(No Model.) 2 Sheets—Sheet 1.

E. H. PHIPPS.

MACHINE FOR MAKING CEMENT LINED PIPES.

No. 556,160. Patented Mar. 10, 1896.

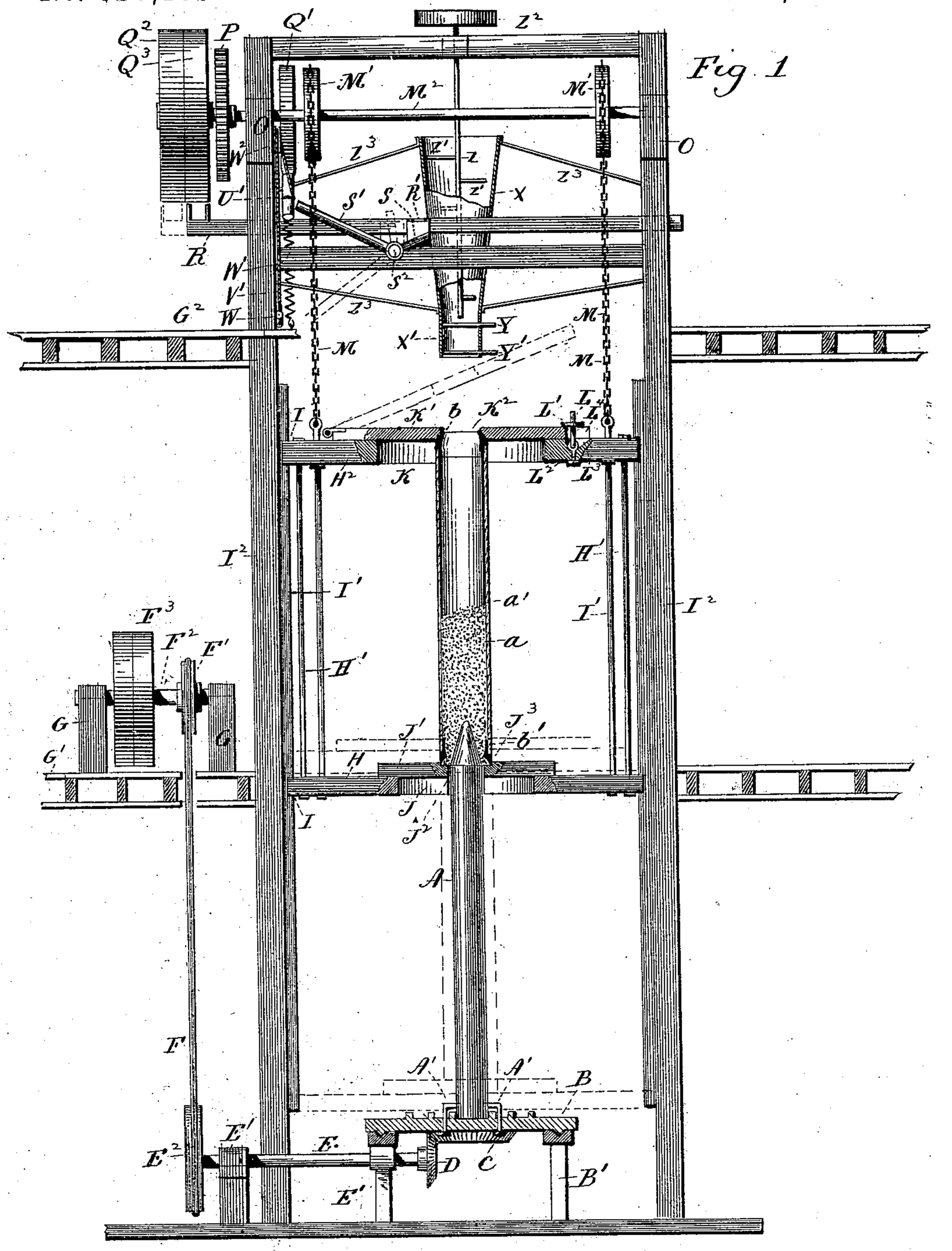

Fig. 1

Witnesses.
J. St. Shumway.
Lillian D. Kelsey.

