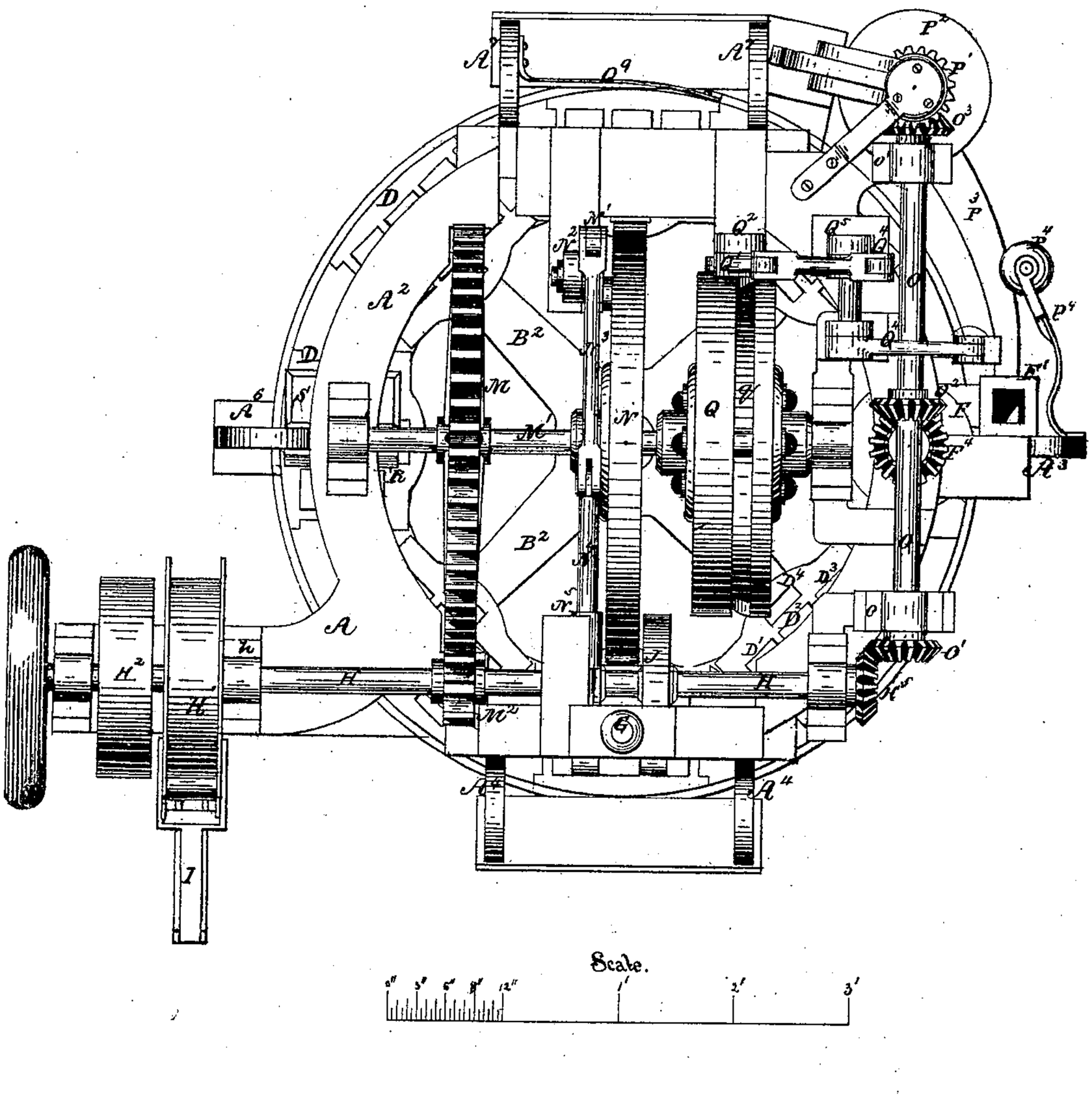
6 Sheets--Sheet 1.

I. GREGG.

Improvement in Manufacturing Bricks.

No. 132,463. Patented Oct. 22, 1872.

Fig. 1



Scale.

Witnesses:

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Edwd. C. Davidson,

Inventor.

