A. W. ALTHOFF.

MACHINE FOR ELEVATING AND MIXING CONCRETE.

APPLICATION FILED APR. 9, 1914.

1,155,190.

Patented Sept. 28, 1915.

4 SHEETS—SHEET 1.

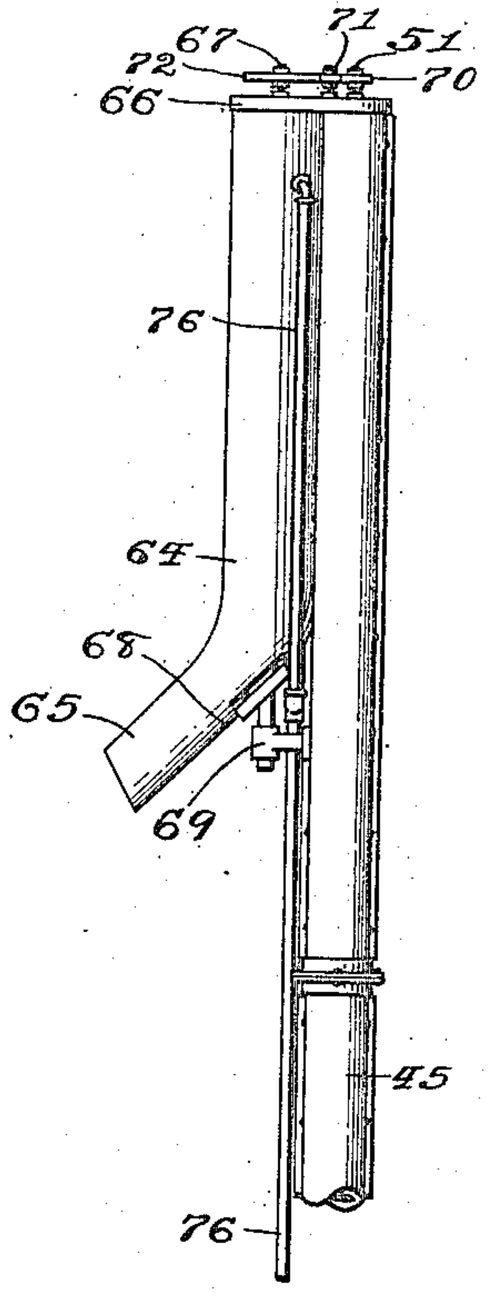
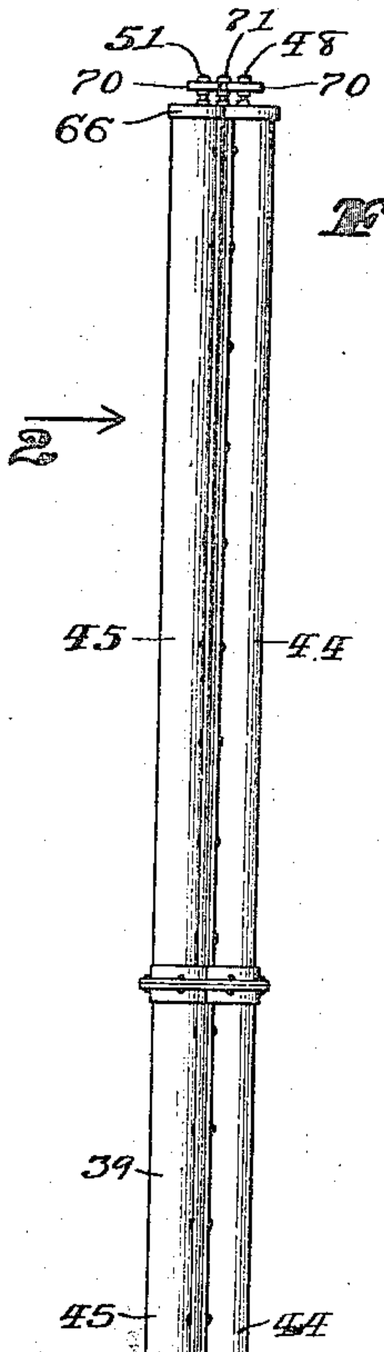


Fig. 2.