Edward H. Phipps
Inventor
By Atty
Edson & Seymour

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2

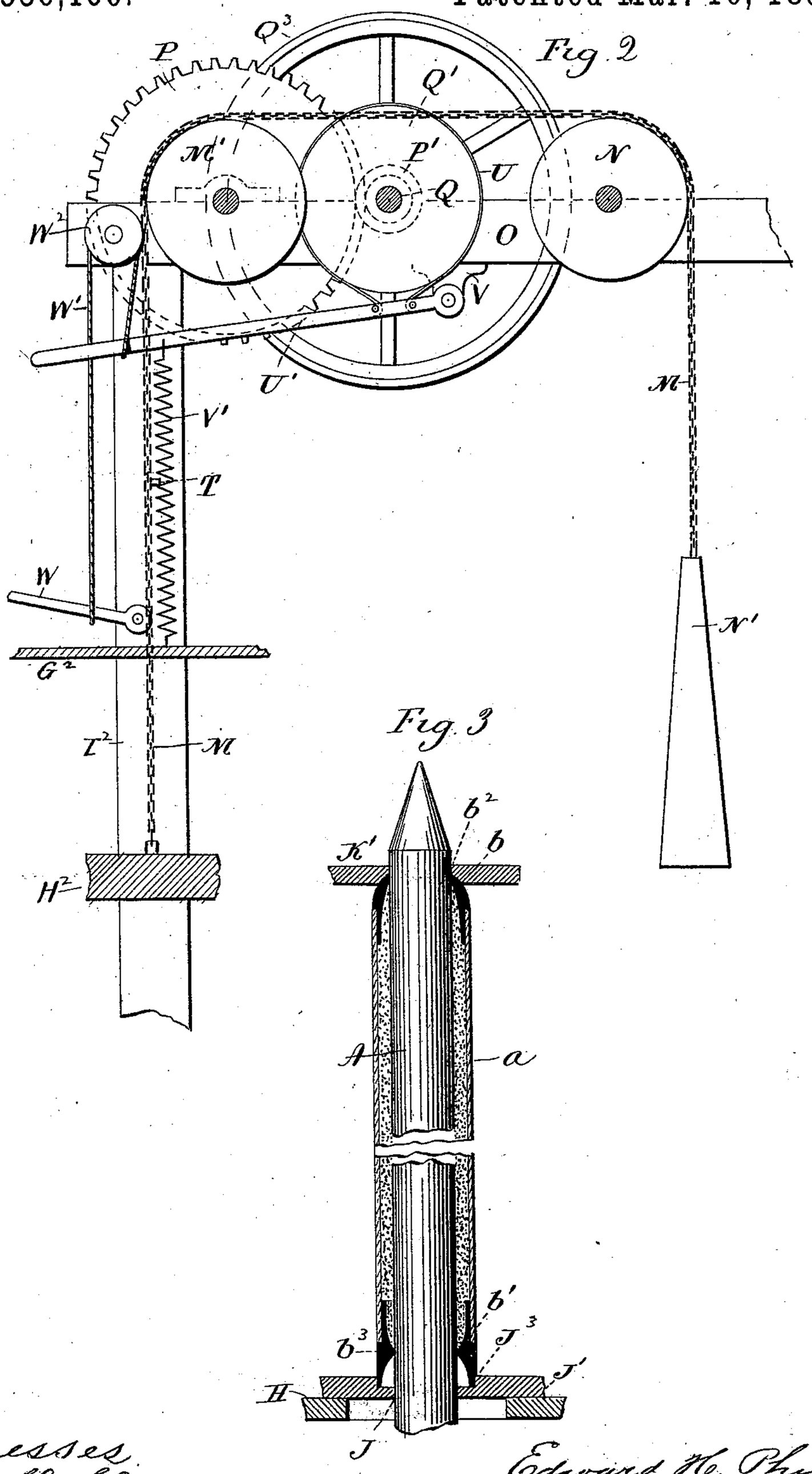

Fig. 3

Witnesses
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UNITED STATES PATENT OFFICE.