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Fig. 2

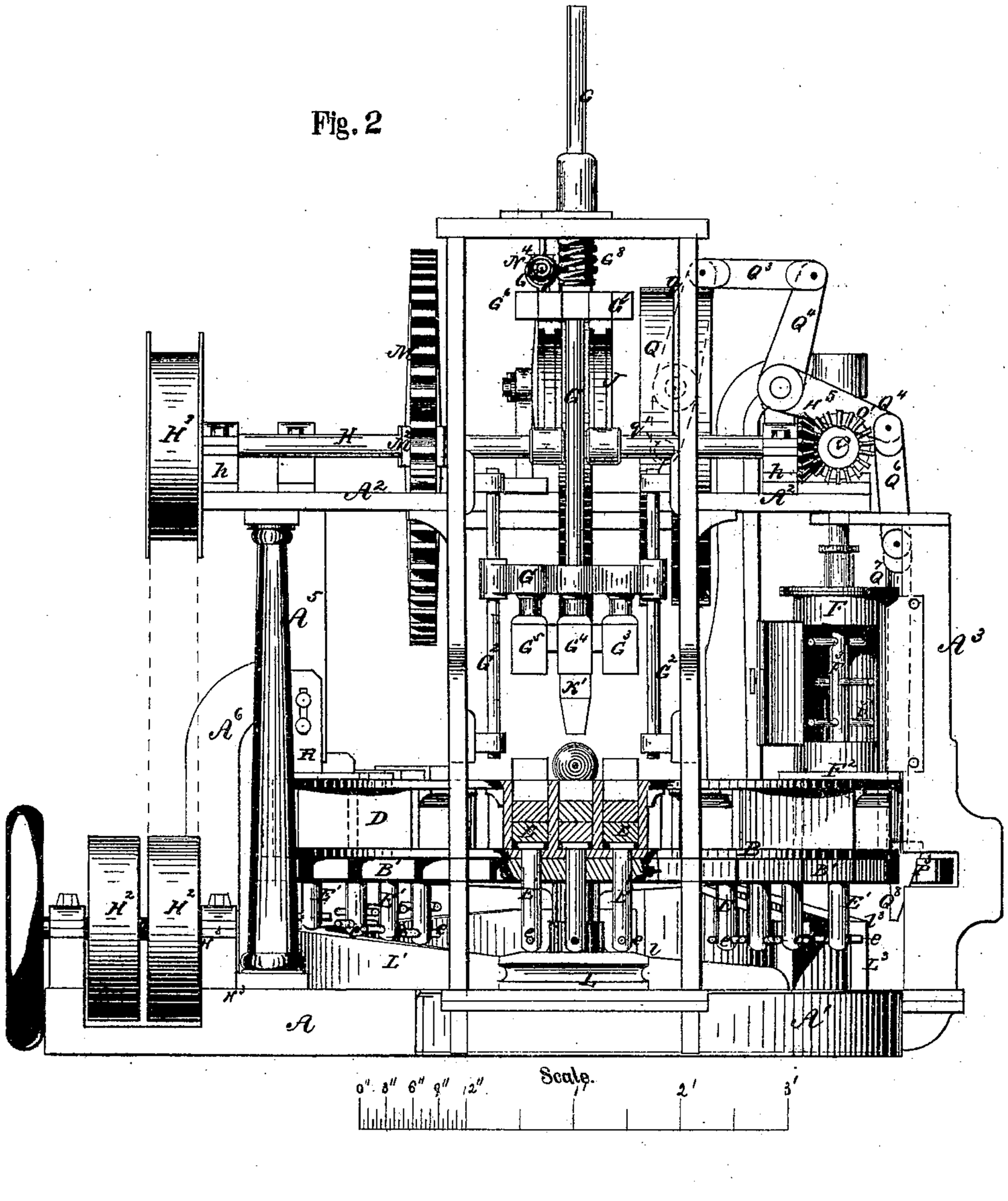

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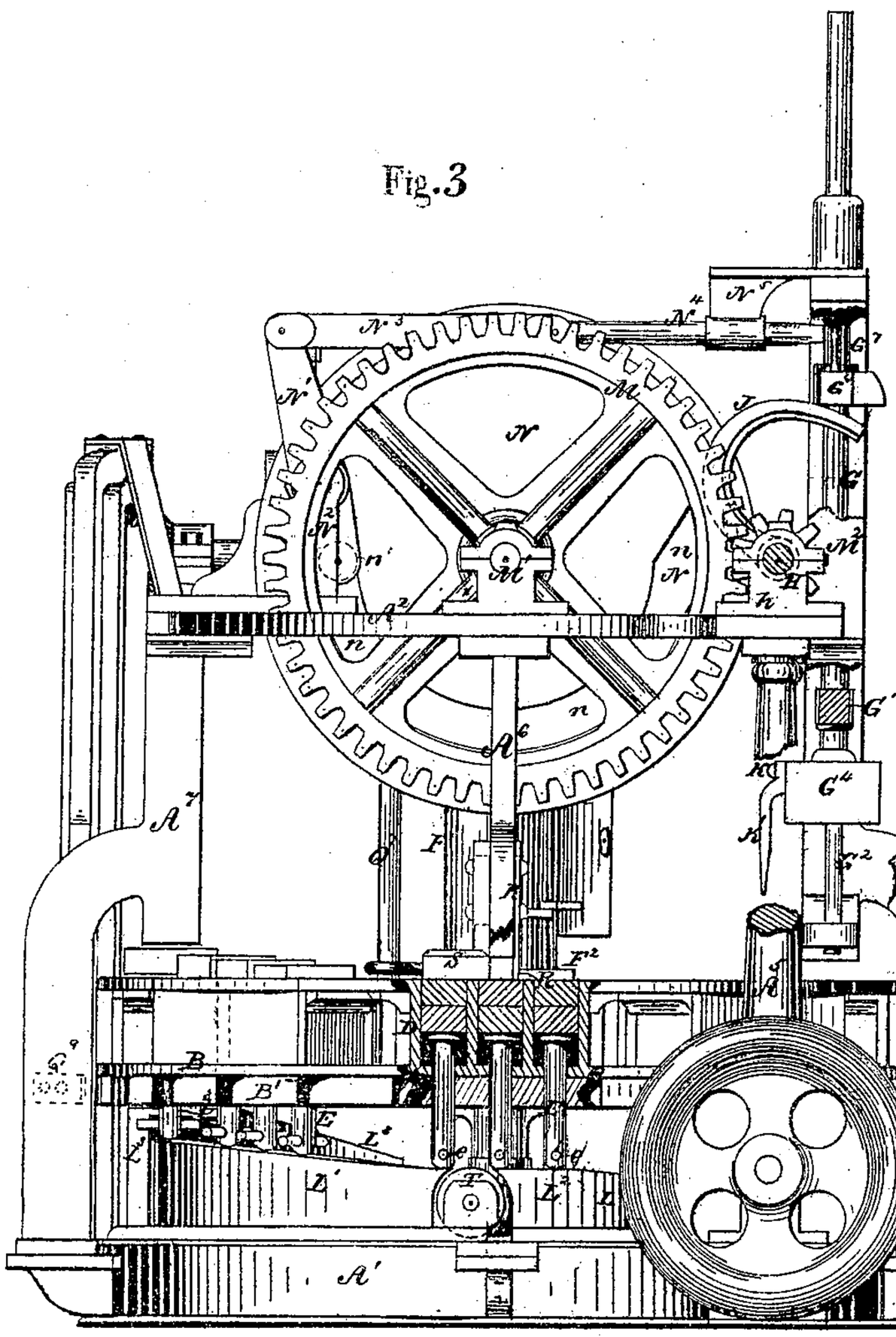
Fig. 3



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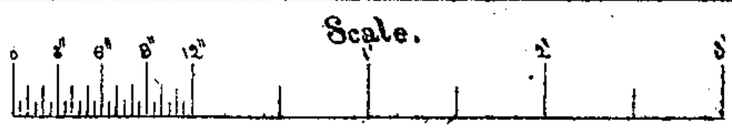

