

L. E. L. THEMKE & S. McCARDIA.

HYDRAULIC COMPRESSOR.

APPLICATION FILED MAR. 14, 1908.

903,420.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.

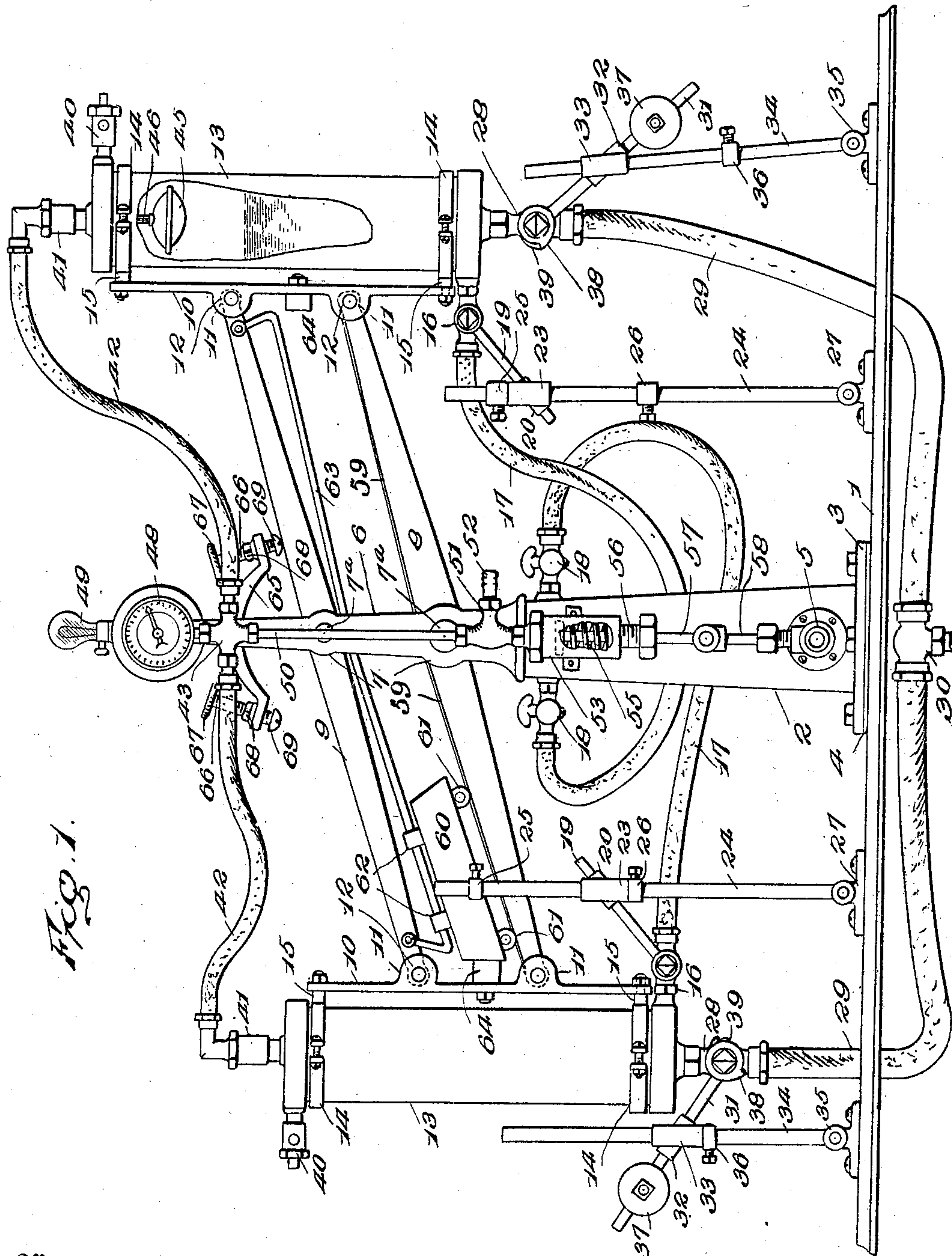


Fig. 1.

