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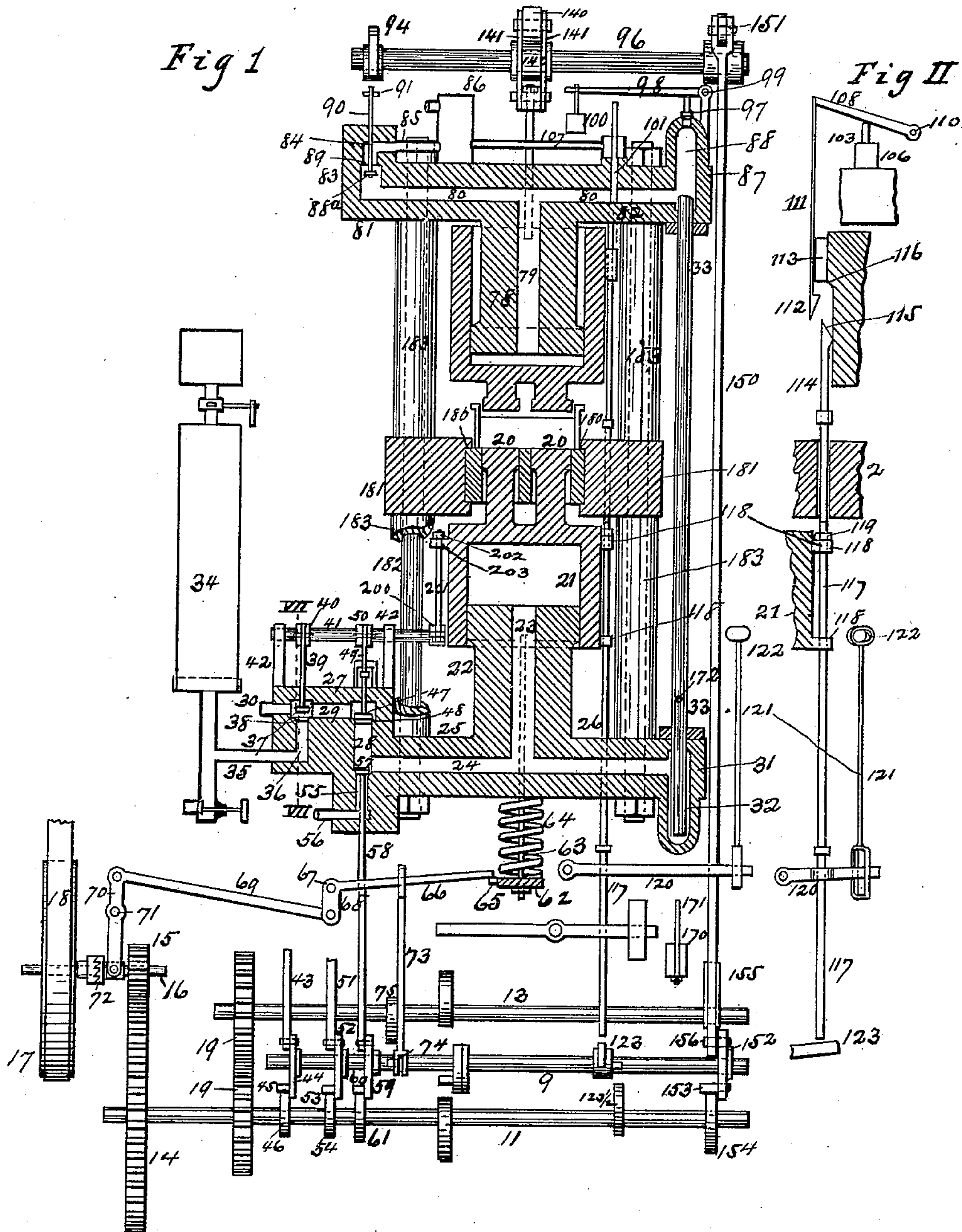
4 Sheets—Sheet 1.

J. J. KOCH.

HYDRAULIC BRICK MACHINE.

No. 397,730.

Patented Feb. 12, 1889.



Attest.
E. Arthur,
M. J. Larcomb.