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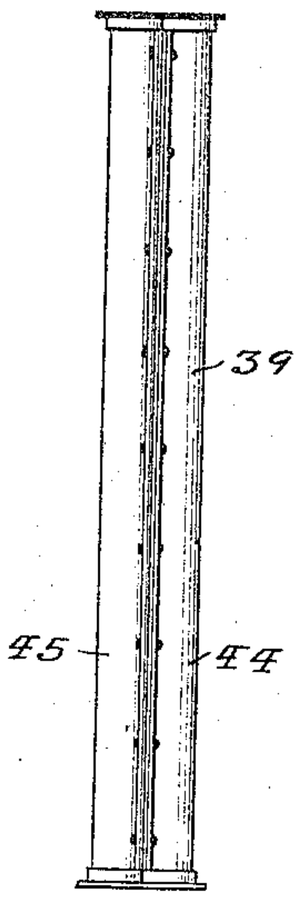

Fig. 3.

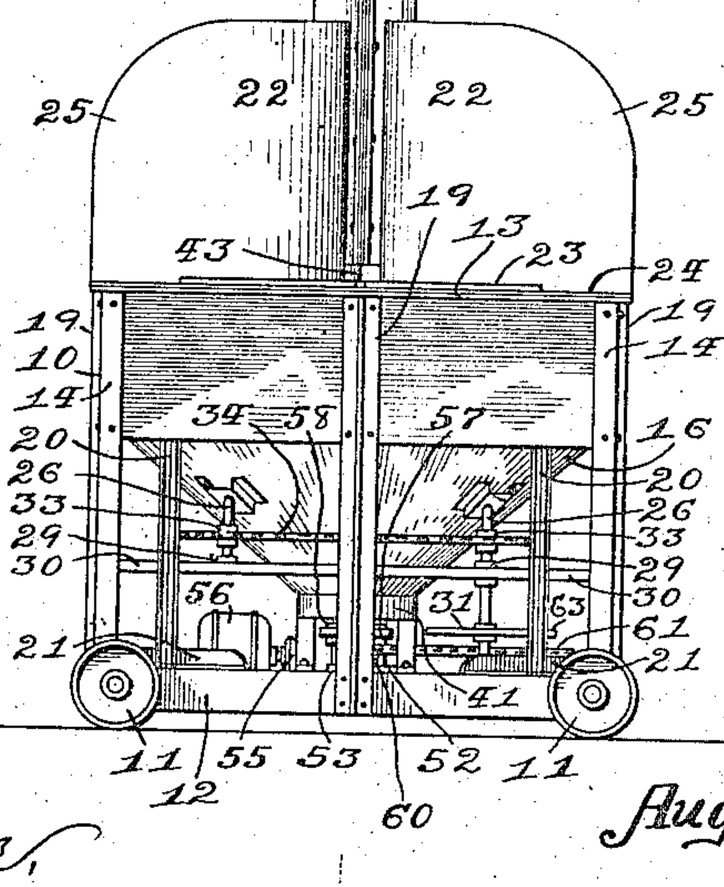

Fig. 4.