EDWARD H. PHIPPS, OF NEW HAVEN, CONNECTICUT.

MACHINE FOR MAKING CEMENT-LINED PIPES.

SPECIFICATION forming part of Letters Patent No. 556,160, dated March 10, 1896.

Application filed June 29, 1891. Serial No. 397,843. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. PHIPPS, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Machines for Making Cement-Lined Pipes; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view partly in elevation and partly in vertical section of a machine constructed in accordance with my invention; Fig. 2, a broken view on a large scale of the friction mechanism for sustaining the pipe-carriage in its elevated or charging position. Fig. 3 is a broken sectional view on a still larger scale, showing the core, portions of the upper and lower platforms of the pipe-carriage, and a pipe in place.

My invention relates to an improvement in machines for making cement-lined pipes, the object being to produce a simple and effective machine having a large capacity for work.

With these ends in view my invention consists in the combination, with a vertical cone, of a vertically-movable pipe-carriage located above the same and constructed to receive and hold a pipe which is telescoped over the cone when the carriage is lowered and means for raising the said carriage and for controlling its descent. My invention further consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As herein shown, the lower end of the vertical cone A is detachably secured by clamps A′ A′ to a large horizontal rotatable disk B, supported on an elevated frame B′ and having a bevel-gear C secured to the center of its lower face. This construction permits the cone to be changed for other cones of different size, according to the diameter and length of the pipes to be lined. The said bevel-gear C meshes into a corresponding gear D, attached to a horizontal shaft E, supported in bearings E′ E′ and carrying at its opposite end a pulley E^2, over which runs a belt F, also running over a pulley F′, mounted on the same shaft F^2 with a driving-pulley F^3, to which power is communicated from any convenient source. The shaft F^2 is journaled in bearings G G, attached to the floor G′, which, as shown, may be considered the first or ground floor of the building in which the machine or apparatus is located, for, as represented, the lower end of the cone and its connections are situated in a pit below the said first floor, although they may of course be located above and upon the first floor, in which case the floor G′ would become the second floor of the building. I have chosen to call the part A a "cone," because it is generally so called, although in fact the said part is not strictly conical, but cylindrical throughout the main portion of its length, and tapered only at its extreme upper end.

Directly above the cone is located a vertically-movable pipe-carriage composed of a rectangular lower platform, H, connected by upright rods H′ with a similar upper platform, H^2. Corresponding points in the ends of the said platforms are recessed, as at I I, to receive upright guides I′ I′ attached to the inner faces of the heavy upright beams I^2 I^2, whereby provision is made for guiding the pipe-carriage as it is raised and lowered. The lower platform, H, is constructed in its center with an opening J, to be made considerably larger than the diameter of any cone which may be used with the apparatus. A movable interchangeable supporting-plate J′ located upon the said platform over the opening J therein is constructed with an opening J^2 made a very little larger than the diameter of the cone and immediately encircled at its upper end by a shallow annular recesss J^3, adapted in size to receive and retain against lateral displacement the lower end of the pipe *a* to be lined. Several of these plates respectively constructed with openings and recesses corresponding to the several sizes of pipes are provided for use with the machine in which they are readily interchanged.

The upper platform, H^2, is provided with a clearance-opening K larger than the opening J, before memtioned, in alignment therewith, and designed to permit the required tipping of the upper end of the pipe in placing it in position in the carriage and removing it therefrom after it has been lined. A pipe-holder