Inventor:
J. J. Koch
By Knight Bros
Atty

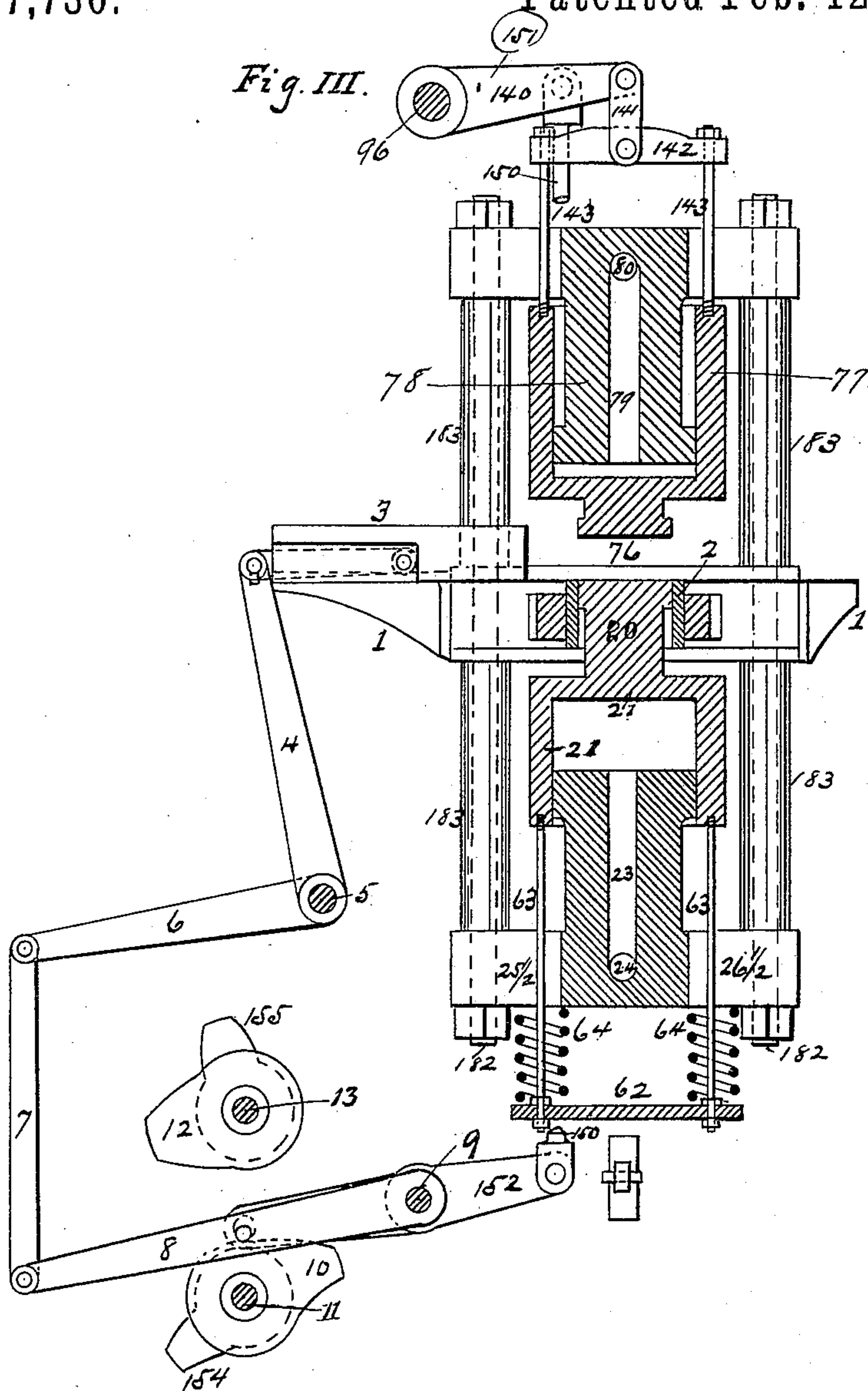
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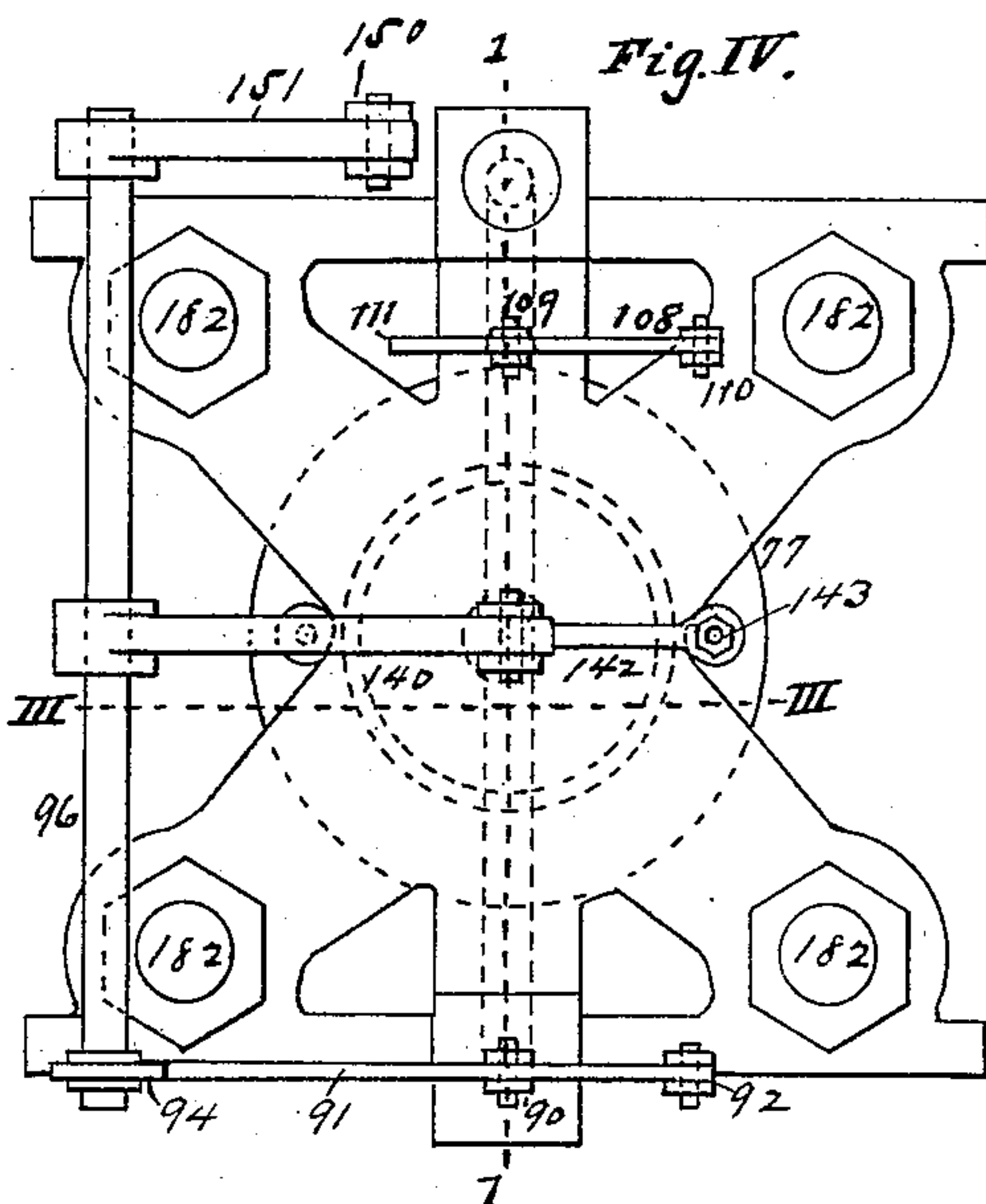
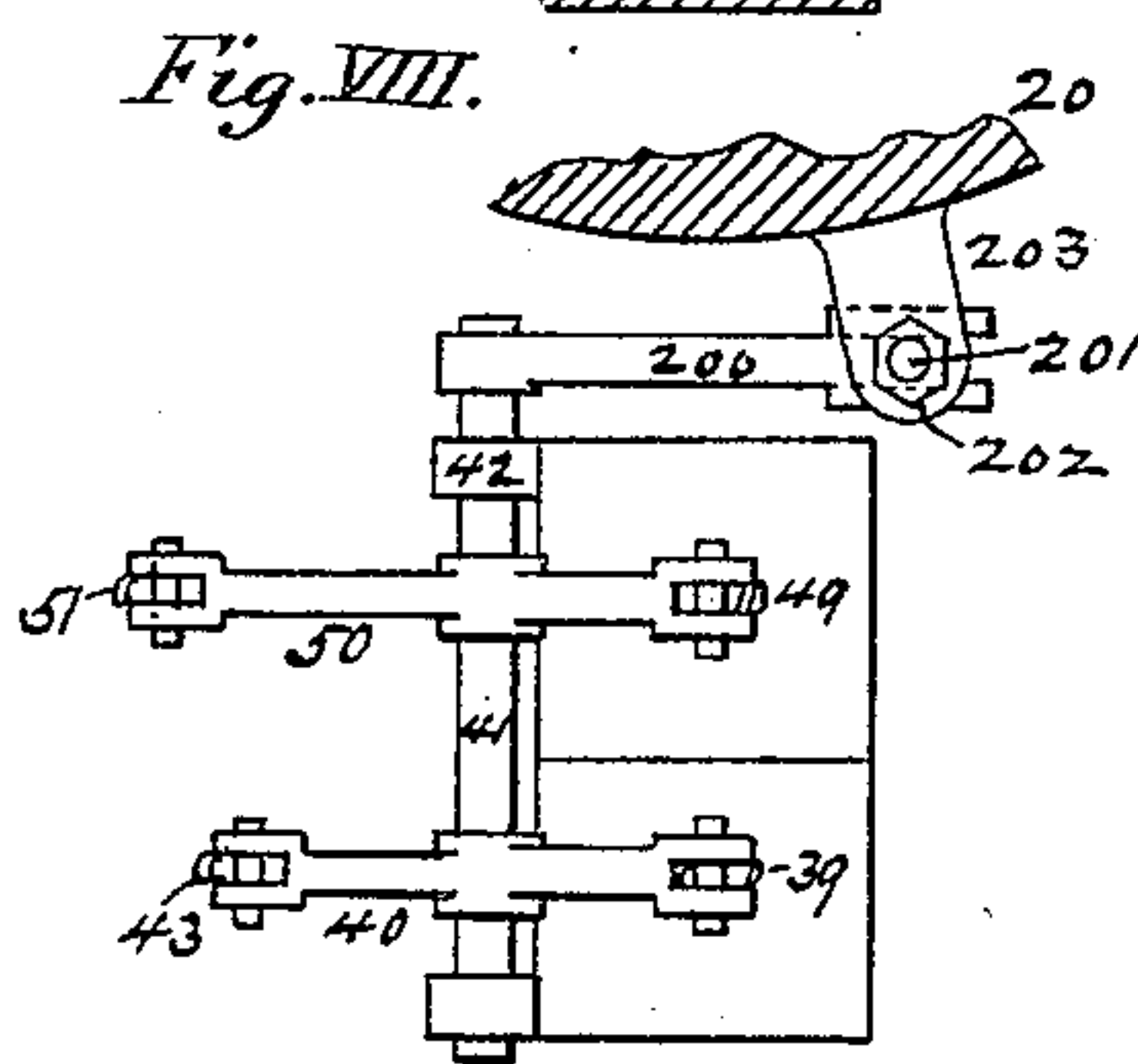