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Fig. 4

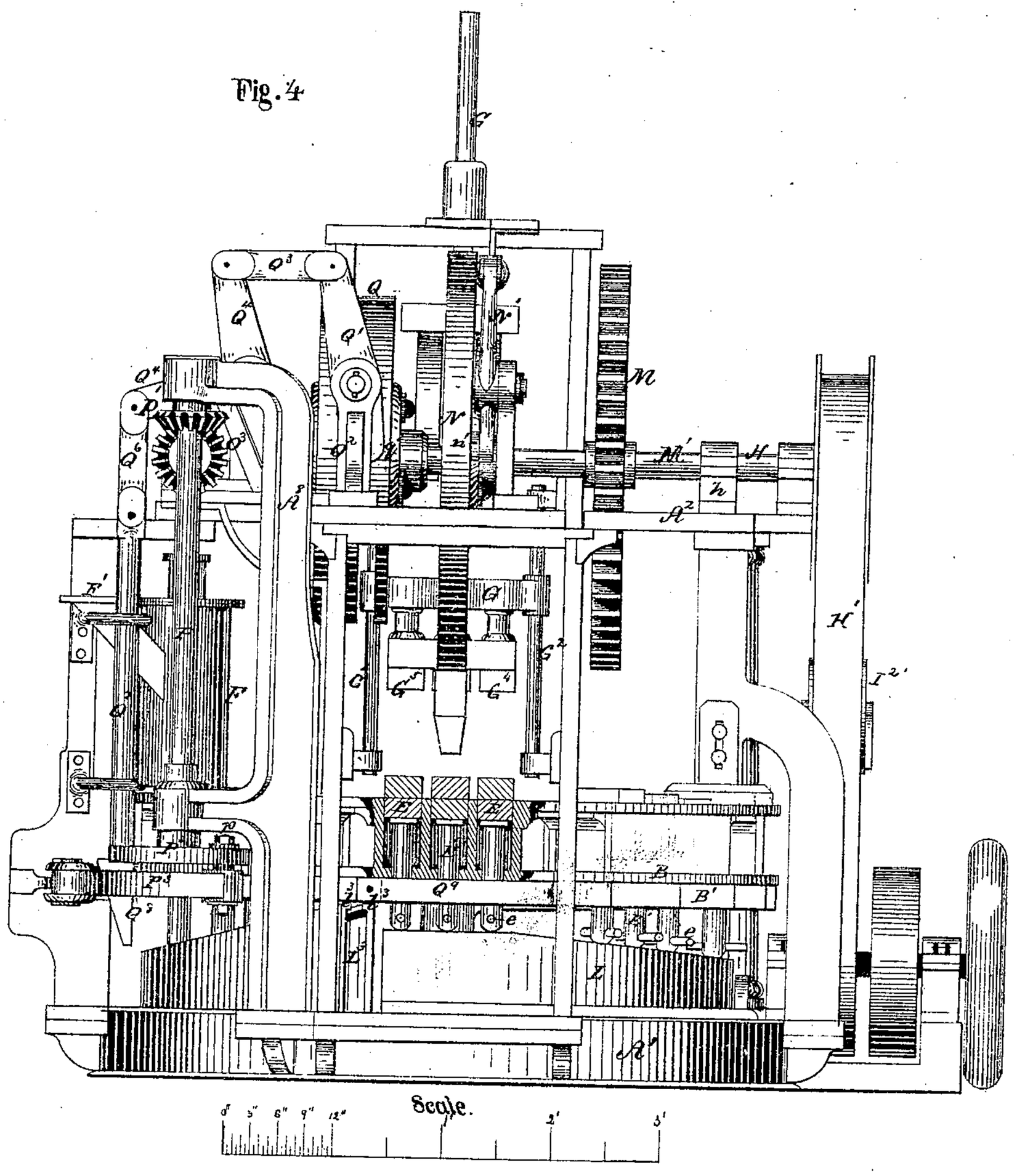

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