads X.

The clamps B<sup>2</sup> are braced across the cleft B<sup>9</sup> during the closing operation by a hook B<sup>10</sup>, hinged to one side of the cleft and engaging in a suitable recess in the opposite side of the cleft, the hook being operated by the cam B<sup>12</sup>, turning or reciprocating at intervals on the sleeve B<sup>25</sup> with the cam B<sup>6</sup> through the levers B<sup>13</sup> and rod B<sup>14</sup>.

The staves are introduced through the cleft B<sup>9</sup> in the clamp B by means of a pair of reciprocating projections or hooks D, operated by levers D', moved by a cam D<sup>2</sup> on the shaft E, the staves being presented to the hook D by resting them between converging lateral guides D<sup>7</sup> on supports D<sup>8</sup> against gages or stops D<sup>4</sup>, which are retracted by a lever D<sup>5</sup> and cam D<sup>6</sup> during the movement of the stave by the hooks D. The jaws B<sup>3</sup>, opposite the cleft B<sup>9</sup>, are hinged to permit the staves to pass through the cleft B<sup>9</sup>, as shown in Fig. 11.

The arms C<sup>2</sup> are not rigidly attached to the rings C', but are hinged thereto, as shown in Fig. 14 in a detached view, so that they may be contracted and withdrawn from the staves by means of the rods C<sup>5</sup> and levers C<sup>6</sup>, operated by a cam C<sup>7</sup> on the shaft E', thus leaving the assembled staves inclosed and held in the clamp B<sup>2</sup> free to turn with the clamp B<sup>2</sup> around the brace A'.

The wheels C' are provided with teeth upon their peripheries, which engage in pinions C<sup>8</sup> upon a shaft C<sup>9</sup>. The pinions C<sup>8</sup> engage in wheels C<sup>12</sup> on the shaft E<sup>2</sup>, causing them to turn with equal velocity by means of a star-wheel C<sup>10</sup> receiving intermittent motion from the cam C<sup>11</sup> on the shaft E.

As shown in Fig. 15, the mechanism for placing the arms C<sup>2</sup> and fingers C<sup>3</sup> in position

so as to receive and place the staves in the clamp B<sup>2</sup> and afterward to retract them from the staves when centrally clamped is differently arranged. In this instance the arms C<sup>2</sup>, instead of being hinged or pivotally attached to the ring or wheel C', are made elastic, and the wheels C' fitted so as to slide on the bearing C in the direction of their axis to such a distance as will permit them when retracted to clear the ends of the staves, which is done after the staves have been centrally compressed by the clamp B<sup>2</sup>, the teeth of the wheels C' sliding in or between those of the pinions C<sup>8</sup>. In this retracting operation the sliding motion is imparted to the wheels C' by the bolts C<sup>13</sup>, plates C<sup>14</sup>, rods C<sup>5</sup>, levers C<sup>6</sup>, and cam C<sup>7</sup> on the shaft E'.

F are clamps supported and reciprocated on slides F', secured to the frames A, and provided with jaws F<sup>2</sup>, arranged to open and close by cams F<sup>3</sup>, operated by levers F<sup>4</sup> receiving intermittent motion from the cams F<sup>5</sup> on the shaft E'. The reciprocating motion of the clamps F on the slides F' is produced by rollers F<sup>6</sup>, worked by the cams F<sup>7</sup> on the shaft E'. The reciprocating motion of the clamps F is for the purpose of retracting them toward the frame A, so that the series of staves assembled in the clamp B<sup>2</sup> may be brought into concentric position with the clamps F and the clamps F when opened placed around them and after compressing the staves may again be retracted so as to permit the staves held in the clamp B<sup>2</sup> to pass out and another series in another of the clamps B<sup>2</sup> to enter and be similarly treated. The jaws F<sup>2</sup> should be arranged so as to rock or pivotally move on an axis parallel with the circumference of the clamp and adapt themselves to the taper of the cask as it develops in closing the clamp.