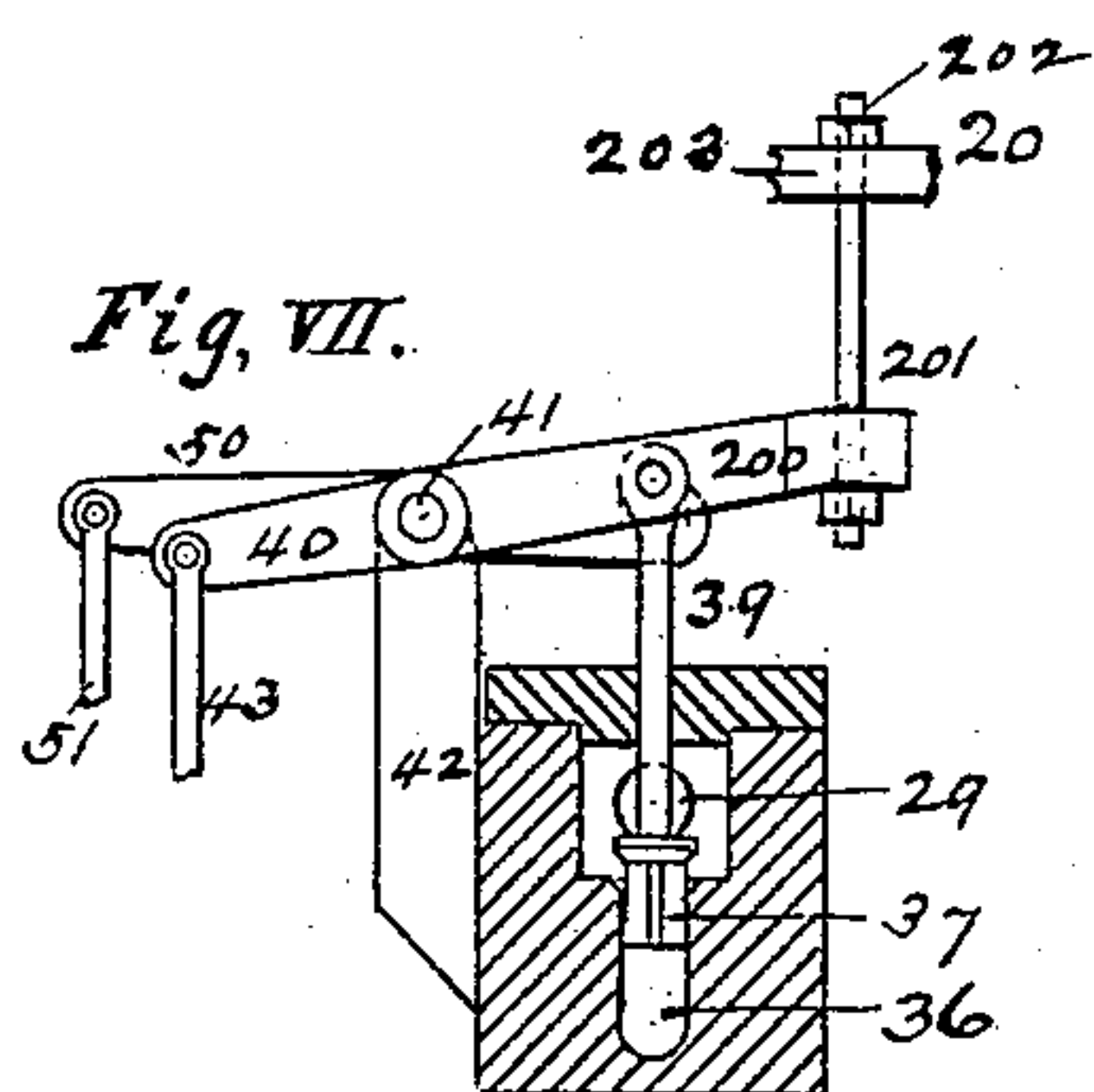
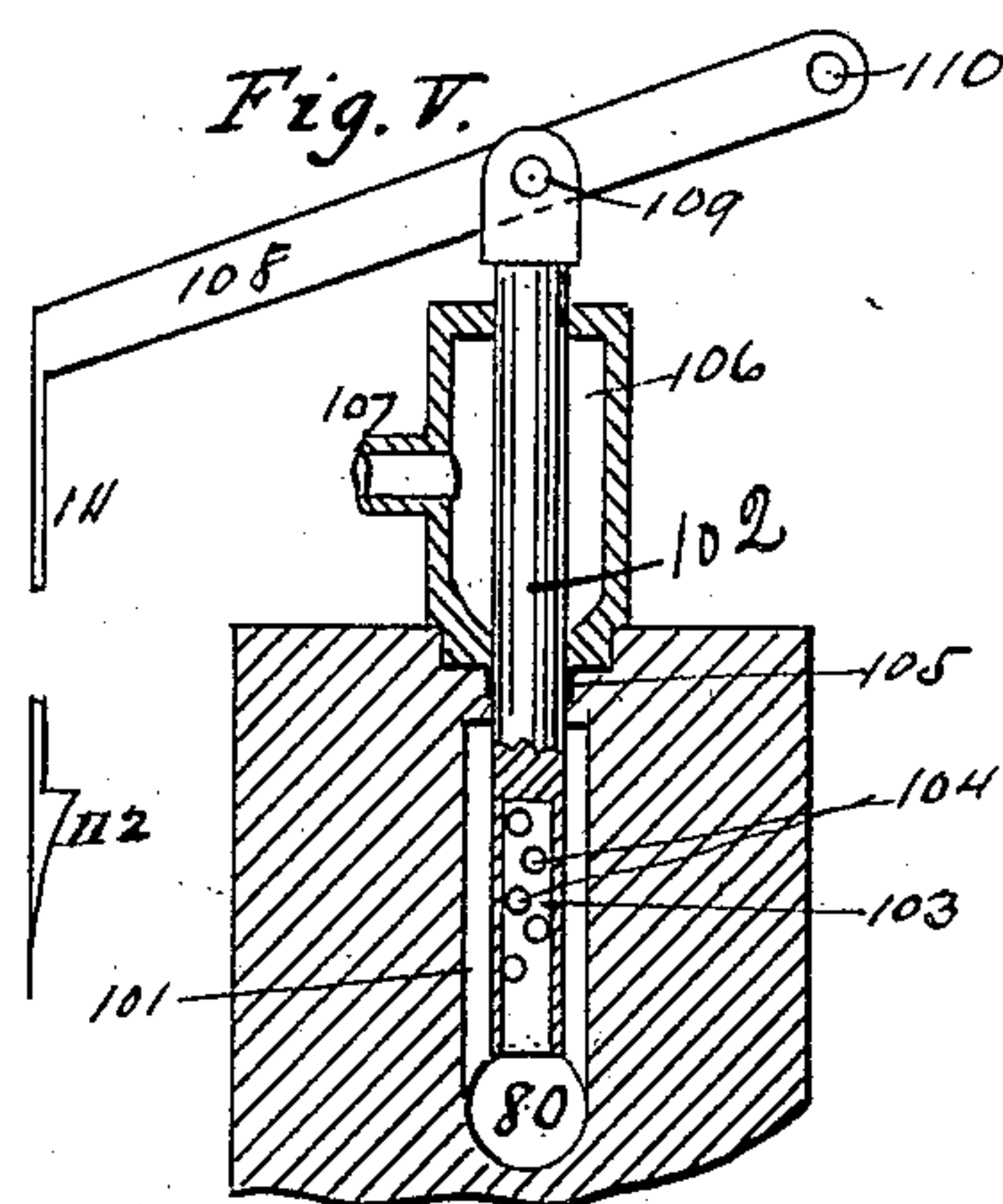
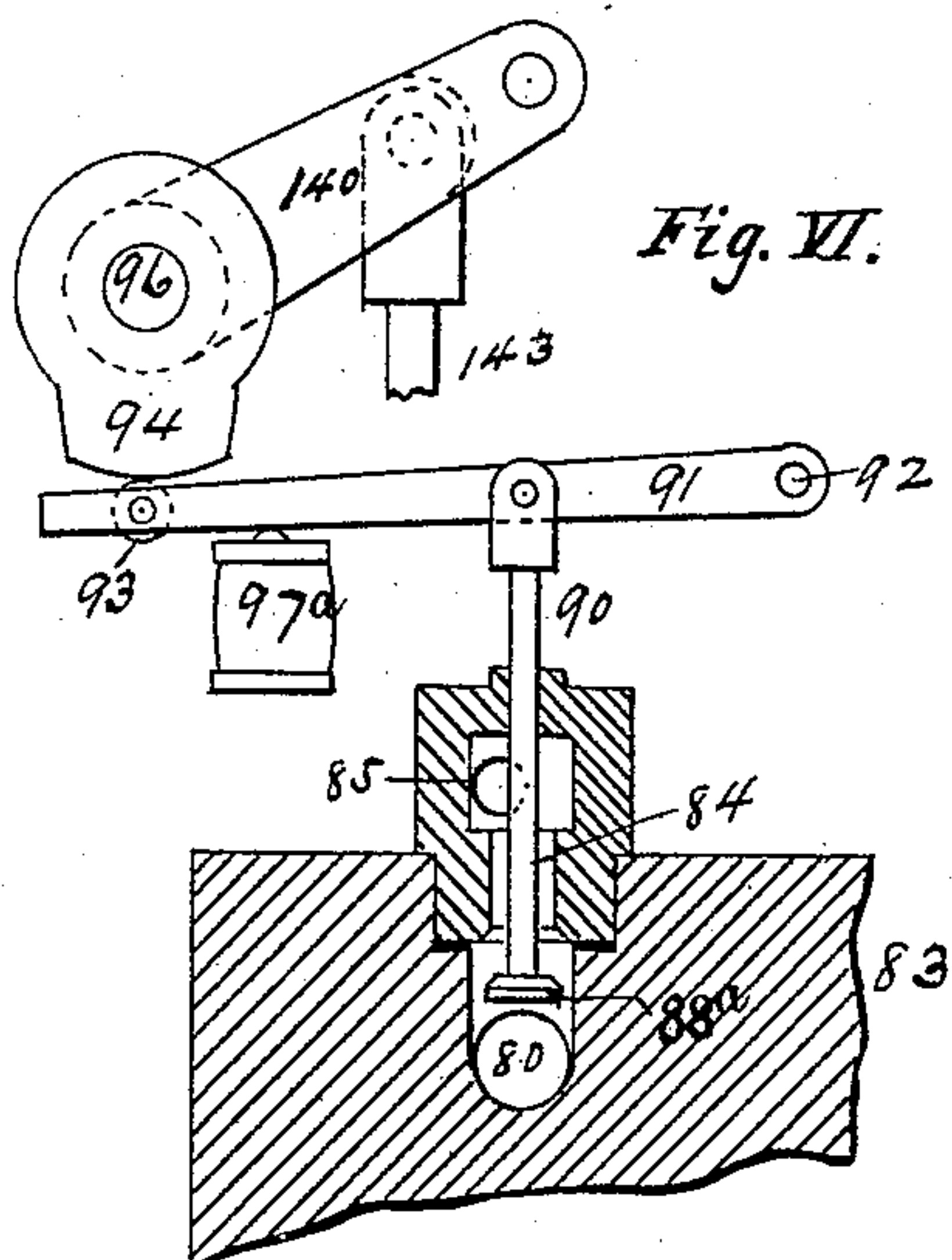
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Fig. IX.