Fig. 5

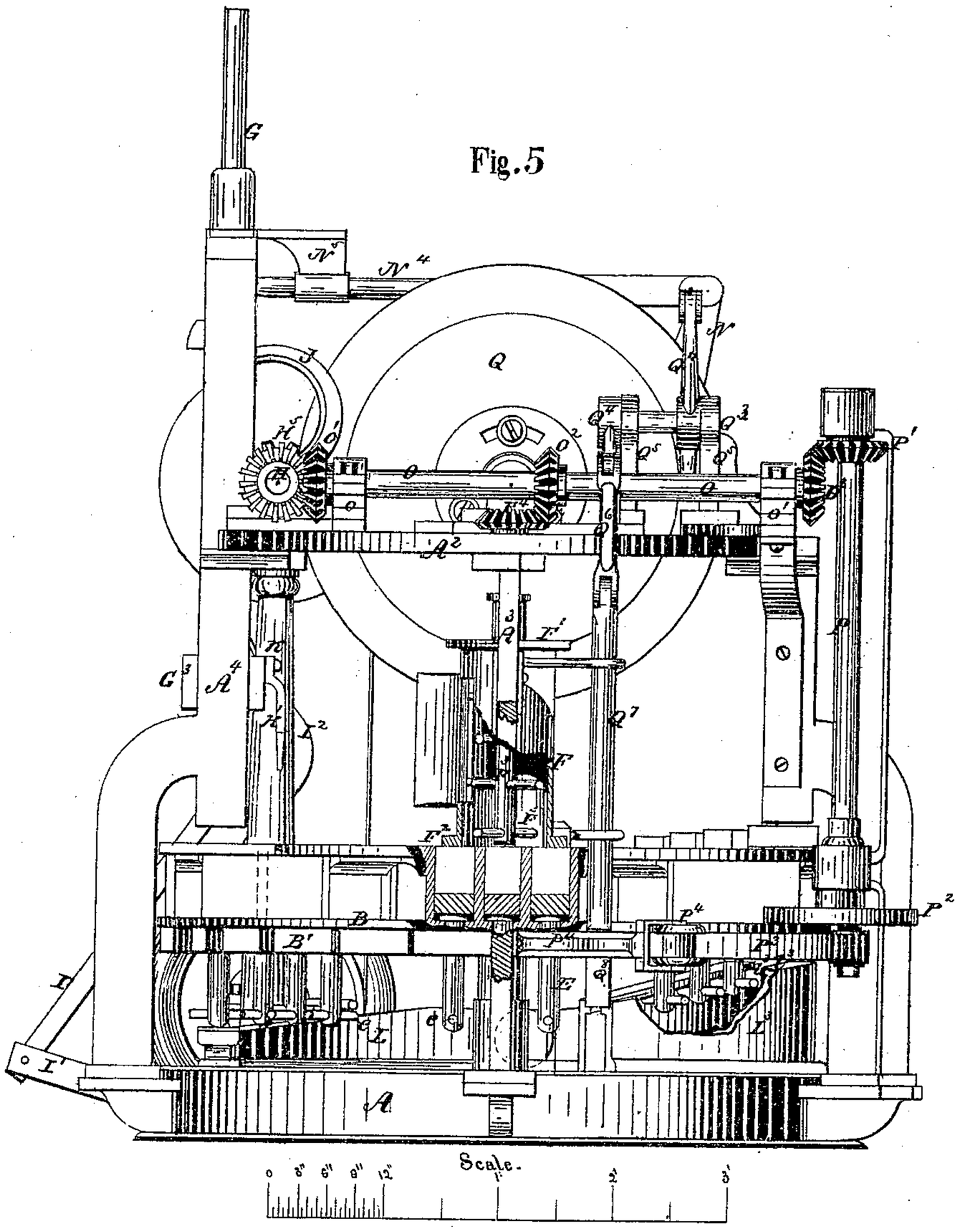

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Fig. 6