K′ hinged to the upper face of the upper platform, H^2, near one end thereof is adapted in size to cover the opening K formed therein and constructed with an opening K^2 corresponding in size to the opening J^2 with which it aligns when the holder is in its horizontal or normal position, the lower end of the said opening K^2 being immediately encircled by an annular groove adapted to receive the upper end of the pipe, whereby the same is held in position. The said pipe-holder is secured in its closed position by means of a locking device which may take any convenient form. As herein shown, it consists in an eye-screw L, carrying a nut L′ and having its eye passed through the eye of an eyebolt L^2, located in a recess L^3 formed in the opposite end of the platform H^2, the said eye-screw being entered into a slot L^4 formed in the adjacent end of the holder K′ to permit the nut L′ to be engaged with the upper face thereof, whereby the holder is locked down in its closed position. Several of these pipe-holders respectively having openings corresponding to the several sizes of pipes are provided so as to be interchanged with each other when the cone and supporting-plate are changed to adapt the machine to line another-sized pipe. It will be understood that when the lower end of the pipe is set into the annular recess J^2 in the supporting-plate J′ and its upper end has been entered into the annular recess K^2 in the pipe-holder K′ it is firmly held against lateral or vertical displacement.

The carriage is suspended by means of two chains M M attached to eyes formed in the upper ends of two of its rods H′ and passing over pulleys M′ M′ mounted on the shaft M^2, and also over idle-pulleys N, only one of which is shown, and that in Fig. 2 of the drawings. The opposite ends of the said chains are furnished with heavy weights N′, (only one of them is shown,) which partly counterbalance the weight of the carriage and its load. The said shaft M^2 is supported at its ends in horizontal beams or plates O, each supported at one end upon the upper ends of the upright posts I^2 I^2 before mentioned. One end of the shaft M^2 projects beyond its support and is provided with a gear-wheel P, which meshes into a small pinion P′, (see Fig. 2,) mounted upon a driving-shaft Q, also supported on the beams O O, and carrying a friction-pulley Q′, a fixed pulley Q^2 and a loose pulley Q^3, the said fixed and loose pulleys receiving the belt from which power is communicated to the driving-shaft Q. A shipper R, located below the said fixed and loose pulleys and mounted for horizontal reciprocation in the framework of the machine, is constructed about midway of its length with a vertical opening R′, which receives the short arm S of a hand-lever S′, hung on a horizontal pivot S^2 in position to be manually operated from the floor G^2 of the building containing the machine and forming the second floor of the said building, according to the arrangement shown herein. By lifting the said hand-lever into the position in which it is shown by full lines in Fig. 1 of the drawings the shipper will be moved inwardly, so as to throw the belt onto the fixed pulley Q^2, whereby the shaft M^2 is operated to lift the pipe-carriage into its elevated or charging position, in which its lower platform is about on the level with the floor G′, on which the pipes are located and from which they are introduced into the carriage. By depressing the said hand-lever into the position in which it is shown by broken lines in the drawings the shipper is shifted so as to throw the belt from the fixed pulley onto the loose pulley, whereby the power is cut off and the elevation of the carriage stopped. This stopping of the carriage is by preference done automatically by means of a lug T, carried upon the chain M, adjacent to the said lever, in position to engage with the same and lift it as the carriage is raised; but this lug might obviously be replaced by some other device projecting upwardly from the upper platform of the carriage in position to engage with and lift the hand-lever at the right time.

As the counterweights N N are not sufficiently heavy to in themselves sustain the carriage in its elevated position, I employ a friction device or mechanism to assist them therein and in controlling its descent. As herein shown, this consists of a band U encircling the friction-pulley Q′ and having its lower ends attached to a substantially horizontal lever U′, (see Fig. 2,) having its inner end hung from a bracket V suspended from the lower end of one of the beams O, the opposite end of the said lever having attached to it a heavy spring V′, which normally pulls the lever downward with sufficient force to place enough tension on the band U to support the pipe-carriage. This friction is relieved for permitting the carriage to descend by lifting the lever by hand or by means of a treadle W, located near the floor G^2 and connected by means of a chain or band W′ leading over an idle-pulley W^2 to the outer end of the said lever U′. When, therefore, it is desired to allow the carriage to descend, the workman on the floor G^2 either lifts the lever by hand or depresses the treadle W with his foot, thus lifting the lever U′ against the tension of the spring V′ and relieving the friction of the band U upon the friction-pulley Q′. By means of this friction device the pipe-carriage is thus not only supported in its charging position, but also regulated and controlled in its descent.