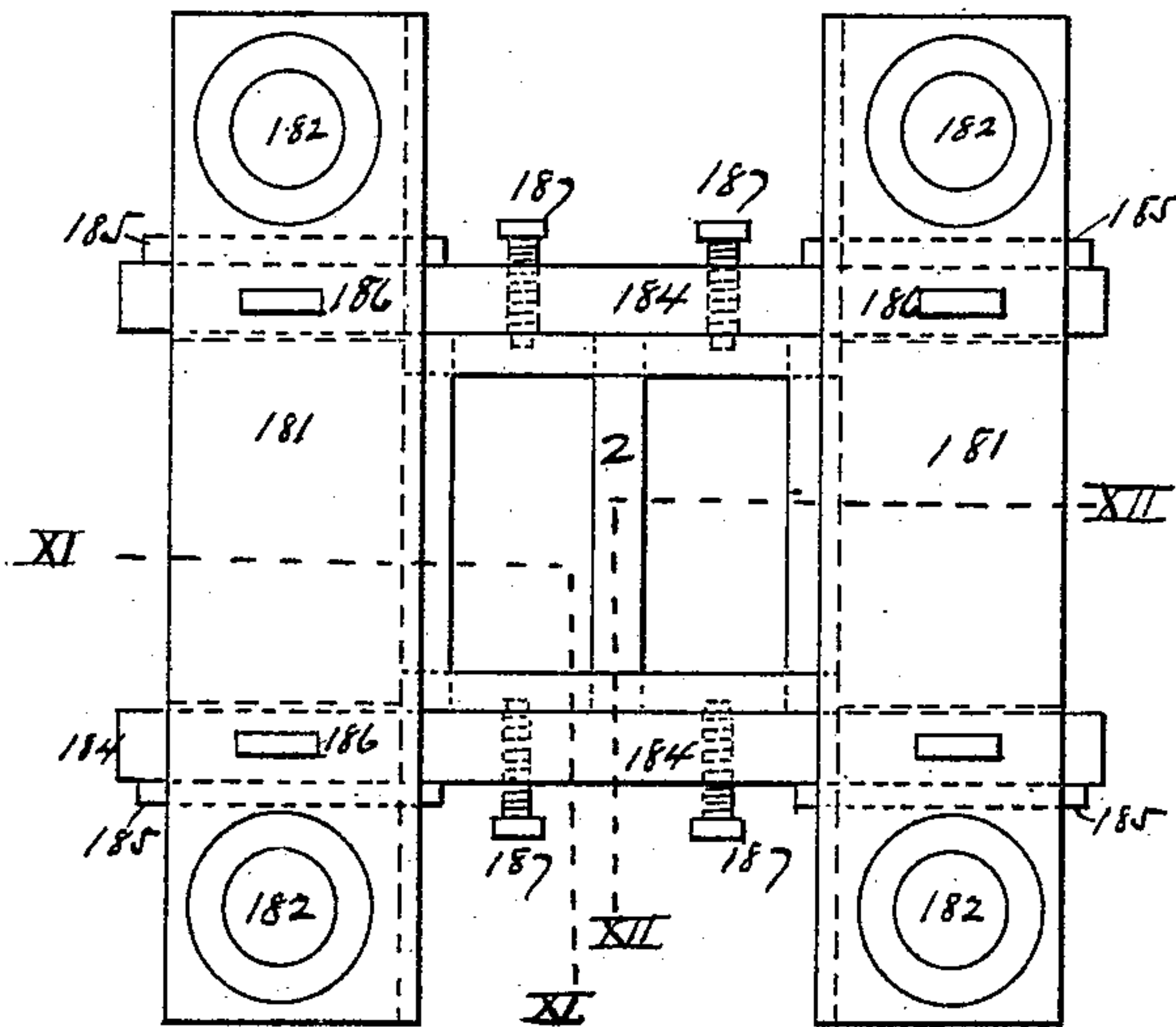


Fig. XII.