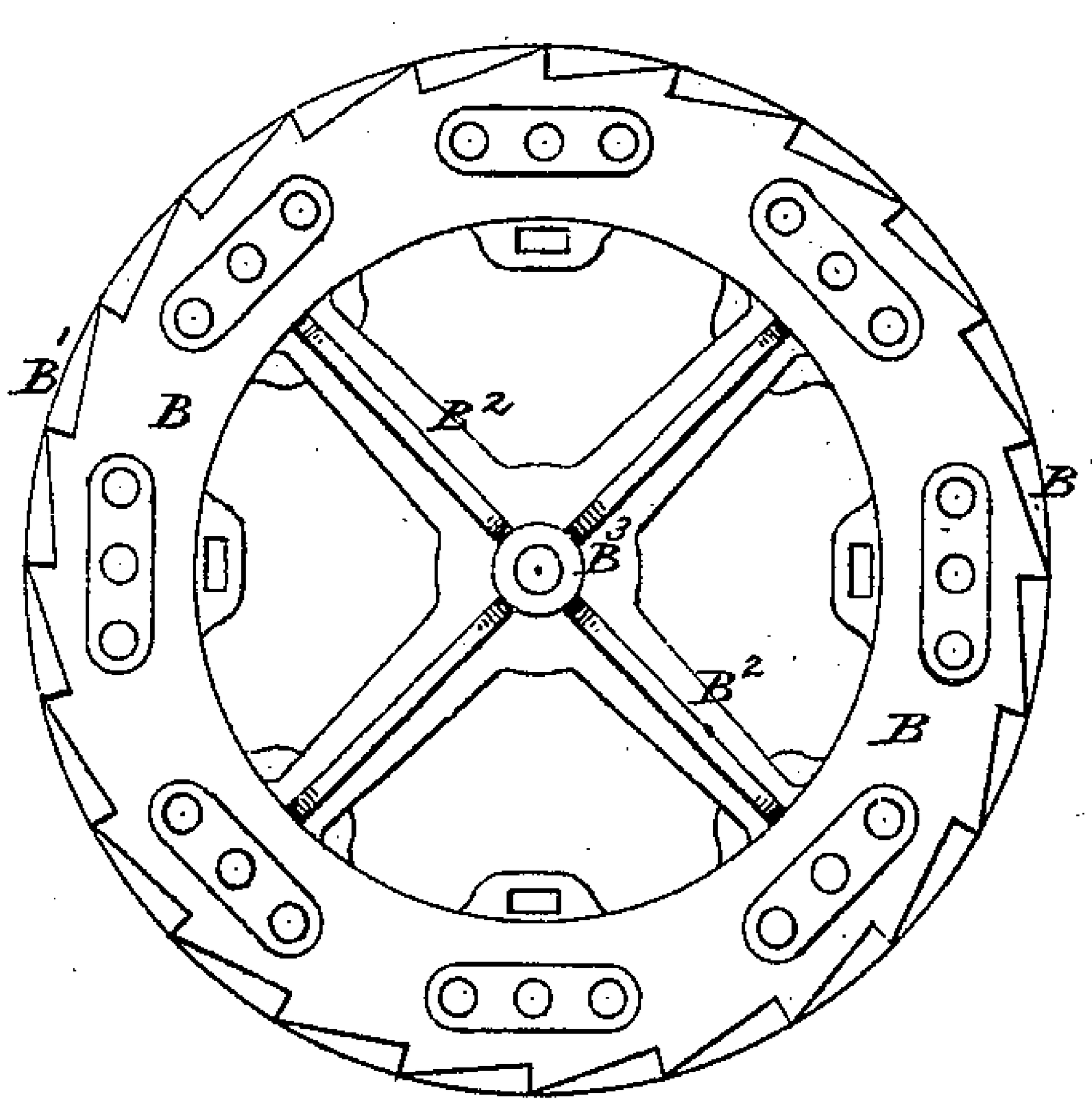


Fig. 7

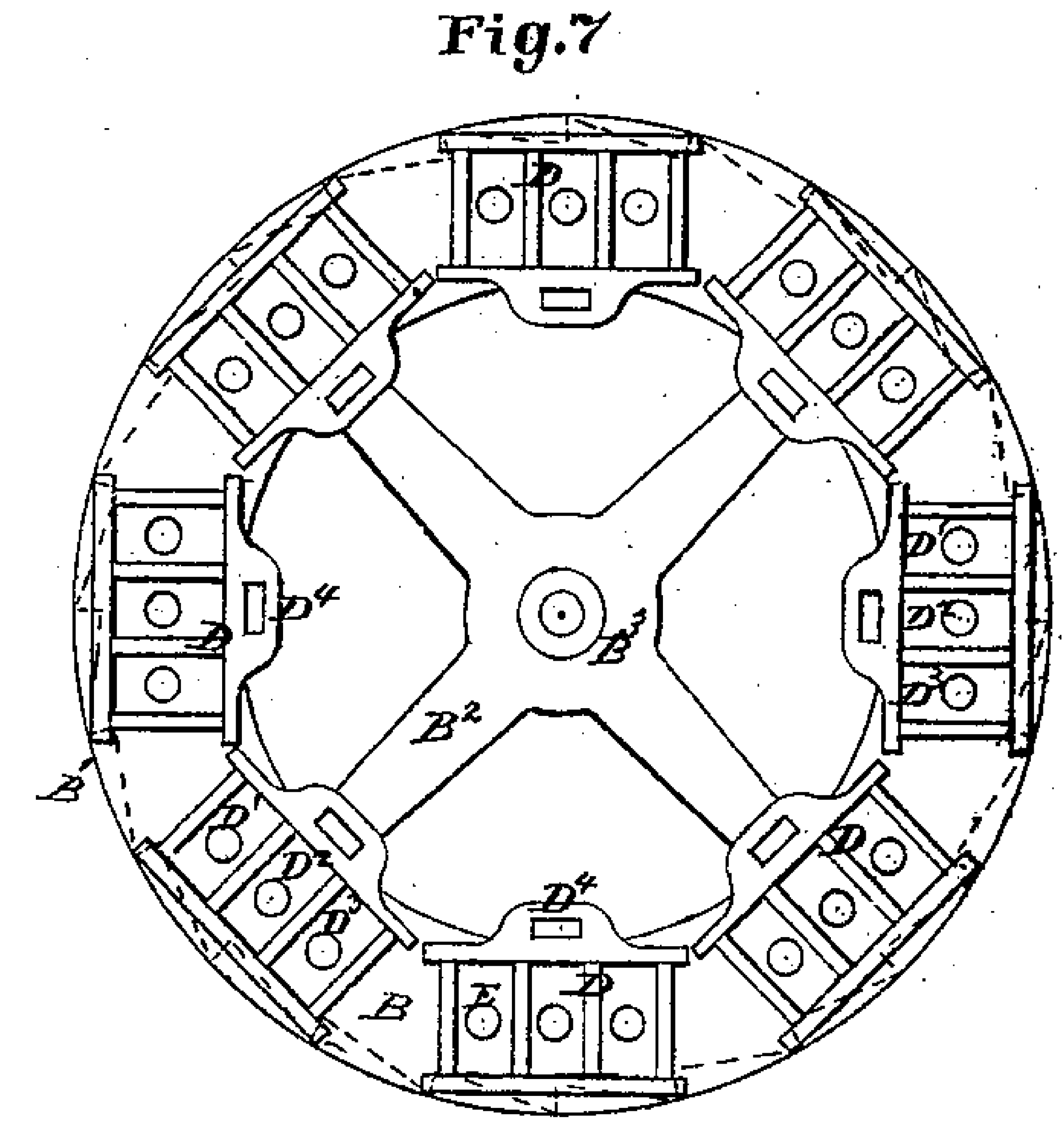
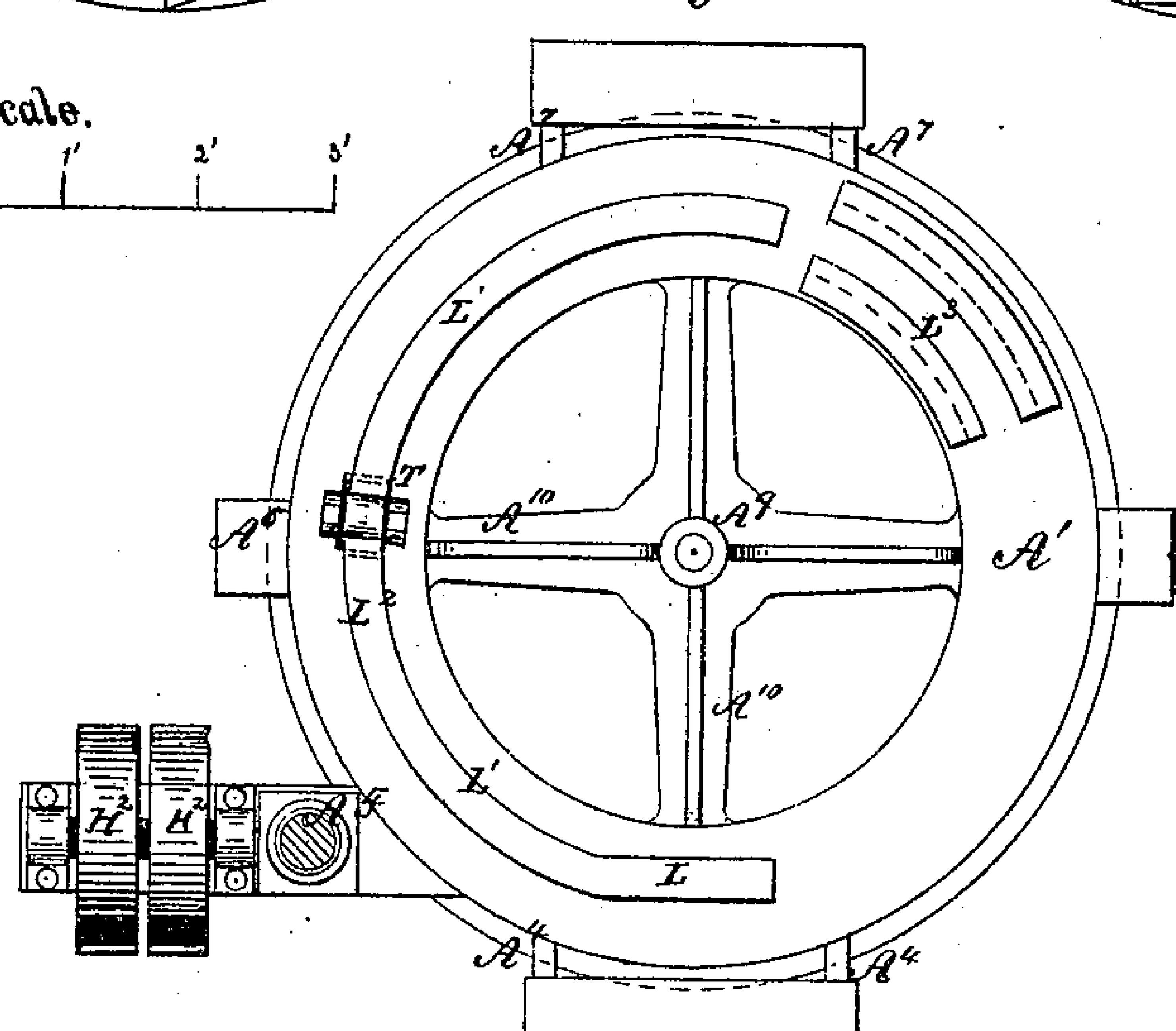