As herein shown, I have arranged a cement-mixer over the apparatus and in line with the openings in the two platforms of the pipe-carriage and in the movable supporting-plate and hinged pipe-holder. This mixer consists of a long upright tapering mixing-chamber X having a cylindrical lower end X′, which is provided with two gates Y and Y′ and forms a retaining-chamber. A beater composed of a vertical shaft Z carrying lat-

eral beating-arms Z′ is located in the tapering upper portion of the mixer and rotated by a pulley Z^2 attached to its extreme upper end. Funnels (not shown herein) are suitably arranged for conveying cement and water into the open upper end of the said mixer. Braces Z^3 secured to the uprights I^2 I^2 are provided for supporting the mixer in place. After the cement and water have been thoroughly mixed the upper gate, Y, is pulled out to allow the prepared cement to fall into the cylindrical lower end of the mixer in which it is supported upon the gate Y′. After this the upper gate, Y, may be pushed in again and another lot of cement prepared. Then when a pipe has been placed in the pipe-carriage the lower gate, Y′, is pulled out, permitting the previously-prepared cement to fall into the pipe, as indicated by *a′* in Fig. 1 of the drawings. I do not limit myself, however, to the use of this device for mixing cement, although it is very convenient, for if preferred the cement may be mixed elsewhere and poured or shoveled into the upper end of the pipe by a workman standing on the upper platform or on the pipe-holder of the pipe-carriage.

The pipe *a* (see Fig. 3) is provided at its opposite ends with cast-iron rings *b* and *b′*, the points b^2 and b^3 whereof engage with the cone and center the pipe thereon, and thus insure uniformity in the thickness of the lining.

In using my improved apparatus an unlined pipe or shell is taken from the floor G′ by one or more workmen who then walk in upon the lower platform of the carriage and set the lower end of the pipe into the groove J^3 in the supporting-plate J′ and over the upper end of the cone A. When this has been done, the pipe-holder K′ is lowered into its horizontal or closed position, whereby the upper end of the pipe is firmly held in place. The pipe is now partly filled with cement, either from such a mixer as shown in the drawings or in any other way. After this has been done the carriage is allowed to descend under the control of its counterweights and friction device whereby the pipe will be slowly telescoped over the cone which is being rotated and which will displace the cement from the bottom of the pipe and form and pack it into a hard lining extending throughout its length. The points b^2 and b^3 of the pipe-rings *b* and *b′* prevent the cement from escaping, and if there is an excess of cement they crowd it back and make it pack the closer. After this has been done the hand-lever is operated to apply the power for raising the carriage, which is automatically stopped when it reaches its elevated or charging position by the means described. The pipe-holder is then unlocked and lifted and the workmen enter upon the lower platform of the carriage and carefully disengage the pipe therefrom and carry it away and replace it by another, and so on. An apparatus or machine constructed in accordance with my invention does the work of lining pipes very rapidly and well and with the minimum of outlay for labor and repair.

I have shown and described a rotating cone, but it is not necessary that the cone should rotate, although the results are perhaps more satisfactory when it does.

I am aware that a machine for making cement-lined pipes, providing for supporting the pipes in a fixed position and for longitudinally moving a cone in them, is old, and also that it has been proposed to employ a stationary cone and provide for longitudinally moving the pipes with respect to it. I do not, therefore, broadly claim a machine providing for supporting the pipes in the fixed position and longitudinally moving a cone, or a machine having a fixed cone and providing for longitudinally moving the pipes. In view of this and the suggestions of alterations and changes made elsewhere I would have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for making cement-lined pipes, the combination with a vertically-arranged cone, of a vertically-movable pipe-carriage located directly over the same, and having a horizontal upper platform formed with an opening, and a horizontal lower platform constructed to permit the upper end of the cone to project upward through it, a supporting-plate located upon the lower platform, adapted to support the lower end of a pipe and to receive the cone which stops the lower end of the pipe when the cement is being introduced into its upper end, a movable pipe-holder connected with the upper platform, adapted to hold the upper end of a pipe and constructed with an opening to permit the introduction of cement into the pipe after the same has been mounted in the carriage, and means applied to the carriage for raising and lowering it substantially as described.