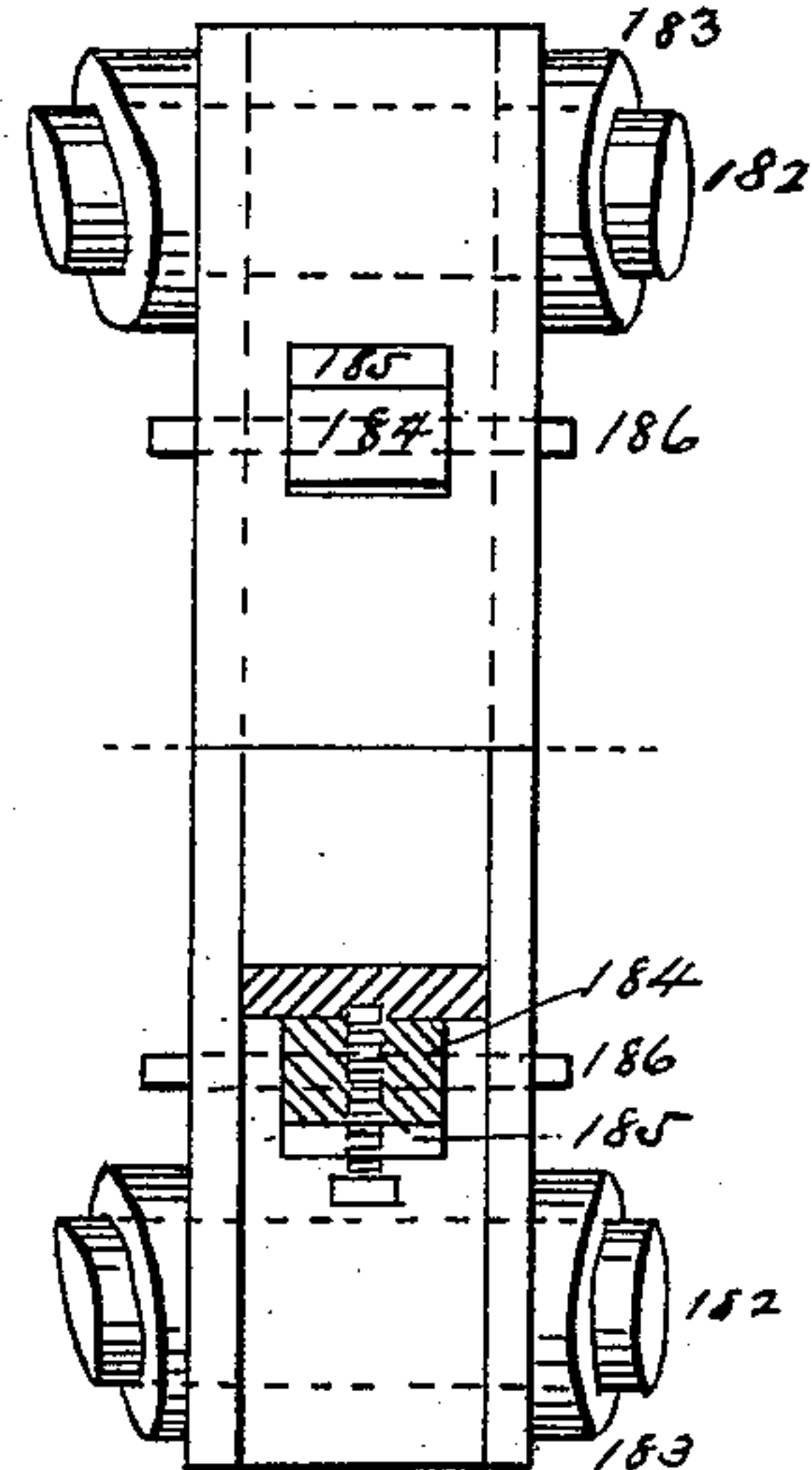


Fig. X.

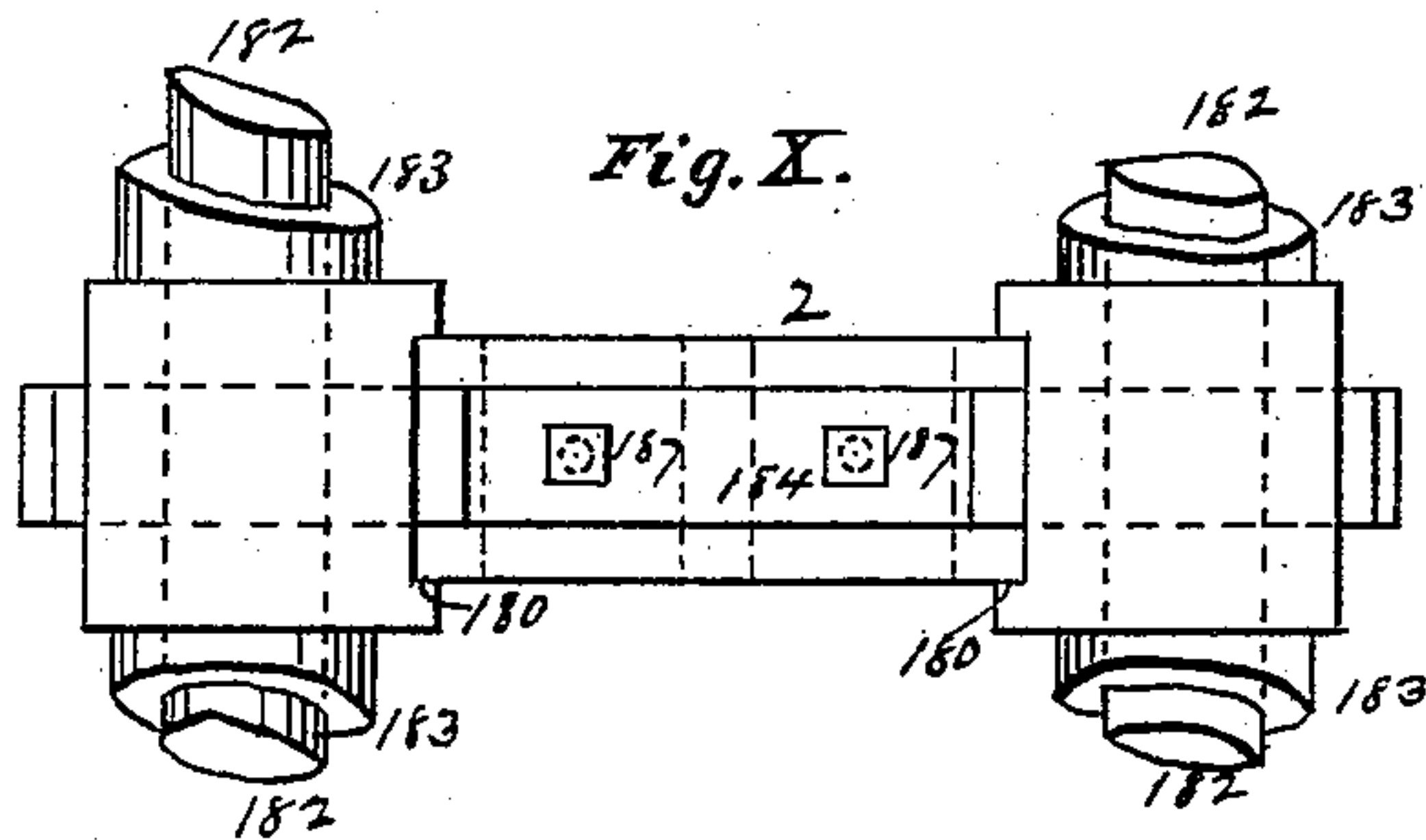
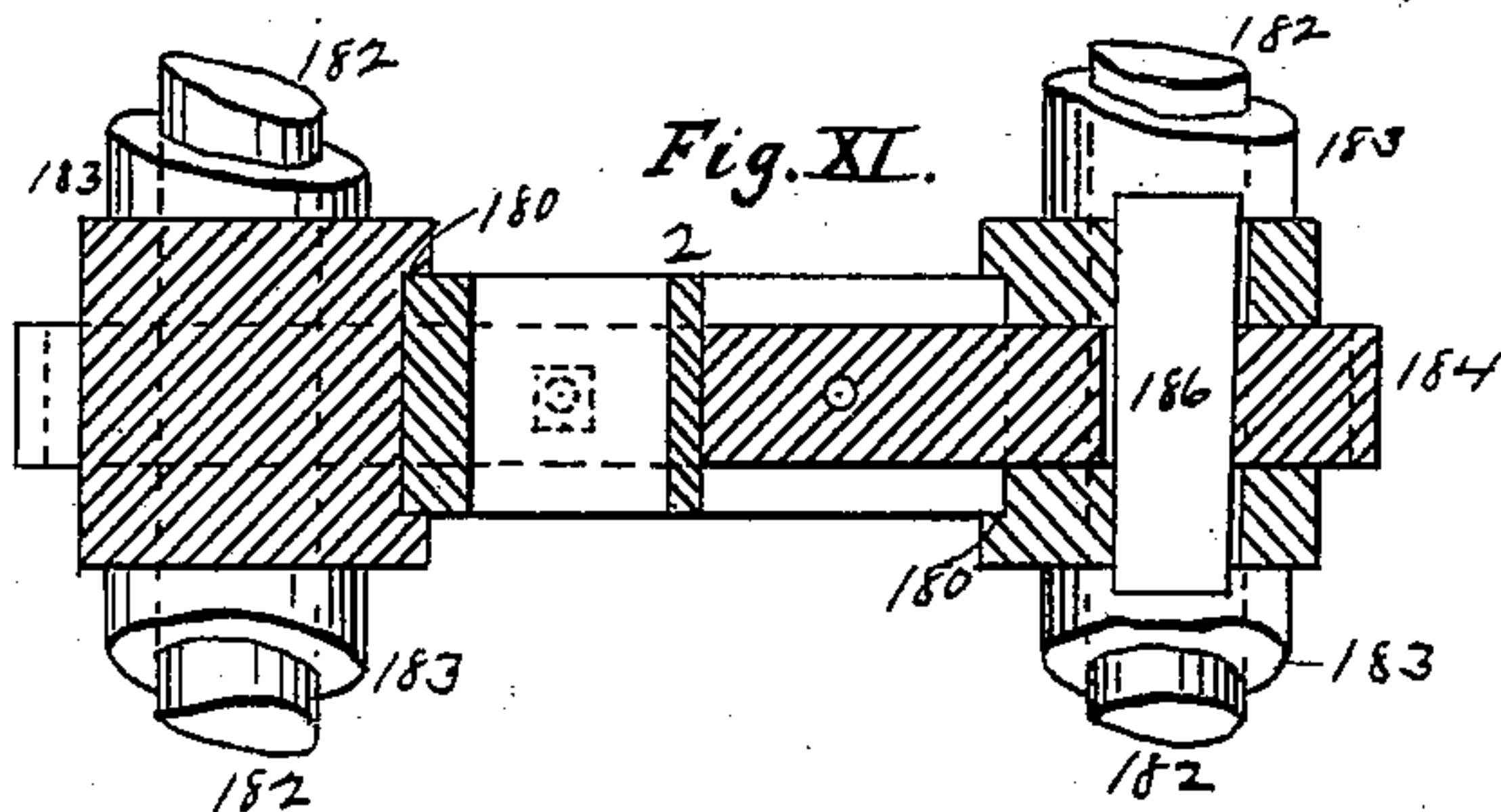


Fig. XI.