Fig. 8



Scale.

Witnesses.

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Inventor.

Isaac Gregg

UNITED STATES PATENT OFFICE.

ISAAC GREGG, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MANUFACTURING BRICKS.

Specification forming part of Letters Patent No. **132,463,** dated October 22, 1872.

To all whom it may concern:

Be it known that I, ISAAC GREGG, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in the Art of Manufacturing Bricks, of which the following is a specification:

My invention relates more particularly to a new and improved method and machine for molding, impacting, and sizing bricks, but some of the devices for carrying my invention into effect may be obviously used in machines acting upon a different principle and producing different results.

The machines that are now in general use, so far as my knowledge extends, have molded and solidified the clay by the force of compression, which has been attended with many and serious objections. When the clay is subjected to pressure or the force of compression it has been found that the air permeating the clay is condensed in the mass, no opportunity being offered for its escape during the process, and when it is subjected to heat the air will expand and cause the bricks to crack. This method also requires a great degree of power to give to the brick the proper solidity, thus materially affecting the cost of operating the machine and also subjecting it to severe strains which tend to break and disorganize the mechanism.

Attempts have been made heretofore to solidify the clay by the impact or percussion of falling bodies. This method tends in a great degree to increase the density of the clay, while the concussion of the blow disturbs the air therein and aids materially in its escape. It has been demonstrated by experiment that a far greater force can be exerted to solidify the clay by this means than could be obtained from the power required to lift the weights if employed to compress the clay. The methods heretofore used and the machinery employed for manufacturing bricks upon this principle have been imperfect and are not now in successful use.

It is the object of my invention to apply an improved method and a more complete and effectual mechanism for applying the principle of impact to the manufacture of bricks whereby the clay may be subjected to a rapid, thorough, and uniform treatment, and the machinery operated with less power and at a greatly reduced cost. The improvements consist, first, in a novel method of manufacturing bricks by first supplying the clay in proper condition to the mold; then moving the mold to a beater, where it is stopped while the clay is impacted in the mold by a succession of blows from the beater; then moving the mold to a knife to size the brick; and finally ejecting the finished brick from the mold by the connected and progressive movements of the mold, as hereinafter set forth. Second, of the combination of a revolving table of mold-boxes and stamps or beaters to impact the clay in the molds, as hereinafter set forth. Third, of the combination of a revolving table carrying mold-boxes having an automatic intermittent movement and intermittently-operating beaters to impact the clay in the molds, the table and beaters operating alternately, as hereinafter set forth. Fourth, of the combination, with the mold-table and beaters, of devices to guide the beaters in descending upon the clay in the molds, as hereinafter set forth. Fifth, of the combination of an intermittently-rotating table of mold-boxes, followers in the molds, and an anvil beneath the table, upon which the followers rest to prevent their yielding while the clay is being impacted, as hereinafter set forth. Sixth, of the combination of a mold-box to hold the clay-beaters to impact the clay, a continually-moving tripping device, and an automatic detent to intermit the action of the tripping device upon the beaters, as hereinafter set forth. Seventh, of the combination of the mold-box, the beaters, the tripping device, and a spring to accelerate the movement of the beaters, as hereinafter set forth. Eighth, of the combination of the beaters, the trippers, the mechanism for operating the trippers, and devices for preventing the movement of the trippers from being reversed, as hereinafter set forth. Ninth, of the combination and arrangement of the driving-shaft, the counter-shaft, the crank shaft, the crank, the pawl, the revolving mold-table, and its ratchets for operating the table, as hereinafter described. Tenth, of the combination of the revolving mold-table, its ratchets, the continually-moving pawl, and the devices for disengaging the pawl, whereby the motion of the table is intermitted at regular intervals, as hereinafter set

forth. Eleventh, of the combination of the intermittently-revolving mold-table, its ratchets, the pawl, the disengaging device for intermitting the action of the pawl, and a detent to prevent the backward movement of the table when the pawl is disengaged from the ratchets, as hereinafter described. Twelfth, of the combination of the movable table, the mold-boxes, the beaters, the followers, the horizontal anvil, the inclined plane for raising the followers, the horizontal plane, and a knife arranged above the plane for sizing and leveling the bricks as they pass beneath it, as hereinafter described. Thirteenth, of the combination of the table, the mold-box, the followers, the incline for raising the brick to the knife, a smoothing-iron, and a friction-roller for raising the brick to the smoothing-iron to be finished, as hereinafter described.

In the accompanying drawing, Figure 1 is a plan view of my machine; Fig. 2 is a front elevation with one of the mold-boxes in section while under the beaters; Fig. 3, a side elevation with one of the mold-boxes in section while under the knife, and with part of the framework broken away to show more clearly the tripping mechanism; Fig. 4, a rear elevation with one of the mold-boxes in section, showing the bricks raised in the mold ready for delivery; Fig. 5, an elevation from the side opposite Fig. 3, partly in section, showing the plungers withdrawn from the molds and leaving them ready to receive a new supply of clay; Fig. 6, a bottom view of the mold-table detached, on a smaller scale; Fig. 7, a top view of the same; and Fig. 8, a plan view of part of the frame, showing the inclines for raising and withdrawing the followers, as hereinafter described.