The clamps F may be modified and simplified in construction by omitting the jaws F<sup>2</sup>, cams F<sup>3</sup>, levers F<sup>4</sup>, and cams F<sup>5</sup> and substituting for them rollers S, as shown in Fig. 11<sup>a</sup>, inside of the clamps, which when the clamps F are forced toward the clamps B<sup>2</sup> by the cams F<sup>7</sup> press upon the staves and force them inwardly upon the heads. This arrangement is open to the objection that in the event of the staves not being firmly held in the clamp B<sup>2</sup> they are more liable to be displaced lengthwise.

Concentric with the horizontal axis of the clamps F and resting in brackets or bearings G', attached to the frames A, are splined cylindrical spindles G, arranged to both slide and rotate in the bearings G'. The rotative motion is imparted by the pinions G<sup>2</sup>, having keys or feathers G<sup>12</sup>, fitting into the splines of the spindles G and receiving rotative motion in both directions from toothed segments G<sup>3</sup>, reciprocated by cams G<sup>4</sup> on the shaft E'. The pinions G<sup>2</sup> are held in position to always engage in the teeth of the segments G<sup>3</sup> by means of caps G<sup>5</sup> holding them against the bearings of the brackets G'. The spindles G have reciprocating sliding motion in the



brackets G' imparted to them by collars G<sup>6</sup>, secured upon them and holding between them collars G<sup>7</sup>, pivotally connected with levers G<sup>8</sup>, operated by cams G<sup>9</sup> on the shaft E'. Upon the inner ends of the spindles G are formed flat or slightly concave disks G<sup>10</sup>, and in the center of each disk is a conical screw-threaded point G<sup>11</sup>, resembling the point of a gimlet, which points should be of such form and dimensions as to readily and firmly screw into the centers of cask-heads without perforating or splitting them.

Secured to the inner sides of the frames A are grooved racks H, of such dimensions as to receive dressed cask-heads X and permit them to slide in perpendicular plane, so that when resting on the bottom of the racks H the heads X will be concentric with the spindles G. Upon the inner side of the racks H at the lower part the sides of the grooves are cut away sufficiently to permit the heads X to pass toward the center of the machine, and jaws H' are hinged so as to retain the heads X in the grooves, so that the screw-points G<sup>11</sup> may be fastened into them. The jaws H' are opened and closed by levers H<sup>2</sup>, worked by cams H<sup>3</sup> on the shaft E'. Above the space occupied by the heads X when resting in the bottom of the rack H is a stop H<sup>4</sup>, connected by a lever H<sup>5</sup> with a similar stop H<sup>6</sup>, placed more than the diameter of a head X above the stop H<sup>4</sup>, which stops move into positions so as to let only one head drop at each reciprocation of the lever H<sup>5</sup> and to hold the heads X up at all times when the spindles G, disks G<sup>10</sup>, and screws G<sup>11</sup> are not retracted from the frames H. The levers H<sup>5</sup> are operated by the cams H<sup>3</sup> on the shaft E'.

Concentric with the spindles G and the clamps F are flat rings J, of such dimensions as to readily pass over the cask-heads X and of less internal diameter than the end hoops W of the casks. The rings J are supported on and moved by slides J', passing through guides J<sup>2</sup> and operated by a cross-head J<sup>3</sup>, connected by links J<sup>4</sup> and levers J<sup>5</sup> with cams J<sup>6</sup> on the shaft E'. Upon the lower sides of the rings J are formed rims J<sup>7</sup>, which serve to support the hoops W. A series of pins J<sup>14</sup>, as shown in dotted lines in Fig. 7, may be substituted for the rims J<sup>7</sup>. Above the rims J<sup>7</sup>, when the rings J are retracted toward the frames A, are grooved guides J<sup>8</sup>, through which hoops may descend and rest on the rims J<sup>7</sup>, the descent of the hoops in the guides J<sup>8</sup> being controlled by stops J<sup>9</sup> and J<sup>10</sup>, operated by a lever J<sup>11</sup>, worked by a cam H<sup>3</sup>, so that one hoop only can descend in each guide J<sup>8</sup> and that the remaining hoops in the guides J<sup>8</sup> shall not obstruct the reciprocating motion of the rings J. Springs J<sup>13</sup> are attached to the rings J so as to bear on each side of the hoops W, so as to retain them in position, the free ends of which springs are curved outwardly, so as to pass readily over the ends of the staves.