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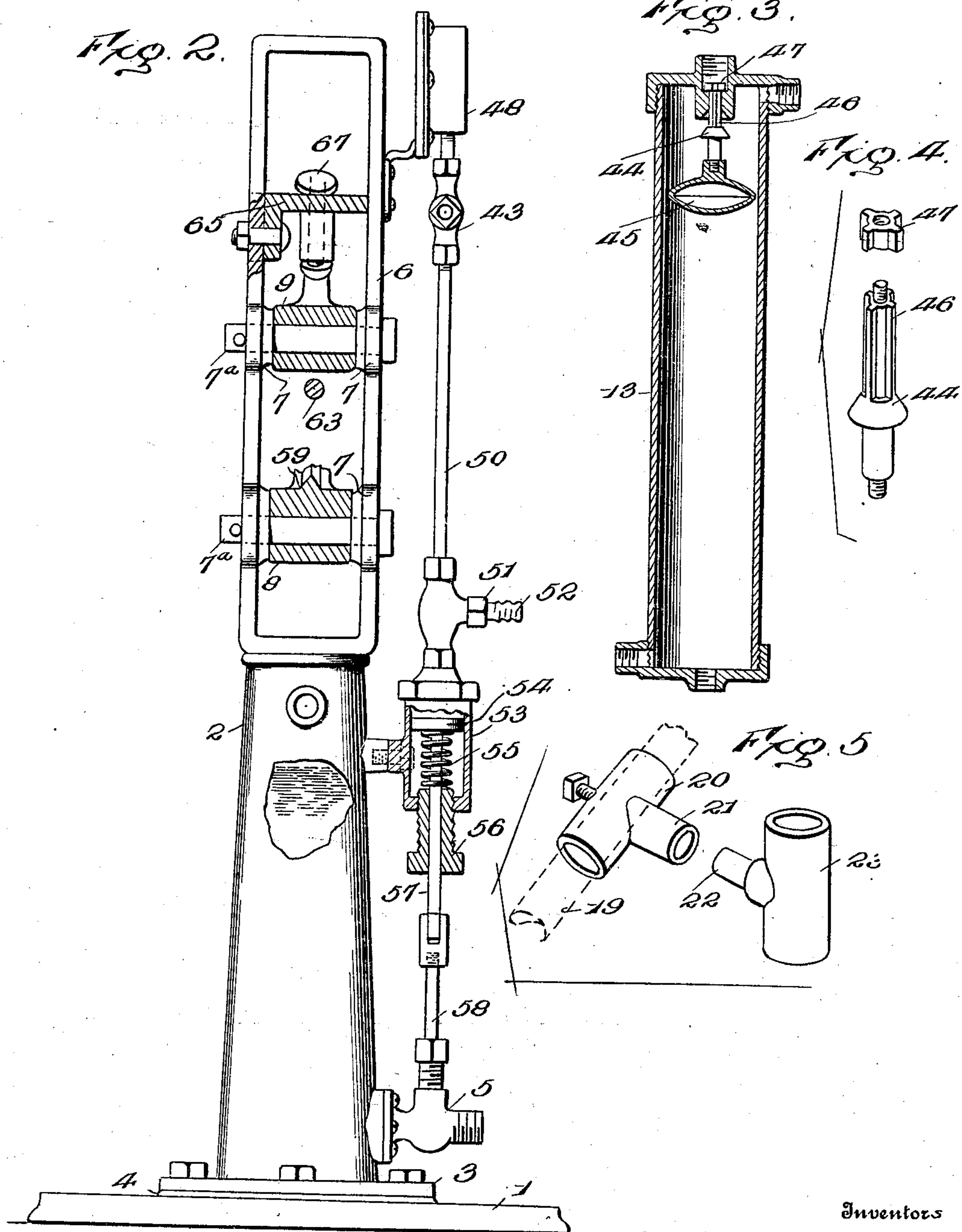
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UNITED STATES PATENT OFFICE.

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HYDRAULIC COMPRESSOR.

No. 903,420.

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To all whom it may concern:

Be it known that we, LOUIS ERNEST L. THEMKE and SAMUEL McCARDIA, subjects of the King of Great Britain, residing at Strathcona and Edmonton, respectively, in the Province of Alberta, Canada, have invented certain new and useful Improvements in Hydraulic Air-Compressors, of which the following is a specification.