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UNITED STATES PATENT OFFICE.

JULIUS J. KOCH, OF ST. LOUIS, MISSOURI.

HYDRAULIC BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,730, dated February 12, 1889.

Application filed May 22, 1888. Serial No. 274,753. (No model.)

To all whom it may concern:

Be it known that I, JULIUS J. KOCH, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Hydraulic Brick-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

10 Figure I is a vertical section through my improved machine, taken on line I I, Fig. IV. Fig. II is a vertical detail section. Fig. III is a section taken on line III III, Fig. IV. Fig. IV is a top view of the main part of the machine. Fig. V is an enlarged detail section showing the relief-valve. Fig. VI is an enlarged detail view, part in section and part in elevation, showing the valve that controls the passage of water to the upper plunger. Fig. VII is a section taken on line VII VII, Fig. I. Fig. VIII is a detail top view showing the parts illustrated in Fig. VII, and showing also a part of the lower plunger. Fig. IX is a top view of the mold and frame. Fig. X is a front edge view of same. Fig. XI is section taken on line XI XI, Fig. IX. Fig. XII is part in side view and part in section, the section being taken on line XII XII, Fig. IX.

My invention relates to a brick-machine wherein both hydraulic and mechanical pressure are employed; and my invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Referring to the drawings, 1, Fig. III, represents the table of the machine, in which is located the mold 2.

3 represents the charger, sliding or moving on the table 1, and which is operated by means of an arm, 4, pivoted to a suitable support by means of a rod or pin, 5, to which is also secured a lever, 6, connected by a link, 7, to another lever, 8, loosely mounted on a rod or shaft, 9.

10 represents a cam secured to a shaft, 11, for raising the lever 8 and through means of the described connection, shoving the charger 3 forward, and 12 represents a cam secured to a shaft, 13, for depressing the lever 8 and, through means of the described connection, drawing the charger backward. The shaft 11 is turned by means of a gear-wheel, 14, Fig. I, thereon, which meshes into a pinion, 15, on a

counter-shaft, 16, upon which is mounted a driving-pulley, 17, with a belt, 18. (See Fig. I.) The shaft 13 is turned by having pinion-connection 19 with the shaft 11. The shafts are thus turned in opposite directions, the cam 10 moving the lever 8 upward, as stated, and the cam 12 moving it downward, as stated.

20 represents the lower plunger, upon the lower end of which is formed a cylinder, 21, fitting over a fixed piston, 22. The piston is provided with a vertical port or water-passage, 23, and a horizontal port or water-passage, 24, the latter being made in horizontal extensions or wings 25 26 of the piston. The wing 25 is provided with a head or enlargement, 27, in which is made a vertical port, 28, and a horizontal port, 29, with the latter of which connects a supply-pipe, 30, from a high-pressure pump. (Not shown.) The wing 26 is provided with a head or enlargement, 31, having a chamber, 32, into which fits the lower end of a rod, 33.

34 represents a tank connecting with the port 29 by means of a pipe, 35, and a port, 36.

37 represents a valve located in the port 29, and which has a seat, 38, at the mouth of the port 36. The stem 39 of this valve 37 is secured to a lever, 40, (see Figs. I, VII, and VIII,) which is rigidly secured to a rock-shaft, 41, journaled in standards 42, secured to the head 27. Secured to the lever 40 at the opposite end to the stem 39 is a rod, 43, the lower end of which is connected to one end of a lever, 44, loosely mounted on the rod 9. (See Fig. I.) The lever 44 is provided with a pin, 45, against which (at the proper time) works a cam, 46, secured to the shaft 11.

In the port 29 is another valve, 47, which has a seat, 48, at the upper end of the port 28. (See Fig. I.) The stem 49 of the valve 47 is secured at its upper end to a lever, 50, loosely mounted on the rod or shaft 41. Connected to the opposite end of the lever 50 to that to which the stem 49 is secured (see Fig. VIII) is a rod, 51, the lower end of which (see Fig. I) is connected to a lever, 52, loosely mounted on the rod 9, and which has a pin, 53, against which bears a cam, 54, on the shaft 11.

55 represents a port communicating with the port 24 and with which connects an exhaust-pipe 56. At the upper end of the port

55 is a valve, 57, provided with a stem, 58, the lower end of which is connected with a lever, 59, loosely mounted on the rod 9, and which is provided with a pin, 60, engaged by a cam, 61, on the shaft 11. (See Fig. I.)

62 represents a cross-piece secured by rods 63 to the cylinder of the lower plunger, as shown in Fig. III. Surrounding the rods 63 between the cross-piece 62 and wings 25½ 26½ of the piston 22 are springs 64, the action of which is to return the lower plunger after it has been raised. Secured to the cross-piece 62 is a projection, 65, (see Fig. I,) which, when the lower plunger moves upward, comes against the inner end of the lever 66 and raises it. The lever is pivoted at 67 and has a projection, 68, to which is connected the inner end of a rod, 69, the outer end of the rod being connected to a lever, 70, pivoted at 71, and the lower end of which is connected to a movable member of a sliding clutch, 72, located on the shaft 16. When the inner end of the lever 66 is raised, the clutch is engaged and the mechanical part of the machine is set in motion. At the proper time the clutch is thrown out again by means of a link, 73, engaging the lever 66, and which is connected at its lower end to a lever, 74, loosely mounted on the rod 9, and the other end of which is engaged at the proper time by means of a cam, 75, on the shaft 13. The cam 75 depresses the end of the lever 74 to which the rod 73 is connected, and, pulling downward on the inner end of the lever 66, throws the clutch out. When the projection 65 on the cross-piece 62 comes against the lever 66 to engage the clutch, the cam 75 has of course left the lever 74.

76 represents the upper plunger, formed with a cylinder, 77, within which fits a stationary piston, 78, having a vertical port, 79, and a horizontal chamber, 80, the latter being made in wings 81 82 on the upper end of the piston, the wing 81 having a head, 83, in which is formed a port, 84, connected by means of a pipe, 85, to a water-tank, 86. The wing 82 is provided with a head, 87, having a chamber, 88, in which the upper end of the rod 33 fits and works. Located in the port 84 of the head 83 is a valve, 88^a, having a seat, 89, and a stem, 90, to the upper end of which is connected a lever, 91, (see Figs. I and VI,) the lever being pivoted to a suitable support at 92, and having on its free end a friction-roller, 93, against which bears a cam, 94, on a shaft, 96, the said lever resting upon a cushion, 97^a, which returns the valve to its seat.