Power is applied by a band to the driving-pulley K, secured by a friction-clutch L on

the shaft K', and by a pinion K<sup>2</sup>, engaging in a spur-wheel K<sup>3</sup>. On the shaft K<sup>4</sup>, turning with the wheel K<sup>3</sup>, is a pinion K<sup>5</sup>, engaging in the spur-wheel K<sup>6</sup>, turning the shaft E', and during the forming of each cask the motion of these three shafts is continuous during the working of the machine. The shaft E and cam C<sup>11</sup> are driven with much higher velocity by a pinion K<sup>7</sup>, which gears into a spur-wheel K<sup>8</sup> on the shaft E. The pinion K<sup>7</sup> is fitted to turn freely on the shaft K', and upon its side is a clutch K<sup>9</sup>, which engages in a corresponding clutch K<sup>10</sup>, splined on the shaft K', and is disengaged automatically by means of the lever K<sup>11</sup> and cam K<sup>12</sup> on the shaft E' during the motion of the clamps B<sup>2</sup> around the brace A' and re-engaged when the motion of the clamps B<sup>2</sup> ceases.

The teeth on the wheel B<sup>16</sup> are of such form that a pinion M on a shaft M' may be readily engaged in it for the purpose of turning it by a hand-wheel or by a crank M<sup>2</sup>, and a large hand-wheel N is placed on the shaft K' for the purpose of turning the machine by hand in adjusting it, and a friction-brake N' is applied to the wheel N, operated by a treadle-lever N<sup>2</sup>, to arrest the motion of the machine promptly in case of accident, the friction-clutch L being also controlled by the same treadle-lever N<sup>2</sup>.

Upon the upper portion of the frames A are secured a hoop-driving mechanism for placing and driving the intermediate hoops between the chines upon the casks. This is preferably done while the cask is in the grasp of the central clamp B<sup>2</sup>.

The completed casks are removed by rollers continuously revolved by the band-wheel O<sup>8</sup>, bands O<sup>7</sup>, band-wheels O<sup>6</sup>, pinion O<sup>5</sup>, spur-wheels O<sup>4</sup>, chains O<sup>3</sup>, and chain-wheels O<sup>2</sup>, the rollers O being supported in their journals in links O', so that the proper central distances between their axes is maintained for effective transmission of force by the chains O<sup>3</sup> and chain-wheels O<sup>2</sup> and yet permit the upper rollers O to rest upon the cask. The bearings of the lower rollers are made in a rigid frame O<sup>9</sup>. The rollers O are located so that the lower rollers are forward of or in the vertical plane of the axis of the finished cask and the upper rollers but slightly to the rear of such plane. The peripheries of the rollers O project inwardly toward the cask between the claws Q' and Q<sup>3</sup>, for driving the intermediate hoops hereinafter described. The cask as it passes to the highest point of rotation in the clamp B<sup>2</sup> clears the lower roller O, and passing under the first of the upper rollers lifts it slightly, when the clamp B<sup>2</sup> opens and releases the cask. Then the cask rests upon the lower rollers, the upper rollers resting upon the cask. The rotary movement of the rollers O draws the cask out of the clamp B<sup>2</sup> and discharges it upon the inclined plane P.