The main frame A has a circular base, A^1, and an elevated platform, A^2, of corresponding shape to support the gearing and shafting. Suitable uprights A^3, A^4, A^5, A^6, A^7, and A^8 serve to support the platform and other parts of the machine and securely brace and connect them together. The platform may be connected with the base of the machine by a suitable ladder, and protected by railings, to aid the attendant in repairing, oiling, and inspecting the machinery. A circular mold-table, B, has ratchet-teeth B^1 formed on its periphery, and arms B^2 extending across its diameter to form a hub, B^3, which is supported by a similar hub, A^9, and arms A^{10} connected with the base of the frame. A center-bolt, C, is secured to the hub A^9, and serves as a journal for the hub B^3 of the mold-table. A suitable number of mold-boxes, D, each having, in this instance, three molds, D^1 D^2 D^3, are bolted to the mold-table, and formed with rectangular openings or guide-ways D^4 in their inner flanges, as hereinafter described. Each mold is provided with a follower, E, that fits snugly therein, and has a pendent stem, E′, with a pin or lug, *e*, at its lower end, which serves to depress the followers in their molds, as hereinafter set forth. A cylindrical hopper, F, with a neck, F^1, to receive the clay, is securely bolted to the upright A^3, and has a plate or flange, F^2, at its base that bears lightly upon the face of the mold-boxes and aids to steady their movement and keep them in place. A revolving shaft, F^3, operated by a bevel-pinion, F^4, connected with the driving-shaft, is journaled at the top, and passes through the axis of the cylindrical hopper, and is provided with radial arms F^5 that revolve with the shaft and serve to agitate the clay and feed it regularly to the molds. A vertical rod or stem, G, is supported and guided at its upper end in a cross-brace that connects the uprights A^4, and is secured at its lower end to a cross-head, G^1, which is connected with guide-rods G^2 secured to the uprights A^4 of the frame. A set of beaters, G^3, G^4, and G^5, are slightly smaller than the molds on the table to permit the air to escape when impacting the clay, are secured to the cross-head, and may be made of any suitable weight and material. A driving-shaft, H, journaled in bearing-blocks *h* on the frame A^2, is, in this instance, connected, by a belt, H^1, with pulleys H^2 on a shaft supported on the base A^1 of the frame, and operated by the main driving power. An arm, I, pivoted at one end to a bracket, I′, on the frame, carries at the other end a weighted roller that bears upon the belt H^1 and serves to keep it taut in a well-known manner. Tripping-arms J, of suitable form, are secured to the driving-shaft and revolve with it. A plate, G^6, is secured on the rod G at a proper point to be operated upon by the arm J to raise the beaters a sufficient height and let them drop, at proper intervals, upon the clay in the mold and give to it the requisite solidity. A plate, K, braces and connects the beaters G^3, G^4, and G^5 together, and an arm, K′, projects downward therefrom, and is wedge-shaped to better enable it to pass into the rectangular space or guide-way D^4 in the mold-box. By this means the molds are always brought directly in line with the beaters and the edges of the molds never injured. It is important that the edges of the molds should be sharp and perfect, as otherwise the sizing-knife would not give a smooth finish to the brick. An anvil, L, is securely bolted to the base A^2 of the frame, and serves to support the followers and receive the shock of the blow from the beaters. A spur-gear, M, secured to the shaft M^1, is driven by a pinion, M^2, on the main shaft, which is in this instance of such proportion that six revolutions of the pinion will make but one of the spur-gear. A cam-wheel, N, secured to the shaft M^1, has a groove, *n*, formed in its face, that receives a friction-roller, *n′*, on an arm, N^1, pivoted to a bracket, N^2, on the frame. The arm N^1 is connected, by a link, N^3, with a sliding bolt or detent, N^4, that is supported and guided by a bracket, N^5, also secured to the frame. The detent engages at proper intervals in an eye or staple, G^7, on the plate G^6, and serves to support the beaters and prevent them from being acted upon by the tripping-arms. The groove in the face of the cam-wheel N is of such