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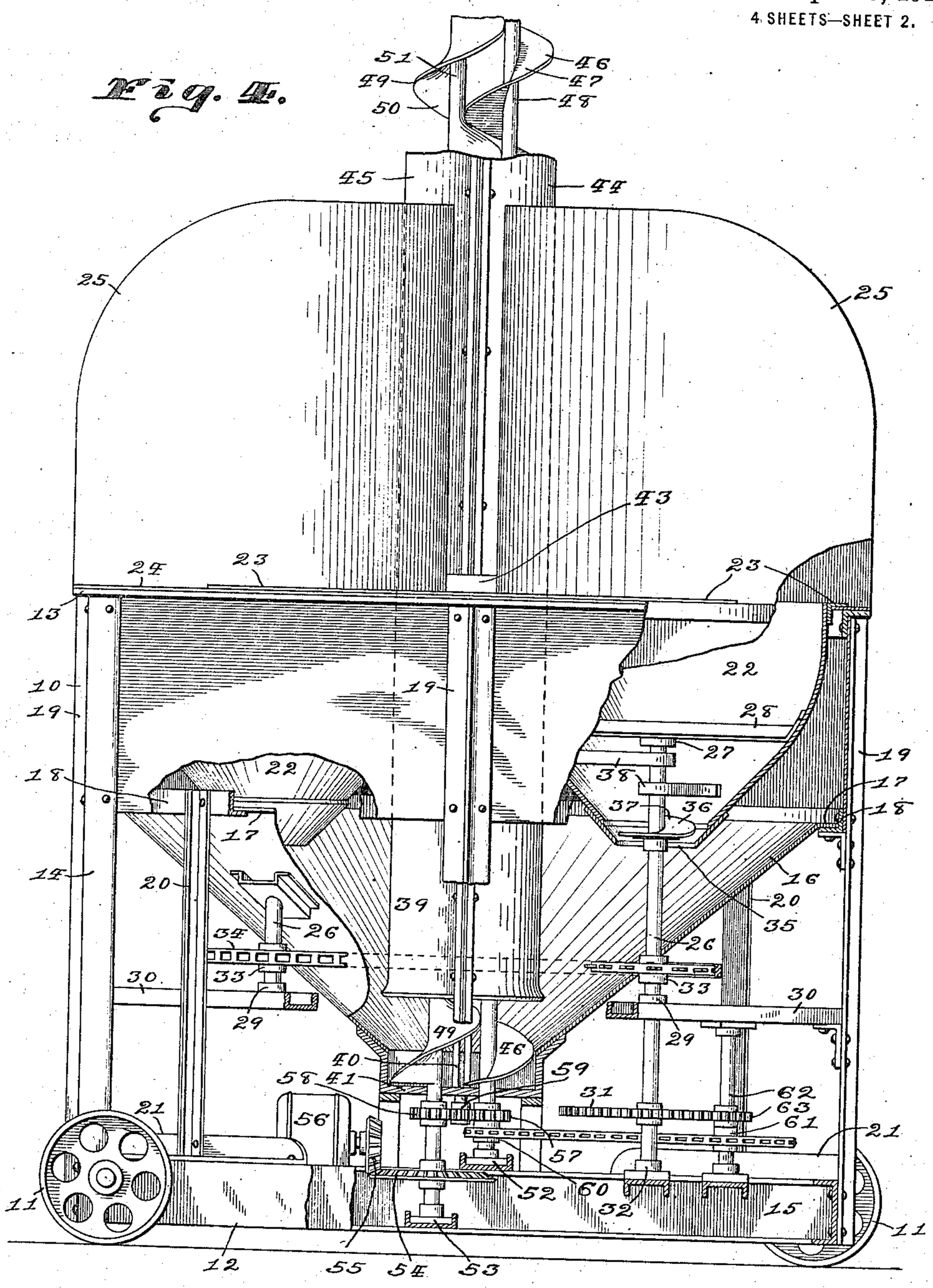