The hoop-driving mechanism consists of a series of cylinders marked Q<sup>7</sup> and Q<sup>8</sup>, ar-



ranged in circles upon each side of the machine in frames  $Q^9$  and  $Q^{10}$ , firmly fastened to the frames A of the machine and securely braced together at their upper portions by rods  $Q^{11}$  and  $Q^{12}$ . The central spaces within the circles formed by the cylinders  $Q^7$  and  $Q^8$  should be large enough to permit a completed cask to readily pass lengthwise through these spaces. In each of the cylinders  $Q^7$  and  $Q^8$  is a piston marked  $Q^5$  and  $Q^6$ , which is capable of reciprocating motion under pressure of fluids introduced from a reservoir through pipes  $Q^{13}$  and controlled and distributed by a valve  $Q^{14}$  and branched pipes  $Q^{15}$  and discharged by the pipe  $Q^{16}$ . To each of the pistons  $Q^5$  and  $Q^6$  is pivotally attached claws  $Q^1$ ,  $Q^2$ ,  $Q^3$ , and  $Q^4$ , having shoulders  $Q^{17}$ , adapted to press edgewise against the hoops  $W'$ , and lips  $Q^{18}$ , adapted to rest against the sides of the hoops  $W'$  and support them.

The metal in claws  $Q^1$ ,  $Q^2$ ,  $Q^3$ , and  $Q^4$  should be so proportioned in relation to their pivots as to neither open nor close by gravitation, and have springs  $Q^{19}$  connected to them so as to close or press them toward each other, and links or chains  $Q^{20}$  connecting with each series of claws to a handle  $Q^{21}$ , whereby the attendant can open each circle of claws and place the hoops  $W'$  within each of them, whereby, the reaction of the springs  $Q^{19}$  pressing the lips  $Q^{18}$  of the claws against the hoops, they are held therein until forced upon the cask.

The valve  $Q^{14}$  has a lever  $Q^{22}$  for operating it by the hand of an attendant, so as to control the motion of the pistons and the connected hoop-driving claws. This lever  $Q^{22}$  is connected by a link  $Q^{23}$  with the lever  $B^{19}$ , so that the valve  $Q^{14}$  cannot be turned to direct fluid against the pistons in a direction to force them toward the clamp  $B^2$  when the projection  $B^{18}$  is disengaged from the clamp  $B^2$ , thus preventing collision of the hoop-driving claws and pistons with the cask during the turning of the clamps  $B^2$  upon their common axis.

Rings or frames  $Q^{24}$  and  $Q^{25}$  are attached to the pistons  $Q^5$  and  $Q^6$ , from which links or chains  $Q^{26}$  extend to a lever  $Q^{27}$ , one end of which lever is pivotally connected to the lever  $N^2$ , disengaging the clutch L and applying the brake  $N'$ , and the other end of the lever  $Q^{27}$  is connected with the lever  $B^{19}$ , so that the lever  $B^{19}$  when lowered so as to disengage the projection  $B^{18}$  from the notches  $B^{21}$  in the arms  $B'$  forms a fulcrum for the lever  $Q^{27}$ , and the opposite end of the lever  $Q^{27}$  operates the lever  $N^2$  and disengages the clutch L and applies the brake  $N'$  and prevents rotation of the clamps  $B^2$  and avoids collision of the casks contained therein with the claws  $Q^1$ ,  $Q^2$ ,  $Q^3$ , and  $Q^4$  and pistons  $Q^5$  and  $Q^6$  by preventing the turning of the shaft  $E'$  with the cam  $B^{17}$  and the intermediate gearing imparting rotative motion to the clamps  $B^2$ . When the claws  $Q^1$ ,  $Q^2$ ,  $Q^3$ , and  $Q^4$  are retracted, the rings  $Q^{24}$  and  $Q^{25}$  being retracted with them, the chains  $Q^{26}$  change

the position of the lever  $Q^{27}$  so that the lever  $N^2$  may re-engage the clutch L and release the brake  $N'$ .