10 This invention comprehends certain new and useful improvements in hydraulic air compressors of that type which are designed particularly for use in connection with beer dispensing apparatus, although applicable
15 to other uses generally for the purpose of compressing air in a storage tank or the like, and the invention relates more particularly to that type of pump or air compressor which embodies one or more oscillating cylinders
20 adapted to be automatically actuated by water pressure to compress the air therein and force it to the storage tank or similar reservoir, the preferred form of the apparatus embodying two oppositely acting cylinders arranged to oscillate in vertical planes with an
25 alternate up and down movement, so as to effect a practically continuous flow of air from the cylinders.

30 The primary object of the invention is a mechanism of this character which avoids the use of pistons, plungers, or water controlling valves within the cylinders, thereby overcoming the serious defect which is incidental to the use of such accessories, owing
35 to the packing of the valves or pistons leaking, or sticking, and a further primary object of the invention is an improved construction of apparatus of this character which will positively prevent any water from being
40 forced over with the air into the beer.

The invention also has for its object, more specifically, a duplex oscillating automatic hydraulic air compressor embodying oppositely acting and alternating air compressing
45 cylinders, each of which is provided, outside of the cylinder with water controlling cocks automatically opened and closed in the operation of the mechanism, the construction avoiding inside plungers, pistons, or valves
50 for controlling the water as above noted. And a further main object of the invention is an improved hydraulic air compressor in which the apparatus is automatically stopped and started when a predetermined
55 air pressure is reached.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a front elevation of our improved hydraulic air compressor, parts being broken
65 away; Fig. 2 is a transverse sectional view thereof; Fig. 3 is a detail sectional view of one of the air compressing cylinders; Fig. 4 is a perspective view of parts of the air outlet
70 valve leading from the cylinder; and, Fig. 5 is a similar view of the swivel connection between the water controlling valve handles and their posts.

Corresponding and like parts are referred
75 to in the following description and indicated in all the views of the drawings by the same reference characters.

Upon the bed plate 1 is a hollow column or stand 2 preferably secured to the bed by
80 bolts passing through an outstanding flange 3 formed on the base of the column, a washer or gasket 4 being interposed between the flange and the bed to secure a tight joint. 5
designates a casing for the main water inlet
85 valve, said casing being bolted or otherwise secured to the lower or base portion of the stand 2 and being arranged for connection by any suitable piping to any suitable source of
90 water supply, as for instance, the city system. The hollow stand 2 supports at its upper end
an upwardly extending head 6, the upper end of said stand being preferably closed and the
head being preferably formed as an integral
95 casting with the stand. This head is in the present embodiment of our invention in the form of a vertically elongated loop with upright and spaced side members connected at
their upper end by a cross bar as shown, and the said head 6 is formed on the inner side of
100 its upright members with preferably beveled journal-bearings 7 through which the pintles 7^a pass so as to form axes or journals for the lower and upper oscillating beams 8 and 9
that extend parallel to each other in both di-
105 rections from the stand and that constitute the main portion of a vertically vibratory support for the air compressing cylinders.

The corresponding ends of the oscillating beams 8 and 9 support the two vertically-
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disposed plates 10, each of which is formed with upper and lower pairs of ears 11 through which pins extend to pivotally connect said plates to the eyes 12 that are formed on the beams and that are inserted between the ears, as clearly illustrated in the drawings, the arrangement of the parts being such, preferably, that the pins which connect the plates to the beams are held stationary in the ears of the plates, but have their necessary movement in the eyes 12 of the beams. In the oscillation of the beams 8 and 9, it is obvious that the plates 10 will be held in true vertical position at all times.

The air compressing cylinders 13 are carried by the plates 10, said cylinders being vertically disposed as shown and being provided with lower and upper heads that may be screw threaded to the body portions of the cylinders or held thereon in any desired way. Band clamps 14 encircle the respective cylinders 13, the said bands being provided with bolts 15 which extend through upper and lower holes formed in the respective plates 10, being held therein by nuts screwing on the threaded ends of the bolts so as to securely connect the cylinders with the plates, whereby the cylinders are mounted for an alternate oscillatory movement in a vertical plane, while they are held at all times truly vertical.

Each cylinder 13 is formed preferably in its lower head with a casing 16 of a water inlet cock which, in the present instance, is of the turning plug variety. Each casing 16 is connected to a flexible water inlet pipe or hose 17, and the two inlet pipes 17 are respectively connected to the water cocks 18, secured preferably in diametrically opposite relation to the stand 2 at the upper end thereof. The cocks 18 are always open.