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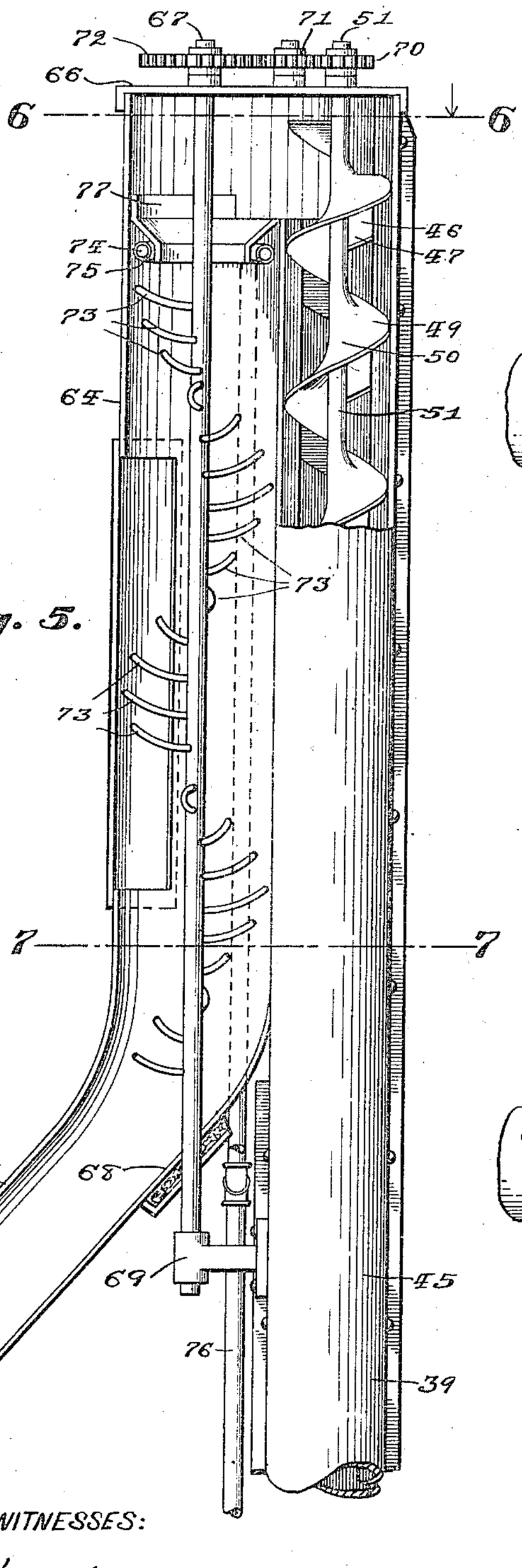

Fig. 5.

Fig. 6.

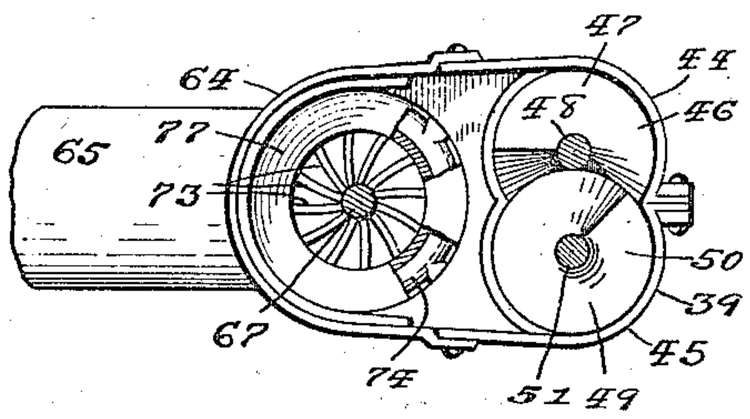

Fig. 7.