The operation of this machine is as follows: Power being applied to the pulley K and the shaft E put in rotation, heads X are placed in the guides or racks H and hoops W in the racks or guides  $J^8$ . Staves Z, previously planed, crozed cut to length, beveled on the ends, and planed on the joints, are placed successively on supports  $D^3$ , resting against the stops  $D^4$ . The hooks D draw the staves through the cleft  $B^9$  into the clamps  $B^2$ , and deposit them on the fingers  $C^3$  and  $C^4$  of the arms  $C^2$ , the wheels  $C'$  turning in the bearings C by the action of the pinions  $C^8$ , shaft  $C^9$ , star-wheel  $C^{10}$ , and cam  $C^{11}$ . As each stave is introduced at such a distance as to receive the next stave, this operation proceeds until the requisite number of staves has been introduced to form a cask. The further rotation of the shaft E is suspended by the action of the cam  $K^{13}$  and lever  $K^{12}$  disengaging the clutch  $K^{10}$  from the clutch  $K^9$ . The brace-hook  $B^{10}$  is then closed over the cleft  $B^9$  into the recess  $B^{11}$  by the lever  $B^{13}$ , rod  $B^{14}$ , and cam  $B^{12}$ , operated by the lever  $B^7$  and cam  $B^8$  on the shaft  $E'$ . The jaws  $B^3$  are next closed by the cams  $B^4$ , worked by the lever  $B^5$  from the cam  $B^6$ , moved by the lever  $B^7$ , operated by the cam  $B^8$  on the shaft  $E'$ . The sleeve B, arms  $B'$ , and clamps  $B^2$ , bearing the assembled staves now centrally clamped into a circular arch, moves through an arc one hundred and twenty degrees by the action of the ratchet-wheel  $B^{16}$ , pawl  $B^{15}$ , and cam  $B^{17}$  on the shaft  $E'$ . In this position the clamps and connected parts are locked by the projection  $B^{18}$  on the lever  $B^{19}$  being engaged and held by the cam  $B^{20}$  on the shaft  $E'$  into one of the notches  $B^{21}$  in the arms  $B'$ . The staves in the clamp  $B^2$  are thus placed in a central line with the clamps F. Another empty clamp  $B^2$  is now opposite the wheels  $C'$ , and the arms  $C^2$  being again expanded by the action of the cam  $C^7$ , lever  $C^6$ , and rods  $C^5$ , the shaft E resumes its motion by the operation of the cam  $K^{13}$ , lever  $K^{12}$ , and the clutches  $K^{10}$  and  $K^9$ . The operation previously described of filling the clamp  $B^2$  is repeated. At the same time the clamps F slide on their guides  $F'$  by the rollers  $F^6$ , worked by the cams  $F^7$  on the shaft  $E'$  over the ends of the staves first clamped far enough to leave exposed a space sufficient to receive the terminal hoops of the cask. The spindles G, meantime having by their rotative action derived from the pinions  $G^2$ , segments  $G^3$ , and cams  $G^4$  screwed the points  $G^{11}$  into the heads X, held by the jaws  $H'$ , so as to secure them in perpendicular position against the disks  $G^{10}$ , thrust the head X into positions opposite the croze in the staves by the operation of the levers  $G^8$  and cams  $G^9$ , the heads X having been released from the jaws  $H'$ . The jaws  $F^2$  of the clamps F close the staves together upon the heads X, and the cams  $J^6$ , levers  $J^5$ , links  $J^4$ , cross-heads  $J^3$ , slides