In order to automatically control the opening and closing movements of the respective water inlet valves or cocks within the casing 16, the handle 19 of each valve carries a collar 20 which is slipped thereover and held at the desired point thereon by means of a set screw as shown. Each collar 20 is formed with a hollow boss 21 designed to accommodate a pin 22 formed on and extending laterally from a sleeve 23 mounted for sliding movement upon the upwardly projecting post 24. The sliding movement of the sleeve 23 is limited by means of upper and lower set collars 25 and 26 secured on the post. Each post 24 is provided at its lower end with an eye received between the ears of a bracket 27 screwed or otherwise secured to the bed 1, the said posts 24 being thereby held to oscillate about horizontal axes, as the sleeves 23 slide upwardly and downwardly thereon in the alternating rising and lowering movements of the cylinders 13, it being manifest that the handles 19 will thereby be turned, owing to their swivel connection with the posts, each handle being so turned when

its corresponding cylinder is lowered that the water supply valve will be closed, but will be opened when the cylinder assumes its upper position.

In addition to its water inlet valve or cock, each cylinder is provided, preferably in its lower head, with a water outlet valve or cock, the casing of which is designated 28. Each of these outlet valves 28 is connected by a flexible water outlet pipe or hose 29 to a common exhaust pipe by means of the T-coupling 30, it being evident that said T-coupling may be suitably connected to the piping so as to lead to the sewerage system or to the rinse-pan of a bar. Each of the water outlet valves is, in the present instance, of the turning plug variety and its handle 31 is connected by a collar 32 and sleeve 33 (similar to the collar 20 and sleeve 23), to an upwardly extending post 34 mounted to oscillate about its lower end as a horizontal axis on the bed 1, the two posts 34 being supported on the bed by brackets 35 similar to the brackets 27. Set collars 36 are secured on the respective posts 34 to limit the downward movement of the sleeves 33, and weights 37 are adjustably mounted on and held at predetermined adjustments by set set screws upon the outer or free ends of the handles 31 to turn the water outlet valves to a closed position upon the upward movement of the corresponding air compressing cylinder. This closing movement of said valves is limited in the case of each valve by means of a lug 38 on the turning plug portion of the valve engaging with the corresponding projection or lug 39 on the valve casing 28 as best indicated at the right hand side of Fig. 1. Each air compressing cylinder 13 is provided with an air inlet valve 40, preferably secured to its upper head, and with an air outlet valve casing 41 which is secured to each upper head, said casings in turn being secured by means of flexible pipes or hose 42 to the oppositely extending arms of a cruciform coupling 43. In order to positively prevent the water as it rises in the cylinders, from passing through the valve casing 41 and thence to the storage tank where it would be forced into the beer, each cylinder is provided with an air outlet valve 44 adapted to close the passage through the casing 41 when it is raised against its seat by means of a float 45. Each valve 44 is formed or secured on the lower end of a winged or vaned spindle or valve rod 46, and a nut 47, with a recessed margin is secured to the upper end of said valve rod so as to suspend the valve 44 and float 45 with the former in an open position, to normally permit the air to flow freely from the cylinder through the casing 41. It is clear that the stem 46 may perform its function by being square in a round bore.

The upwardly projecting branch of the cruciform coupling 43 supports a pressure

gage 48 which may be surmounted by an incandescent electric light bulb 49 so that the gage may be viewed at all times and it is obvious that if desired, the bulb may be located
 5 behind a transparent advertising sign, of a brewery, for instance. The lowermost branch of the coupling 43 is connected to an air pipe 50 and said pipe is in turn connected to one branch of a T-coupling 51, the main branch
 10 52 of which leads to the storage tank (not shown). The T-coupling 51 has one of its branches connected to a cylinder 53 which is rigidly supported in a vertical position at one side of the stand 2 by means of a bracket
 15 projecting laterally therefrom. Within the cylinder 53 is a piston 54 designed to be pressed downwardly by the air pressure against the action of a spring 55. The lower end of the spring 55 bears against an adjustable plug 56 mounted in the lower end of the cylinder 53 whereby the tension of the spring may be regulated as desired. The rod 57 of the piston 54 extends downwardly through the plug 56 and has a jointed connection with
 20 the valve stem 58 on the water supply controlling valve within the casing 5. By this means, it is clear that after the pressure in the storage tank has arrived at a predetermined point, controlled or regulated by the tension of the spring 55 as varied by the plug 56, any excess pressure will result in forcing the piston 54 downwardly and in the consequent closing of the valve within the casing 5 so as to shut off the supply of water and
 25 stop the operation of the mechanism. Upon the diminution of the air pressure below the predetermined point, the spring 55 will be permitted to act to open the main supply valve and the operation of the apparatus will
 30 be instantly resumed. Hence it will be seen that our improved hydraulic air compressor embodies means whereby the operation of the mechanism is at all times automatically under the control of the air pressure, and that
 35 it needs no attention whatever to start and stop the operation.