2. In a machine for making cement-lined pipes, the combination with a vertically-arranged cone, of power connections applied to the lower end of the same for rotating it, a vertically-movable pipe-carriage located over the cone, and having a horizontal upper platform and a horizontal lower platform, both of which have central openings, a pipe-support applied to the lower platform and having an opening for the cone, and an annular recess around the said opening for the pipe, and a pipe-holder hinged at one end to the upper platform and having an opening through which cement is supplied to the tube or shell while the lower end thereof is closed by the upper end of the cone, substantially as described.

3. In a machine for making cement-lined pipes, the combination with a vertically-arranged cone, of a horizontally-arranged rotatable disk to which the lower end of the cone is detachably secured, power connections applied to the disk for rotating the same, and hence the cone; a vertically-movable pipe-carriage located over the cone and constructed to receive a pipe, and means attached to the said carriage for lifting the same, substantially as described.

4. In a machine for making cement-lined pipes, the combination with a vertically-arranged cone supported by its lower end, leaving its remaining portion free, of a vertically-movable carriage located directly above the cone, and comprising a horizontal, lower platform constructed with an opening, a horizontal, movable supporting-plate located upon the said platform and constructed with an opening immediately encircled at its upper end by an annular recess, a horizontal upper platform constructed with a large clearance-opening, a pipe-holder hinged to the upper face of the said upper platform, and constructed with an opening corresponding to the opening in the said supporting-plate and immediately encircled at its lower end by an annular retaining-recess, a lock for securing the said hinged pipe-holder in its closed position, and means attached to the carriage for operating it, substantially as described.

5. In a machine for making cement-lined pipes, the combination with a vertical cone, of a vertically-movable pipe-carriage located directly above the cone and constructed to hold a pipe, power connections for lifting the carriage to its elevated or charging position, and automatic mechanism for stopping the carriage when it reaches that position, substantially as set forth.

6. In a machine for making cement-lined pipes, the combination with a vertical cone, of a counterweighted vertically-movable pipe-carriage located directly over the cone and constructed to hold a pipe in an upright position, power connections for raising the said carriage including a fixed and a loose pulley, and a shipper, and automatic mechanism for moving the shipper to cut off the power from the carriage, substantially as set forth.

7. In a machine for making cement-lined pipes, the combination with a vertical cone, of a counterweighted and vertically-movable pipe-carriage, power connections for raising the carriage to its charging or elevated position, including a fixed and a loose pulley and a shipper, a lever connected with the said shipper for shifting the same, and means moving with the carriage for engaging with the said lever for shifting it to cut off the power and stop the carriage, substantially as set forth.

8. In a machine for making cement-lined pipes, the combination with a vertical cone, of a counterweighted and vertically-movable pipe-carriage, power connections for raising the carriage to its charging position, and friction mechanism for normally sustaining the carriage in that position, substantially as described.

9. In a machine for making cement-lined pipes, the combination with a vertical cone, of a counterweighted and vertically-movable pipe-carriage, power connections for raising the carriage to its charging position, and friction mechanism for normally sustaining the carriage in that position, including a hub connected with the said power connections, a band encircling the said hub, a lever to which the ends of the band are attached, and a spring for acting on the lever to put tension on the band, substantially as set forth.

10. In a machine for making cement-lined pipes, the combination with a vertically-arranged cone supported by its lower end, leaving its remaining portion free, of a vertically-movable pipe-carriage located over the said cone and adapted to receive and support a pipe, the lower end of which is closed by the entrance into it of the upper end of the cone, and the upper end of which is left open and a cement-mixer located above the said carriage, which is interposed between it and the cone, and adapted to charge the pipe when the same is in position in the carriage with its lower end closed by the cone, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDW. H. PHIPPS.

Witnesses:
FREDERIC C. EARLE,
LILLIAN D. KELSEY.