J', and rings J drive the hoops W on the ends of the staves Z. The jaws F<sup>2</sup> are reopened by the action of the cams F<sup>3</sup>, levers F<sup>4</sup>, and cam F<sup>5</sup>, and are retracted to their original position by the cams F<sup>7</sup> and rollers F<sup>6</sup>. The rings J are retracted by the further rotation of the cams J<sup>6</sup> working the levers J<sup>5</sup>, links J<sup>4</sup>, cross-heads J<sup>3</sup>, and slides J' in opposite directions, and the reverse movement of the spindles G, derived from the cams G<sup>4</sup>, through the segments G<sup>3</sup> and pinions G<sup>2</sup>, and the cams G<sup>9</sup>, through the levers G<sup>8</sup>, restore the spindles G to their original position. The cams H<sup>3</sup> and lever H<sup>2</sup> then close the jaws H', and by the action of the lever H<sup>5</sup> and cams H<sup>3</sup> the upper stop H<sup>6</sup> holds the upper heads X and the lower stop H<sup>4</sup> drops the lower heads ready to be screwed upon the points G<sup>11</sup> for the next cask. As soon as the clamps F, rings J, and spindles G are retracted the cam B<sup>20</sup> disengages the projection B<sup>18</sup> on the lever B<sup>19</sup> from the notches B<sup>21</sup> in the arm B', and the motion of the stave-supplying mechanism, as already described, is again suspended, the hook B<sup>10</sup> fastened, the jaws B<sup>3</sup> contracted upon the staves, and the arms C<sup>2</sup> retracted from the set of staves last introduced, and the clamps B<sup>2</sup> and connected parts turn through a further arc of one hundred and twenty degrees by the repeated action of the cam B<sup>17</sup>, pawl B<sup>15</sup>, and ratchet-wheel B<sup>16</sup>. The forms of the cams B<sup>6</sup> and B<sup>12</sup> and their adjustment upon their respective shafts are such that the jaws B<sup>3</sup> of the several clamps B<sup>2</sup> and the hooks B<sup>10</sup>, bracing the clefts B<sup>9</sup>, open before the clamps commence to turn and descend after reaching their highest point in rotation, the jaws B<sup>3</sup> opening first to release the cask, and the hook B<sup>10</sup> immediately afterward being then relieved of the strain produced by clamping the cask. Immediately after reaching their highest position the casks receive their intermediate hoops from the hoop-driving mechanism Q, in the manner hereinbefore described, and upon the opening of the jaws B<sup>3</sup> rest upon and come within the grasp of the rollers O, by which they are passed down the inclined plane P. After the discharge of the cask from the clamp B<sup>2</sup> the then empty clamp, by rotating through an arc of one hundred and twenty degrees, is presented with its cleft B<sup>9</sup> at the stave-supports D<sup>3</sup> ready to be again filled with staves, as before. These operations are repeated, so that while one set of staves are being introduced another set are receiving the heads and end hoops, and yet a third set receive the intermediate hoops and are discharged ready for the hoop-tightening operations.

To more readily discharge the completed casks from the clamp at its highest point of rotation, a series of rotating rollers or wheels O are employed, upon which the casks do not rest until the clamp-jaws B<sup>3</sup> open and the wheels pass the cask out lengthwise to an inclined plane P, leading to a hoop-driving ma-

chine for forcing the hoops tightly upon the casks.