form that the detent is engaged with the staple during one-half of the revolution of the cam-wheel or three revolutions of the driving-shaft and trippers, and disengaged with the same during the other half of the revolution of the shaft and the other three revolutions of the trippers. Other proportions may be used, however, if found desirable. A coiled spring, G^8, secured to the cross-brace of the uprights A^4, encircles the upper part of the rod G, and bears upon the plate G^6 when it is raised so as to accelerate the blow of the beaters when they are raised by the tripping-arms or released from the detent. A clutch mechanism, consisting in this instance of a ratchet-wheel, H^3, secured to one of the driving-pulleys, and a pawl, H^4, attached to the frame, serves to prevent the driving-shaft and tripping-arms from being reversed by any accidental cause and the mechanism thereby deranged. Other well-known clutch devices may be substituted for the ratchet-wheel and pawl to accomplish the same purpose. The driving-shaft H has a bevel-pinion, H^5, that meshes with a corresponding pinion, O^1, upon a counter-shaft, O, which is journaled in bearing-boxes *o o'* on the upper frame A^2, and revolves at a uniform speed with the driving-shaft. The counter-shaft is at right angles to the driving-shaft, and passes directly over the shaft F^3 of the hopper and extends to the rear of the machine. Miter-pinions, O^2 and F^4, connect the counter-shaft with the shaft F^3 and serve to operate it positively and at a regulated speed. Other miter-pinions, O^3 and P^1, connect the counter-shaft and crank-shaft P and serve to operate it in the same way. The crank-shaft P is supported in a vertical position by bearings in the upright A^8, and has a crank-wheel, P^2, secured to its lower end. A pawl, P^3, is connected, by an adjustable wrist-pin, *p*, with the crank-wheel, and is held against the face of the ratchets of the table by a spring-roller, P^4, secured to the upright A^3 of the frame. By this arrangement of shafting the pawl is operated by the driving-shaft continually in a uniform manner with but little loss of power. A cam-wheel, Q, on the shaft M^1, has a groove, *q*, formed in its periphery that receives a friction-roller, *q'*, on the lower end of an arm, Q^1, pivoted to a bracket, Q^2, on the upper frame. The upper end of the arm Q^1 is connected, by a link, Q^3, with a bell-crank lever, Q^4, also journaled in brackets Q^5 on the upper frame, so that the lever and arm are vibrated together by the action of the cam upon the roller of the arm. A link, Q^6, connects the bell-crank lever with a vertical rod, Q^7, supported by brackets upon the upright A^3 of the frame, and provided with a wedge-shaped switch, Q^8, at its lower end. The rod Q^7 receives an intermittent vertical movement through the cam, arm, links, and bell-crank lever, and serves to disengage the pawl, with its ratchet, at regulated intervals, and by this means intermits the movement of the table. The grooves *n* and *q* in the cam-wheels N and Q are so formed, and have such relation to each other, that when the detent is engaged to arrest the action of the beaters the switch will be withdrawn to permit the pawl to act upon and revolve the table. A spring-detent, Q^9, prevents the accidental backward movement of the table when the pawl is disengaged by the switch. This combination of devices insures a positive intermittent movement of the table and a positive intermittent movement of the beaters, operating alternately. The anvil L above referred to has a horizontal face and a beveled or rounded edge, *l*, that raises the followers slightly above the table when they rest upon the anvil, so as to relieve the table of the concussion of the blow when struck by the beaters, and also insures the uniform depth of the molds. An incline plane, L^1, gradually raises the followers in the molds until they reach a horizontal plane, L^2, arranged directly below a sizing-knife, R, secured to the upright A^6 of the frame, and the bricks are by this means leveled off at a uniform thickness. A smoothing-iron, S, is secured to and made adjustable on the upright A^6 of the frame, and a roller, T, journaled to the base of the frame, is arranged directly beneath the smoothing-iron and at the termination of the horizontal plane just described. This roller serves to raise the follower and present the bricks directly and easily to the smoothing-iron to be finally finished upon its surface. The incline plane L^1 continues from the top of the roller T to the rear of the machine, where the bricks are completely ejected from the molds and ready to be taken from the machine. An inversed incline, L^3, is arranged at the end of the incline L^1, with flanges l^3 l^3 that bear upon the pins *e* of the follower-stems as the table revolves, and serve to withdraw the followers to their normal position to prepare the molds to receive a new supply of clay when they have reached the hopper in their second revolution.

The operation is as follows: The clay is first prepared by means well known to the art and delivered to the neck of the hopper, by means of an endless belt or other suitable contrivance, in a comminuted and slightly moist condition. The agitator, revolving at a regulated speed, supplies the clay to the molds in a uniform manner. In the drawing, Figs. 1, 2, 3, 4, and 5 represent the detent withdrawn from the beaters, the tripping-arms supporting the beaters in an elevated position and about to make their first blow; the switch has just been thrown into operation to release the pawl from the ratchets of the table, and the table thereby at rest. The driving-shaft now makes three revolutions; the beaters give three blows to the clay in mold-box No. 1, and lift the beaters to their elevated position; the detent then engages with the beaters; the switch is withdrawn from the pawl and the table is moved by the next three revolutions of the driving-shaft to bring box No. 2 under the action of the beaters. This operation continues, and the mold-boxes, after leaving the beaters, pass on

to the knife and smoothing-iron. The followers are raised by the incline and roller, as described, and the bricks are sized by the knife and finished on their upper surface by the smoothing-iron. The incline continues to raise the brick in the mold until it is finally ejected at the rear of the machine. The inverse incline then operates upon the pins in the stems of the plungers and withdraws them from the molds to prepare the mold to receive a new supply of clay from the hopper.

I claim as my invention—

1. The improvement in the art of manufacturing bricks, consisting in first supplying the clay to the mold; then subjecting the clay in the mold to successive blows; then presenting the brick to a sizing-knife; and, finally, ejecting the brick from the mold by a connected progressive movement of the mold, substantially as set forth.

2. The combination of a revolving mold-table with stamps or beaters to impact the clay in the molds, substantially as set forth.

3. The combination of a revolving mold-table having an automatic intermittent movement, and intermittently-operating beaters for impacting the clay during the pause in the movement of the table, substantially as set forth.

4. The combination of the revolving mold-table, the beaters, the guide-arm, and the guide-way, to insure the proper position of the mold-table during the action of the beaters, substantially as set forth.

5. The combination of the intermittently-rotating table of mold-boxes, the beaters, the followers in the molds, and the anvil to support the followers during the action of the beaters, substantially as set forth.

6. The combination of the table, the molds, the beaters, the continually-moving tripper, and an automatic detent to intermit the operation of the beaters, substantially as set forth.

7. The combination of the mold-table, the beaters, the tripper, and the spring to accelerate the movement of the beaters, as set forth.

8. The combination of the beaters, the tripper, the driving-shaft, and the clutch mechanism to prevent the reverse movement of the trippers, substantially as set forth.

9. The combination of the driving-shaft, the counter-shaft, the crank-shaft, the crank, the pawl, the mold-table, and the ratchets, these parts being arranged and operating substantially as set forth.

10. The combination of the revolving mold-table, its ratchets, the continually-moving pawl, and the switch for disengaging the pawl to intermit the movement of the table at regular intervals, substantially as and for the purpose set forth.

11. The combination of the revolving mold-table, its ratchets, the pawl, the switch for disengaging the pawl to intermit the operation of the table, and the detent to prevent the backward movement of the table, as set forth.

12. The combination of the table, the mold-boxes, their followers, the beaters, the horizontal anvil, the inclined plane, the horizontal plane, and the sizing-knife, these parts being arranged and operating substantially as and for the purpose set forth.

13. The combination, in the manner described, of the revolving table, the mold-boxes, the followers, the incline, the stationary friction-roller, and the smoothing-iron, substantially as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

ISAAC GREGG.

Witnesses:
WM. H. ROWE,
JOE I. PEYTON.