The port 88 is provided at its upper end with a safety-valve, 97, connected to a lever, 98, pivoted at 99, and provided with a weight, 100, on its free end, this weight being sufficient to allow the valve to open only in case of an excess of pressure in the port or chamber 88. Communicating with the port 80 is a port, 101, (see Figs. I and V,) in which fits a rod-valve, 102, with a hollow lower end, 103, having perforations or holes 104. This rod

works through a stuffing-box, 105, and through a chamber, 106, on the wing 82. The chamber 106 is connected by a pipe, 107, to the tank 86. (See Figs. I and V.) As the pressure in the port 80 increases, the rod 102 falls with it. When the pressing of the bricks in the mold is completed, the perforations 104 are raised above the stuffing-box 105, forming a communication between the port 101 and the chamber 106, and allowing the water to pass from the port 80, and consequently from between the cylinder 77 of the plunger 76 and the piston 78, and as the rod 102 rises it lifts the free end of an arm or lever, 108, to which it is connected at 109. The outer end of the lever 108 is pivoted at 110 (see Fig. V) to a suitable fixed object, and to the inner end of the lever is connected a bar or rod, 111, with a hook, 112, on its lower end. (See Figs. I and II.) As the upper plunger moves downward, a projection, 113, thereon engages a latch formed by the hook 112 of the bar 111 and carries the bar, and consequently the free end of the lever 108, downward. This forces the lower perforated end of the rod 102 into the chamber or port 101 and shuts off the communication between the port 80 and the tank 86. As the plungers complete their movement, a trip consisting of a rod or bar, 114, (which has an incline, 115, on its upper end,) comes against the hook 112 and forces it out of engagement with the projection 113, as hereinafter described, allowing the lever 108 and the rod 102 to rise, and thus open communication again between the port 80 and the tank 86. In forcing the hook 112 out of engagement with the projection 113 the incline 115 of the rod or bar 114 comes against an incline, 116, on the upper plunger. It is forced outward by coming against this incline, and accordingly forces the hook 112 outwardly, disengaging it from the projection 113. The rod or bar 114 passes through the mold-frame, and it is moved by a rod, 117, connected to the lower plunger, 22, the connection preferably being made by means of lugs 118 on the plunger, through which the rod passes, and a nut, 119, on the rod above the lugs, so that by turning the nut up or down the rod 117 will be raised or lowered relatively to the plunger, and also relatively to the rod 114, so that the latter can be made to disengage the hook 112 from the projection 113 sooner or later, as desired. The rod 117 may also be raised and lowered by hand, if desired, and for this purpose I provide a lever, 120, through which the rod 117 passes, and with which engages a lift-rod, 121, having a handle, 122, on its upper end. Beneath the rod 117 is an arm, 123, loose on the rod 9, and which is operated by a cam, 123½, on the shaft 11. The office of this is to come against the lower end of the rod 117 and force it upward to cause the incline 115 to disengage the hook 112 from the projection 113 in case the advancing movement of the plungers should not accomplish this for some reason—

as, for instance, there should happen to be an extra large charge of dirt in the mold, preventing the plungers getting near enough together to perform this disengagement of the hook from the projection, in which case breakage might result if the pressure of the upper plunger were not released by this cam 123 $\frac{1}{2}$ and the arm 123 acting to disengage the hook 112, and allowing the upward movement of the valve 103. After being depressed the upper plunger is raised, first by the advancing movement of the lower plunger, and then mechanically by means of links 141, a cross-head, 142, and rods 143. (See Fig. III.)

The shaft 96 is turned for this purpose by means of a rod, 150, connected to the shaft at its upper end by means of an arm or lever, 151, and connected at its lower end to one end of a lever, 152, on the rod 9. The lever 152 has a pin, 153, against which a cam, 154, on the shaft 11 bears to move the rod 150 and raise the plunger. The first part of the downward movement of the plunger is also produced by this mechanism, except, instead of the cam 154 being utilized, a cam, 155, on the shaft 13 is employed, this cam bearing against a pin, 156, on the same end of the lever 152 as that having the pin 153. The lever 152 and the cams 154 and 155 are shown best in Fig. III.

170 represents a weight connected to the rod 33 by means of a rod, 171, part of the rod 171 only being shown in Fig. I, the upper end of this rod engaging a hole, 172, in the rod 33.

The mold 2 (see Figs. I and IX to XII, inclusive) fits in grooves 180, formed in the inner sides of fixed pieces 181, which are located on rods 182, (that tie the upper and lower pistons together,) and which form part of the table 1 of the machine.

183 represents sleeves located above and below the pieces 181 to hold them in place on the rods 182, which are surrounded by the sleeves.

The mold is slid into the grooves 180, and is held from horizontal movement therein by means of strips 184, fitting in openings in the pieces 181. After the mold is inserted the strips 184 are adjusted by wedge-shaped keys 185 to bring the mold to its proper adjustment, and when it is thus adjusted vertical keys 186 are inserted, which pass down through the strips and through the cross-piece 181, and which act to tie the two pieces 181 together and avoid displacement of the mold. The mold is supported at its ends throughout its width by fitting in the grooves 180, and to support it at its sides I employ screws 187, which pass through the strips 184 and enter holes made in the sides of the mold, as shown by dotted lines in Fig. IX. This gives the mold a secure support entirely around it.

The operation of my improved machine is as follows: The charger is first moved forward to fill the mold and then recedes. The upper plunger then commences to move downward

through means of the mechanical contrivance I have described, consisting of the cam 154, lever 152, rod 150, crank 151, rock-shaft 96, crank-arm 140, and the rods 143. When it is moved a certain distance by this mechanical device, it is moved then by hydraulic pressure. This is done by the rod 33 being forced into the chamber 88 and displacing the water therein and forcing it into the chamber between the cylinder of the upper plunger and the piston 78. The rod 33 is moved upward by the water in the port 24 entering the chamber 32 beneath the rod 33, (the valve 47 having been opened by its cam 54 and connection described). The water that passes through this port issues from the tank 34 at first until the pressure in the tank is equalized, and then the valve 37 closes automatically by turning the shaft 41, which is free to turn as soon as this pressure is equalized. When this valve closes, the water from the pressure-pump passes through the pipe 28 into the port 29. The rod 33 does not commence to move upward until the resistance of the weight 170 is overcome, and as this weight may be regulated, or made lighter or heavier, the rod 33 may be made to move at the time desired. As soon as the valve 37 closes, it will remain closed under the pressure until it is then opened. The water, entering through the port 24 from the tank 34, passes through the port 23 into the chamber between the lower plunger and its piston, as well as into the chamber 32, as stated, and thus causes the upward movement of the lower plunger, and the two plungers are thus caused to approach each other. Before the upward movement of the lower plunger ceases the pressure on the upper plunger is relieved through means of the perforated pipe 103 and the valve 88^a, as stated, (the pipe acting, first, to relieve the pressure, and then the valve opening and allowing a free escape of the water,) and the lower plunger commences to rise, lifting the upper plunger to start its upward movement, this, of course, being after the pressing is done. The lower plunger, continuing to rise, lifts the bricks out of the mold. As the lower plunger completes its upward movement, its projection 65 comes in contact with the lever 66 and sets the clutch, (the clutch having been disengaged by the rod 73 and its lever 74 and cam 75, as already described,) and the mechanism is again started. When the lower plunger has completed its upward movement, the valve 37 is raised by means of the cam 46 and the described connection, or it may be opened by the lower plunger, to which it is connected by an arm, 200, rigidly secured to the shaft 41, and a rod, 201, (see Figs. I and VII,) and the exhaust-valve 57 opened, while the valve 47 is closed. The plunger is then lowered under the influence of the springs 64. By the opening of the valve 37 at the time the plunger reaches its extent of upward movement the water is allowed to pass into the tank 34 from the

pressure-pump, as the valve 47 will be then closed. When the lower plunger is down, as it is when the valve 37 closes automatically, there should be a lost motion between the nut 5 202 on the rod 201 and the lug 203 on the plunger, so as not to interfere with the closing of the valve.

In case the rod 33 should fail to act, then the upper plunger, with the ports 79 and 80, 10 in combination with the safety-valve 97, will act as a water-cushion and pressure-regulator.

I claim as my invention—

1. In a brick-machine, the combination, with the upper plunger having a cylinder and 15 a piston, of two fluid-chambers, 32 88, one of which is in communication with said cylinder and the other with a source of fluid under pressure, a rod, 33, projecting into both of said chambers, a valve, 47, for shutting off 20 said fluid-pressure, and cam 54, adapted to open said valve, substantially as set forth.

2. A brick-machine having an upper and lower plunger, the upper plunger having a piston with ports, in combination with a chamber connected with one of said ports, a valve, 25 97, closing an opening in said chamber, and the rod 33, adapted to enter said chamber, substantially as and for the purpose set forth.

3. In a brick-machine, the combination, 30 with the upper and lower plungers having cylinders, pistons in said cylinders, and a source of fluid under pressure connected with the lower cylinder, of two chambers, 88 32, connected with said upper and lower cylinders, respectively, a rod, 33, projecting into 35 said chambers, a valve between said source of pressure and the lower cylinder, cams 154 155, for raising and lowering said upper plunger, and mechanism for operating said valve, substantially as set forth. 40

4. In a brick-machine, the combination, with the upper plunger having a cylinder and a piston therein and a pipe for fluid under pressure, of two chambers, 88 32, communicating with said cylinder and pressure-pipe, 45 respectively, a rod, 33, projecting into both of said chambers, a valve in said pressure-pipe, a lever-arm, 151, connected with said plunger, cams 154 155, acting upon said crank-arm 50 alternately in opposite directions, and a cam, 54, for opening said valve, substantially as set forth.