Having described this invention, what I claim is—

1. In a machine for erecting casks from dressed staves and heads, the combination of two or more contractible clamps located equidistantly to and arranged to rotate intermittently about a common axis, each clamp having contractible jaws adapted to grasp and compress the bilge of casks, in combination with a pair of contractible and expansible clamps arranged to reciprocate in the direction of their axis and successively surround and compress the ends, the casks held centrally in the intermittently-rotating clamps to permit the application of hoops and insertion of heads, substantially as set forth and described.
2. In a machine for erecting casks from dressed staves and heads, the combination of the stave-supports D<sup>3</sup>, stops D<sup>4</sup>, reciprocating hooks D and cams D<sup>2</sup> and D<sup>6</sup> operating them, and retractible stave-supports C<sup>2</sup>, with a series of intermittently-rotating cleft-clamps B<sup>2</sup>, the clamps F, and cams F<sup>3</sup> and F<sup>5</sup> for opening and closing said clamps, constructed and arranged to operate substantially as set forth.
3. In a machine for forming casks from dressed staves and heads, the combination of a series of intermittently-rotating clamps B<sup>2</sup>, having clefts B<sup>9</sup> therein, with the hooks B<sup>10</sup> for bracing said clamps, recesses B<sup>11</sup> to engage said hooks with the cams B<sup>12</sup>, arms B<sup>13</sup>, and rod B<sup>14</sup>, constructed and arranged to open said clefts to receive staves and to brace said clamps during the compression of the staves, substantially as set forth.
4. In a machine for forming casks from dressed staves and heads, the combination of the reciprocating hooks D, operated by the levers D' and cam D<sup>2</sup>, stave-supports D<sup>3</sup>, converging guides D<sup>7</sup>, stops D<sup>4</sup>, operated by the levers D<sup>5</sup>, and the arm D<sup>6</sup>, with the intermittently-rotating and retractible stave-supports C<sup>2</sup>, with the clamps B<sup>2</sup>, having clefts B<sup>9</sup> adapted to pass staves by the hooks D from the supports D<sup>3</sup> to the supports C<sup>2</sup>, as and for the purpose set forth.
5. In a machine for forming casks from dressed staves and heads, the combination of the series of intermittently-rotating central clamps B<sup>2</sup>, and mechanism, as described and shown, for placing staves therein, consisting of the hooks D, supports D<sup>3</sup>, and guides D<sup>7</sup>, with the contractible reciprocating clamps F, head-supporting spindles G, having screws G<sup>11</sup> for holding heads, pinions G<sup>2</sup>, segments G<sup>3</sup>, and cams G<sup>4</sup>, operating said segments, cams G<sup>9</sup>, and levers G, reciprocating said spindles G, for the placing of heads in casks and contracting the staves thereon, substantially as set forth.
6. In a machine for forming casks from dressed staves and heads and hoops, the combination of the series of central rotating



clamps B<sup>2</sup>, the mechanism, hereinbefore described and shown, consisting of the hooks D, supports D<sup>3</sup>, and guides D<sup>7</sup> for placing staves therein, retractible clamps F, and head-supporting spindles G, with the hoop-driving rings J and their supporting and moving slides J', and mechanism described for reciprocating the slides, constructed and arranged to operate substantially as set forth.

7. In a machine for forming casks from dressed staves and heads and hoops, the combination of the stave-compressing clamps B<sup>2</sup> and F, with the reciprocating head-supporting spindles G, having screw-points G<sup>11</sup>, with the head-supplying racks H, having jaws H', and cams H<sup>3</sup> operating the same, with the stops H<sup>4</sup> and H<sup>6</sup>, levers H<sup>5</sup>, and cams H<sup>3</sup>, arranged to automatically deliver heads singly, substantially as set forth and shown.

8. In a machine for erecting casks from dressed staves and heads, the combination of the reciprocating guided hoop-driving rings J, with the grooved guides J<sup>8</sup>, arranged to receive the hoops W, stops J<sup>9</sup> and J<sup>10</sup>, and connected lever J<sup>11</sup>, arranged to hold and successively drop the hoops in the path of the rings J, substantially as and for the purpose set forth.

9. In a machine for forming casks from dressed staves and heads and hoops, the combination of the grooved guides J<sup>8</sup>, stops J<sup>9</sup> and J<sup>10</sup>, and lever J<sup>11</sup> and cam H<sup>3</sup> for operating the same, with the reciprocating hoop-driving rings J, moving transversely to the said guides J<sup>8</sup>, and having springs J<sup>13</sup> in the sides thereof for holding, placing, and forcing the end hoops upon the staves, substantially as set forth and described.

10. In a cask-forming machine, the combination of the rotating clamps B<sup>2</sup> with the clamps F, spindles G, rings J, and their described respective operating mechanisms, and the intermediate hoop-placing apparatus Q, constructed and arranged substantially as shown, with the rings Q<sup>25</sup>, connected with the lever Q<sup>27</sup> and lever N<sup>2</sup>, as and for the purpose set forth.