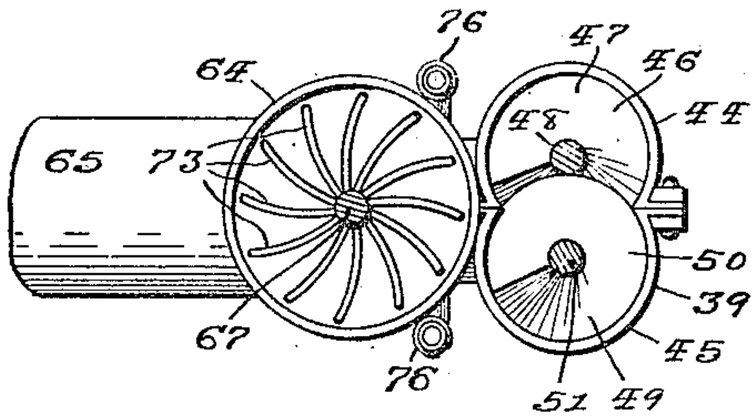

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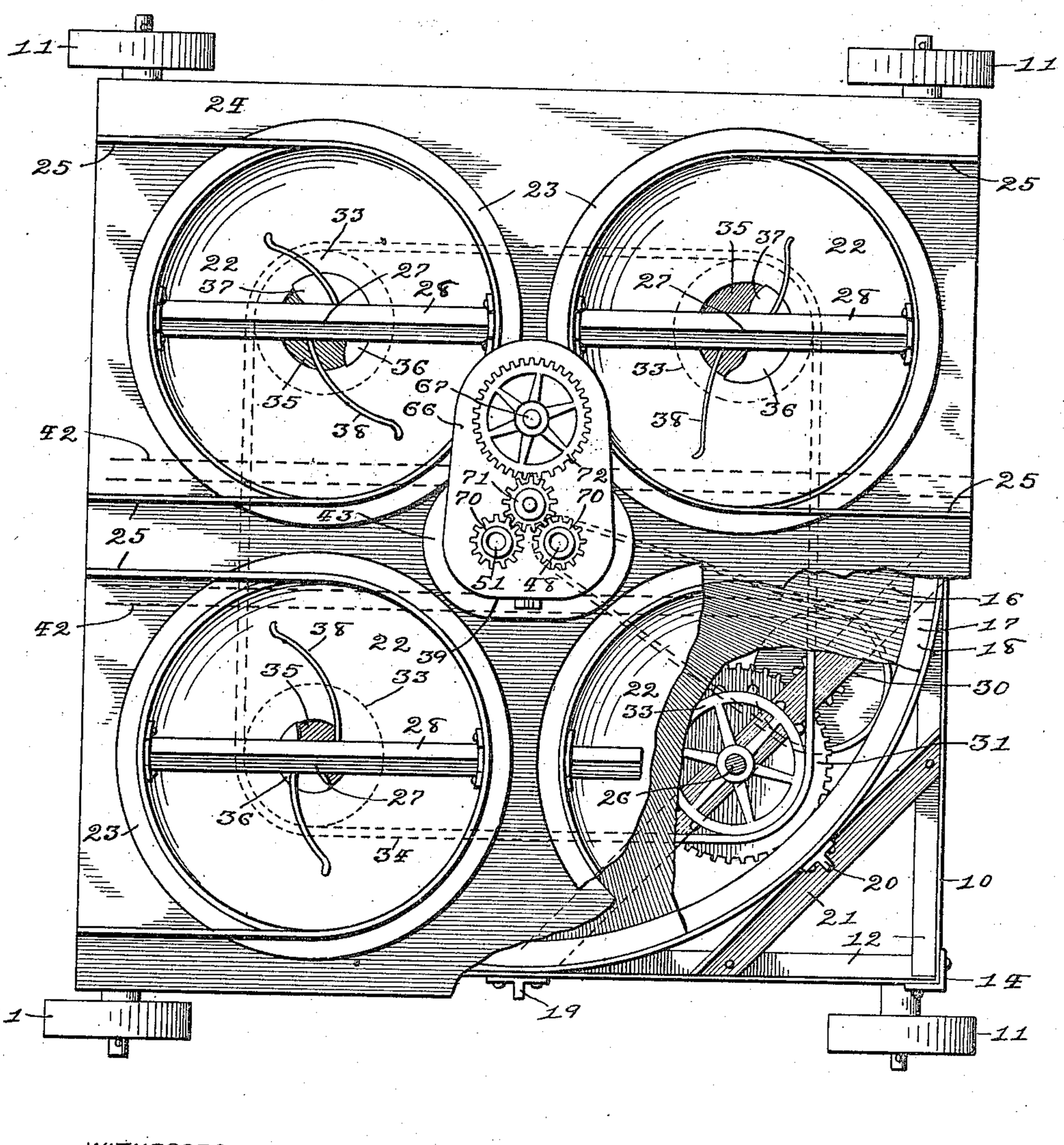
Fig. 8.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR ELEVATING AND MIXING CONCRETE.

1,155,190. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed April 9, 1914. Serial No. 830,591.

To all whom it may concern:

Be it known that I, AUGUST W. ALTHOFF, a citizen of the United States, residing at Oklahoma city, in the county of Oklahoma and State of Oklahoma, have invented certain new and useful Improvements in Machines for Elevating and Mixing Concrete, of which the following is a specification, reference being had to the accompanying drawings.

Under the present method of building a concrete building, the water, sand, cement, crushed stone, and other materials used in the concrete are mixed together at a lower part of the building or on the ground and then hoisted upward to be poured into the forms. In handling concrete in this way, it often has time to harden or "set" before reaching the forms.