5. In a brick-machine, the combination, with the upper plunger having a cylinder and 55 a piston therein, and a pipe for fluid under pressure, and a lower plunger having a cylinder and a piston and a source of fluid under pressure, of two chambers communicating with said upper and lower cylinders, respectively, a rod projecting into both of said chambers, a valve, 47, in said pressure-pipe, a lever-arm, 140, connected with said upper plunger, 60 cams acting upon said lever-arm alternately, and a cam, 54, for opening and a spring, 64, for closing said valve, substantially as set forth. 65

6. In a brick-machine, the combination of the upper plunger provided with a cylinder, a fixed piston fitting in the cylinder of the plunger, provided with ports, and a water- 70 chamber connected with the cylinder, a rod for displacing the water in the chamber and remaining normally withdrawn, and suitable mechanism for reciprocating said rod, substantially as set forth. 75

7. In a brick-machine, the combination of the upper and lower plungers having cylinders, fixed pistons having ports for the passage of water into the chambers between the respective cylinders and pistons, chambers 80 communicating with the respective ports of the upper and lower pistons, and a rod fitting in said chambers and adapted to be forced into the upper chamber by the water in the lower chamber, substantially as and for the 85 purpose set forth.

8. In a brick-machine, the combination of the upper and lower plungers provided with cylinders, fixed pistons having ports and chambers, a rod extending into the respective 90 chambers at its upper and lower ends, and a weight connected to the rod, substantially as and for the purpose set forth.

9. In a brick-machine, the combination of the lower plunger provided with a cylinder, 95 a fixed piston having ports 23, 24, 28, and 29, valves 37 and 47, and mechanism for operating the valves, consisting of levers 40 and 50 44 and 60, connecting-rods 43 and 51, and cams 46 and 54, mounted on an operating- 100 shaft, substantially as and for the purpose set forth.

10. In a brick-machine, the combination of the lower plunger provided with a cylinder, a fixed piston having ports 23, 24, 28, and 29, 105 valves 37 and 47, and mechanism for operating the valves, consisting of levers 40 and 50, connecting-rods 43 and 51, levers 44 and 60, and cams 46 and 54, connected to an operating-shaft, and additional means for operating 110 the valve 37, consisting of a shaft, 41, and lever 200, connected to the cylinder of the plunger by means of a rod, 201, substantially as and for the purpose set forth.

11. In a brick-machine, the combination of 115 the lower plunger provided with a cylinder, a fixed piston having ports 23, 24, 28, and 29, valves 37 and 47 in port 29, provided with means for operating them, and tank 34, connected with port 29, substantially as and for 120 the purpose set forth.

12. In a brick machine, the combination of the lower plunger provided with a cylinder, a piston having ports 23, 24, 28, and 29, valves 37 and 47, provided with means for operating 125 them, and a shaft, 41, to which the valves are connected, the valve 37 being loosely connected to the shaft, substantially as and for the purpose set forth.

13. In a brick-machine, the combination of 130 the lower plunger adapted to be raised hydraulically, and mechanism for lowering the

plunger, consisting of rods 63, a cross-head, 62, and springs 64, substantially as and for the purpose set forth.

14. In a brick-machine, the combination of
5 a lower plunger, a shaft provided with a sliding clutch, and a lever for operating said clutch, said lever being oscillated by the movement of the plunger, substantially as set forth.

15. In a brick-machine, the combination of
10 the lower plunger, a shaft provided with a sliding clutch, and mechanism for operating the clutch by the movement of the plunger, consisting of an arm, 70, link 69, a lever, 66, and
15 a cross-head, 62, connected to the plunger by means of rods 63, substantially as and for the purpose set forth.

16. In a brick-machine, the combination of
20 a lower plunger, a counter-shaft provided with a sliding clutch, mechanism for moving the clutch to engage it by the action of the plunger, and mechanism for disengaging the clutch, consisting of an arm, 70, link 69, lever
25 66, link 73, arm 74, and cam 75, substantially as and for the purpose set forth.

17. In a brick-machine, the combination of
an upper plunger provided with a cylinder, a
fixed piston fitting in the cylinder, provided
30 with ports 79 and 80, means for forcing water through the ports into the chamber between the piston and cylinder, and means for allowing the escape of water, consisting of a valve,
103, fitting in a port, 101, communicating with the port 80, and passing through a chamber,
35 106, provided with a pipe, 107, communicating with a tank, 86, substantially as and for the purpose set forth.

18. In a brick-machine, the combination of
40 an upper plunger provided with a cylinder, a piston fitting in the cylinder and having ports 79 and 80, means for forcing the water through the ports into the chamber between the cylinder and piston, and means for allowing the escape of water, consisting of a perforated
45 pipe controlled by suitable mechanism, and a valve, 88, operated by a cam, 94, in one direction and a spring, 97, in the other direction, substantially as and for the purpose set forth.

19. In a brick-machine, the combination of
50 the upper plunger provided with a cylinder, a fixed piston fitting in the cylinder and having ports 79 and 80, mechanism for forcing water through the ports into the chamber between the cylinder and piston, and mechanism
55 for allowing the escape of water, consisting of a valve, 103, a latch for holding said valve closed, and a trip for lifting said latch, the valve 88, and a cam for unseating said
60 valve, substantially as and for the purpose set forth.

20. In a brick-machine, the combination of
the upper plunger provided with a cylinder, fixed piston fitting in the cylinder, having
65 ports 79 and 80, and chamber 101, a valve fitting in the chamber, lever 108, connected to the valve, and hook 112, secured to the le-

ver, the lower plunger, means for raising the lower plunger, and rods 114 117, operated by the lower plunger and having an incline, 115, 70 adapted to come against an incline, 116, to disengage the hook 112 from a projection, 113, on the cylinder of the upper plunger, substantially as and for the purpose set forth.

21. In a brick-machine, the combination of 75 the upper and lower plungers, rod-valve 103, lever 108, rods 111 117, hook 112 on the rod 111, incline 115 on the rods 114 117, incline 116, and projection 113 on the upper plunger, and connection between the rod 117 and 80 the lower plunger, substantially as and for the purpose set forth.

22. In a brick-machine having upper and lower plungers operated to do the pressing hydraulically, a valve for releasing the upper 85 plunger, and mechanism for releasing the valve, consisting of a lever, 108, rod 111, having hook 112, rods 114 117, having incline 115, adapted to bear against an incline, 116, on the upper plunger to disengage the hook 112 90 from the projection 113 on the upper plunger, and lever 123, operated by the cam 123, substantially as and for the purpose set forth.

23. In a brick-machine, the combination of the upper and lower plungers operated hydraulically to press the bricks, a valve for 95 releasing the pressure on the upper plunger, and mechanism for relieving the valve, consisting of rods 111 114 117, one having a hook and the other an incline, as specified, and 100 means for moving the rod by hand, consisting of a lever, 120, and rod 121, substantially as and for the purpose set forth.

24. In a brick-machine, the combination of the upper and lower plungers operated hydraulically to press the bricks, a valve for 105 relieving the pressure on the upper plunger, a latch holding said valve closed, and a trip-clutch operated by the lower plunger for disengaging said latch, substantially as set forth. 110

25. In a brick-machine, the combination of an upper plunger adapted to be lowered mechanically the first part of its downward movement and to be raised mechanically by 115 mechanism consisting of a shaft, 96, lever 140, cross-head 142, rod 143, lever 151, rod 150, lever 152, and cams 154 155, mounted on an operating-shaft, substantially as and for the purpose set forth.

26. In a brick-machine, the combination of 120 the mold and frame, the latter having grooves to receive the former, cross-pieces 184, and keys 185 186, substantially as and for the purpose set forth.

27. In a brick-machine, the combination of 125 the mold and frame, the latter having grooves to receive the former, cross-pieces 184, and screws 187, substantially as and for the purpose set forth.

JULIUS J. KOCH.

In presence of—

GEO. H. KNIGHT,
JOS. WAHLE.