11. In a machine for forming casks, the combination of the series of rotating contractible and expansible clamps B<sup>2</sup>, with the stave-feeding mechanism, the head-placing and hoop-placing mechanisms, all as described and shown, and the wheels O and inclined plane P, constructed and arranged to receive the weight of the casks and remove the same upon the expansion of the clamps B<sup>2</sup> releasing the casks therefrom, substantially as set forth.

12. In a machine for forming casks from dressed staves, the combination of the inter-

mittently-rotating clamps B<sup>2</sup> with the sleeve B, ratchet-wheel B<sup>16</sup>, pawl B<sup>15</sup>, and cam B<sup>17</sup>, with the lever B<sup>19</sup>, having a projection B<sup>18</sup>, notches B<sup>21</sup>, and cam B<sup>20</sup>, constructed and arranged to operate as set forth.

13. In a machine for forming casks, the combination of the stave-feeding mechanism consisting of stave-supports D<sup>3</sup>, guides D<sup>7</sup>, stops D<sup>4</sup>, and hooks D and cams D<sup>2</sup> and D<sup>6</sup>, operating the same, the rotating retractible fingers C<sup>2</sup> for receiving and supporting staves, the series of contractible clamps B<sup>2</sup>, arranged to rotate intermittently about a common axis, the head placing and supporting spindles G, head-supplying racks H, hoop-driving rings J, grooved hoop-guides J<sup>8</sup>, contractible end clamps F, intermediate hoop-driving claws Q', Q<sup>2</sup>, Q<sup>3</sup>, and Q<sup>4</sup>, pistons Q<sup>5</sup> and Q<sup>6</sup>, discharging-wheels O, and inclined plane P, with the driving-shaft K', clutches K<sup>9</sup> and K<sup>10</sup>, lever K<sup>12</sup>, shaft E', and bearing cams B<sup>8</sup>, B<sup>17</sup>, B<sup>20</sup>, C<sup>7</sup>, F<sup>5</sup>, F<sup>7</sup>, G<sup>4</sup>, G<sup>9</sup>, H<sup>3</sup>, H<sup>7</sup>, J<sup>6</sup>, J<sup>12</sup>, and K<sup>13</sup>, constructed and arranged to simultaneously place and grasp staves in one clamp B<sup>2</sup>, place heads in staves and compress and bind with hoops the staves in another clamp upon heads, and place the intermediate hoops upon casks in another clamp, and discharge casks thus hooped, and provide intermissions of the several working parts during the turning motion of the clamps, substantially as and for the purpose set forth.

14. In a machine for forming casks, the combination of the stave-feeding mechanism consisting of stave-supports D<sup>3</sup>, guides D<sup>7</sup>, stops D<sup>4</sup>, and hooks D and cams D<sup>2</sup> and D<sup>6</sup>, operating the same, the rotating retractible fingers C<sup>2</sup> for receiving and supporting staves, the series of contractible clamps B<sup>2</sup>, arranged to rotate intermittently about a common axis, the head placing and supporting spindles D, head-supplying racks H, hoop-driving rings J, grooved hoop-guides J<sup>8</sup>, contractible end clamps F, discharging-wheels O, and inclined plane P, with the driving-shaft K', clutches K<sup>9</sup> and K<sup>10</sup>, lever K<sup>12</sup>, shaft E', and bearing cams B<sup>8</sup>, B<sup>17</sup>, B<sup>20</sup>, C<sup>7</sup>, F<sup>5</sup>, F<sup>7</sup>, G<sup>4</sup>, G<sup>9</sup>, H<sup>3</sup>, H<sup>7</sup>, J<sup>6</sup>, J<sup>12</sup>, and K<sup>13</sup>, constructed and arranged to simultaneously place and grasp staves in one clamp B<sup>2</sup>, place heads in staves and compress and bind with hoops the staves in another clamp upon heads and discharge casks thus hooped from another clamp, and provide intermissions of the several working parts during the turning motion of the clamps, substantially as and for the purpose set forth.

S. LLOYD WIEGAND.

Witnesses:

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VAN WYCK BUDD.