An object, therefore, of this invention is to overcome this difficulty.

Another object is to provide means for more thoroughly mixing the materials entering into the concrete mixture.

Other objects and advantages of the invention will be set forth in the ensuing description.

One embodiment of the invention in practical form is shown by the annexed drawings, in which:—

Figure 1 is an elevation view of the machine. Fig. 2 is an elevation view of the upper part of the machine in the direction of the arrow 2. Fig. 3 is an elevation view of one of the separable sections of an elevating portion of the machine, in the same direction as Fig. 1. Fig. 4 is an enlarged elevation view of the lower part of the machine in the same direction as Fig. 1, with parts broken away to expose interior arrangement. Fig. 5 is an enlarged elevation view of the upper part of the machine in the same direction as Fig. 2. Fig. 6 is a sectional view taken on line 6—6 of Figs. 2 and 5. Fig. 7 is a sectional view taken on the line 7—7 of Figs. 2 and 5. Fig. 8 is an enlarged plan view of the machine.

Similar characters of reference designate like parts in all the figures.

A substantially rectangular frame 10 is provided to support other parts, and is carried at each corner by a ground wheel 11 to allow it to be moved from place to place or along a building during use. This frame includes four outer channel-iron bottom or sill members 12 riveted together in the form of a square, and four angle-iron top members 13 similarly arranged; the sill members and top members being connected together by angle-iron corner posts 14.

An extra pair of sills 15 extends through the lower part of the frame 10 to support other parts of the machine, and the ends of these sills are riveted to the opposite ones of the four sills 12 first named.

A circular sheet-metal hopper 16 is mounted in the frame 10, the upper edge of this hopper being flanged outward, as at 17, and riveted to an annular reinforcement 18 for support. This reinforcement 18 is riveted to a T-iron post 19 at the center of each side of the frame 10, and is supported at four more points by T-iron posts 20 which are footed on angle-iron corner braces 21 riveted to the sills 12. Smaller hoppers 22, of which there are four shown, are mounted in the upper part of the frame 12 in position to deliver their contents into the larger hopper 16, these hoppers 22 being provided with an external flange 23 which supports them by resting upon the sheet-metal covering 24 of the frame 10. The portion of these hoppers 22 above the covering 24 may be provided with lateral wings 25 for convenience in filling.

To insure proper feed of the materials from the hoppers 22 to the larger hopper 16, each hopper 22 is provided with a vertical feed-shaft 26 which extends through a delivery opening at the lower end of said hoppers the upper ends of these feed-shafts being journaled in bearings 27 on diametric bars 28 which span said hoppers, while the lower ends are journaled in bearings 29 secured to diagonal braces 30 riveted to the frame 10. One of these feed-shafts, however, extends down through its bearings 29 and brace 30 in order to be provided with a gear-wheel 31 for driving it, and the lower end of this feed-shaft is journaled in a bearing 32 secured to the lower part of the frame 10.

Each feed-shaft 26 is provided with a sprocket-wheel 33 just below the hopper 16, and these sprocket-wheels are collectively embraced by a connecting link belt 34 so that movement of one of them drives all the others.

The delivery opening 35 of each hopper 22 is made enough larger than the feed-shaft 26 to allow downward passage of the sand, cement, stone, or other material to be

fed to the hopper 16, the size of said delivery opening being determined by the nature and amount of the material which is to pass through it.

At or a little above the delivery opening 35, the feed-shaft 26 is provided with a substantially semicircular feeding-plate 36, which, while obstructing part of the opening, has its rear end spiraled upward, as at 37, to loosen the material and allow the latter to drop more evenly through the unobstructed portion of the opening as the feeding-plate revolves.

In order to more thoroughly loosen and agitate the material in the hoppers 22, each feed-shaft 26 is provided with two laterally and oppositely arranged stirring-arms 38; each stirring-arm being of resilient strap material and so arranged that it may yield and wind up around its shaft and thereby shorten whenever too forcibly resisted by the material upon which it is acting.

Means are provided for elevating the sand, cement, and other materials delivered into the hopper 16 from the hoppers 22 and at the same time thoroughly mixing said materials; means also being provided for adding the water to the mixture.