The lower oscillating beam 8 is provided on its upper surface with a preferably metal supporting rail 59 which is inclined from both
 40 ends towards the center and which is preferably of inverted V-shape in cross section. A weight 60 is provided with grooved wheels 61 by which it is mounted to travel along the supporting rail 59 and said weight is provided on its upper side with one or two bifurcated lugs 62 arranged to straddle a guide rod 63 suspended by forked and upwardly projecting ends as shown, from the upper oscillating beam 9. 64 designates buffers that
 45 are secured to the respective plates 10 between the upper and lower beams and that are designed to receive the impact of the traveling weight 60 at the limit of its movement in either direction. The movement of
 50 the beams is limited by means of a two-

armed bracket 65 which is secured to the head of the supporting framework or stand, preferably between the upright members thereof just above the upper oscillating beam 9. Abutment screws 66 work in the respective arms of this bracket and may be regulated by means of hand wheels 67 secured to the upper ends of the screws, said screws being provided with lock-nuts 68 so that they may be secured in adjusted position, and being provided with preferably resilient knobs 69 on their lower ends, held in the path of movement of the upper beam 9 and against which the opposite arms of said beam alternately abut.
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In the practical operation of our improved oscillating hydraulic air compressor after the apparatus has been installed and the casing 5 and coupling 30 connected up, the cocks 18 are opened and the machine will at once
 85 commence to work. Each cylinder fills when it is at the upper limit of its vertical movement, while the other cylinder is emptying. The water inlet valve of such upper cylinder is open and its water outlet valve
 90 closed while the reverse is true of the other cylinder. As the upper cylinder fills with water so as to compress air or force the same through the air outlet valve into the storage tank, the weight 60 which is at the far end of
 95 the oscillating track from the upper cylinder, will finally be over-balanced by the column of water in the upper cylinder and thereupon the other empty cylinder and the weight will be moved upwardly by the rocking movement of the beams 8 and 9 and the cylinders will be reversed, whereupon it is clear that the weight will travel along the track to the opposite end thereof to hold the cylinders in an alternate relation to each other, the water
 100 controlling valves of the respective cylinders being reversed during the movement of the cylinders, as will be obvious from the foregoing description, this operation being repeated continuously and automatically so long as
 105 the pressure remains below a predetermined point. When the air pressure has reached a predetermined point, it is clear that the main water supply valve will be moved to a closed position to shut off the supply of water and
 110 bring the apparatus to a standstill until the consumption of the compressed air brings the air pressure below a predetermined degree.

From the foregoing description in connection with the accompanying drawings, it will
 115 be seen that we have provided a very simple, and efficient construction of hydraulic air compressor which is entirely automatic in all of its movements and which will effectively avoid, by its outside water controlling
 120 valves all of the defects incidental to all other hydraulic air compressors that have the water controlling valves inside of the air compressor.

It is to be understood that various changes
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may be made in the details of construction and arrangement and proportions of the parts of our invention, within the scope thereof, as defined by the appended claims.

5 Having thus described the invention, what is claimed as new is:

1. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air thereto, and for conveying away the air forced therefrom, a vibratory support upon which said cylinder is carried, means for automatically vibrating said support to raise and lower the cylinder, said cylinder being provided with a water inlet valve and a water outlet valve, a source of water supply connected to the water inlet valve, handles connected to the respective water valves, posts, supports for said posts, and a movable connection between said handles and said posts adapted to alternately close one of said water valves and open the other as the cylinder rises and falls.

2. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air therein and for carrying off the air forced therefrom, a vertically vibratory support carrying said cylinder, said cylinder being provided with a water inlet valve and a water outlet valve, both of the turning plug variety, each of said water valves being provided with a handle, upwardly extending posts, supports for said posts, and a swiveled and slidingly movable connection between said posts and said handles.

3. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air therein and carrying off the air forced therefrom, a vertically vibratory support for said cylinder, means for actuating said support, said cylinder being provided with a water inlet valve and a water outlet valve, both of said valves being provided with handles by which they are moved to open and closed position, vertically extending rods, means for supporting said rods in a manner to permit a rocking or oscillatory movement thereof, and a swiveled and longitudinally movable connection between the respective rods and said handles.

4. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air therein and for carrying off the air forced therefrom, a vertically vibratory support for said cylinder, means for vibrating said support, said cylinder being provided with a water inlet valve and a water outlet valve, both of which are provided with handles for moving them to open and closed positions, sleeves secured to the respective handles, posts, supporting means for said posts, sleeves mounted to slide on said posts and having a swivel con-

nection with said collars, and means for limiting the sliding movement of said sleeves.

5. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air therein and for carrying off the air forced therefrom, a vibratory support carrying said cylinder, means for vibrating said support, said cylinder being provided with a water inlet valve and a water outlet valve, the water inlet valve being provided with a handle by which it may be opened and closed, a post, a support for said post and from which it projects upwardly, a movable connection between said handle and post adapted to turn the handle in opposite directions upon the upward and downward movement, respectively, of the cylinder, and means for automatically opening and closing the water outlet valve alternately with the opening and closing of the water inlet valve.

6. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air thereto and for carrying off the air forced therefrom, a vertically vibratory support carrying said cylinder, means for vibrating said support, the cylinder being provided with a water inlet valve and a water outlet valve, the water outlet valve being provided with a handle by which it is opened and closed, a post, a support for said post and from which it extends upwardly, a movable connection between said post and said handle arranged to alternately open and close the water outlet valve automatically upon the downward and upward movements, respectively, of the cylinder, and means for automatically opening and closing the water inlet valve alternately with the opening and closing of the water outlet valve.

7. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air therein and for carrying off the air forced therefrom, a vertically vibratory support carrying said cylinder, means for vibrating said support, the cylinder being provided with a water inlet valve and a water outlet valve, the water outlet valve being provided with a handle by which it may be opened and closed, a post, a support for said post and from which it extends upwardly, a movable connection between said post and the handle, between the ends of the latter, a weight on the free end of the handle, and means for automatically opening and closing the water inlet valve upon the upward and downward movements, respectively, of the cylinder.

8. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air thereto and for carrying off the air forced therefrom, a vertically vibratory support for said cylinder, and

means for automatically controlling the admission and discharge of water to and from the cylinder, said means including a water controlling valve provided with a handle by which it is opened and closed, a collar adjustably secured on the handle and formed with a tubular boss, a sleeve having a pin swiveled in said boss, a post upon which said sleeve is mounted to slide, and a support for said post.

9. In a hydraulic air compressor, the combination of an air compressing cylinder, means for admitting air thereto and for carrying off the air forced therefrom, a vertically vibratory support for said cylinder, and means for automatically controlling the admission and discharge of water to and from the cylinder, said means including a water controlling valve provided with a handle by which it is opened and closed, a collar adjustably secured on the handle and formed with a tubular boss, a sleeve having a pin swiveled in said boss, a post upon which said sleeve is mounted to slide, a support for said post, and a set collar on the post adapted to limit the movement of said sleeve.

10. A hydraulic air compressor comprising a bed, a hollow stand mounted on said bed and arranged for connection to a source of supply, a vertically vibratory support carried by said stand, vertically disposed air compressing cylinders carried on the opposite ends of said support, water cocks connected to said stand, water inlet valves secured to the respective cylinders, flexible connections between said cocks and said valves, means for admitting air into said cylinders and for carrying off the air forced therefrom, means for automatically vibrating the support to alternately raise and lower the cylinders, water discharge valves connected to the respective cylinders, and means for automatically opening the water inlet valve of said cylinders alternately, and means for automatically closing the water outlet valve of each cylinder simultaneous with the opening of the water outlet valve of the other cylinder.

11. A hydraulic air compressor comprising a bed, a hollow stand mounted on said bed and arranged for connection to a source of water supply, a vertically vibratory support carried by said stand, vertically disposed air compressing cylinders carried on the opposite ends of said support, water cocks connected to said stand, water inlet valves secured to the respective cylinders, flexible connections between said cocks and said valves, means for admitting air into said cylinders and for carrying off the air forced therefrom, means for automatically vibrating the support to alternately raise and lower the cylinders, water discharge valves connected to the respective cylinders, means for automatically opening the water inlet valve

of said cylinders alternately, and means for automatically closing the water outlet valve of each cylinder simultaneous with the opening of the water outlet valve of the other cylinder, and flexible pipes connected to the water outlet valves and having a common point of connection with each other.

12. In a hydraulic air compressor, the combination with an air compressing cylinder, means for admitting air into the said cylinder and for carrying off the air forced therefrom, a vibratory support carrying said cylinder, means for vibrating said support, means for maintaining the cylinder moving in a definite plane during the vibratory movement of its support, and means for automatically admitting air into and discharging water from the cylinder controlled by the movement thereof, said controlling means embodying valve mechanism, and said valve mechanism including a post extending in a plane parallel to the plane of movement of the cylinder and an operative connection between said post and valve.

13. In a hydraulic air compressor, the combination of a bed plate, a stand thereon, a vertically vibratory support carried by said stand, a cylinder carried by said support, means for admitting air into the cylinder and for carrying off the air forced therefrom, water controlling valve mechanism connected to said cylinder, and a movable connection between the valve mechanism and the bed arranged to open one valve and close the other alternately.

14. In a hydraulic air compressor, the combination of a cylinder, means for admitting air into the cylinder and for carrying off the air forced from said cylinder, a stand, upper and lower beams mounted to rock in said stand, a connection between said cylinder and said beams, said connection holding said beams parallel and maintaining the cylinder in a definite plane during the rocking movements of the beams, and means for automatically admitting water into and discharging water from said cylinder.

15. A hydraulic air compressor, comprising a stand, an upright head secured to said stand, upper and lower beams mounted to rock in said head, air compressing cylinders carried on the corresponding ends of said beams, means for admitting air into said cylinders and for carrying off the air forced therefrom, means for admitting water into the cylinders and discharging the water therefrom alternately, a two-arm bracket secured to the head over the upper beam, and abutments carried by the arms of said bracket and designed for engagement by said beam to limit the rocking movement of the beams.

16. A hydraulic air compressor, comprising a stand, an upright secured to said stand, a vibratory support carried by said stand

and extending in both directions therefrom, air compressing cylinders carried by the ends of said support, means for admitting air into said cylinders and for carrying off the air
5 forced therefrom, means for admitting water into said cylinder and for discharging it from said cylinders alternately, a two - armed bracket secured to the upright, and adjustable abutment members carried by the arms
10 of the bracket and adapted to alternately abut against the support in its movement, whereby to limit such movement.

17. In a hydraulic air compressor, the combination of an air compressing cylinder,
15 means for admitting water therein and for discharging the water therefrom, means for admitting air into said cylinder, and means for carrying off the air compressed in said cylinder, a float in said cylinder, and a valve
20 secured to said float and adapted to control the opening leading the air from said cylinder.

18. In a hydraulic air compressor, the combination of lower and upper oscillating
25 beams, means for supporting said beams, the lower beam being provided on its upper surface with a track, a weight adapted to run on said track, means carried by the upper beam

for guiding said weight, and air compressing cylinders carried on the corresponding ends 30 of said beams.

19. In a hydraulic air compressor, the combination of lower and upper oscillating beams, a support therefor, air compressing cylinders carried on the corresponding ends 35 of said beams, a weight adapted to travel on the lower beam, a guide rod suspended from the upper beam and extending above the weight, and forked lugs carried by the weight and engaging said guide rod. 40

20. In a hydraulic air compressor, the combination of lower and upper oscillatory beams, supporting means therefor, plates secured to the corresponding ends of said beams, air compressing cylinders connected 45 to said plates, a weight adapted to travel along said beams, and buffers carried by said plates against which the weight is adapted to abut.

In testimony whereof we affix our signatures in presence of two witnesses. 50

LOUIS ERNEST L. THEMKE. [L. S.]
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Witnesses:

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