A sheet-metal elevator 39 extends from near the bottom of the large hopper 16 directly upward through the sheet-metal top 24 of the frame 10 and as high as necessary to deliver material to a building, the elevator being in separable sections of, say, ten feet in height, so that it can be built up as the building progresses. This elevator has downward extensions 40 on its lower end which are footed upon the bottom 41 of the hopper 16, and the greater part of its weight is supported by two channel-iron beams 42 which extend through the frame 10 just above said hopper.

A flange 43 on the outerside surface of the elevator 39 rests upon the sheet-metal top 24 of the frame 10, and is riveted thereto. In cross-section, this elevator 39 is shaped as two circular conduits 44 and 45 of equal diameter which open into or overlap each other, and each conduit contains a spiral conveyer adapted to be revolved and co-act with the conveyer of the other conduit in raising and mixing the materials.

Each conveyer comprises a central shaft or core with a spiral lip, the lip of each conveyer filling its inclosing conduit with only a working clearance and extending entirely to the core of the other conveyer with just a working clearance. The conveyers are of the same spiral pitch and are revolved in the same direction by means later described.

As best shown in Fig. 4, which represents a vertical section on a diametric line of both conveyers, the lip 46 of the conveyer 47 projects outward from its core 48 on a line at right angles to the line of axis of said core, so that material being conveyed upward will have no tendency to slide off said lip except by centrifugal force. The lip 49 of the other conveyer 50 projects just beneath the lip 46 during action of the two conveyers, for purposes later stated, and in place of projecting at right angles to its core 51 this lip is so shaped that the edge of said lip 46 contacts a full line on its upper surface from its outer edge to its core 51.

Both conveyers 47 and 50 extend below the lower end of the elevator 39 with the lips having just a working clearance above the horizontal bottom 41 of the hopper 16, and the shafts 48 and 51 of said conveyers extend down through said bottom and are footed in bearings 52 and 53, respectively, in the frame 10. To revolve these conveyers 47 and 50, the shaft 51 of one of them is provided with a beveled gear-wheel 54 which may be driven from any suitable source, for example, a gear-wheel 55 on an electric motor 56 mounted in the frame 10.

Above the gear-wheel 54, the shafts 48 and 51 of the conveyers are provided with gear-pinions 57 and 58, which are operatively connected by a third gear-wheel 59 in order to have them revolve in the same direction.

To drive the feed-shafts 26 of the hoppers 22, a small sprocket-wheel 60 is mounted on the shaft 48 of the conveyer 50, and motion is imparted from this sprocket-wheel to a much larger sprocket-wheel 61 on a shaft 62 journaled vertically in the frame 10. This shaft 62 is in turn provided with a small gear-wheel 63 which drives the gear-wheel 31 aforesaid.

In operation of the parts described, the hoppers 22 are filled with the different dry materials to enter into the concrete mixture, and the feed-shafts 26 revolved to feed said materials down into the large hopper 16. As the materials run down into the hopper 16 around the conveyers 47 and 50 they are caught up by the lips of said conveyers and started on their course upward through the conduits 44 and 45. The conveyers 47 and 50 are revolved at a speed, of say, three hundred revolutions per minute, this speed being thought to be sufficient to pick up the material as it runs down around said conveyers at the bottom of the hopper 16 and carry it upward. The conveyer 47, however, having its lip projecting out at right angles as aforesaid, gathers up a greater amount of the material than the other conveyer, and leads on the work of elevating it. In revolving, the conveyers 47 and 50 throw their load of material outward by centrifugal force into contact with their inclosing conduits 44 and 45, the conduits, in turn, frictionally resisting circular movement of the materials so that the conveyers continually work them upward and mix them.

With the two conduits 44 and 45 opening into each other, and with the lips 46 and 49 of their conveyers interprojecting each other, part or all of the material carried by each conveyer leaves it by centrifugal force on arriving at the opening between the two conduits and is thrown onto the lip of the other conveyer. With the full upper surface of the lip 49 shaped to meet the edge of the lip 46 of the other conveyer in action as aforesaid, it will meet approximately one-half of that portion of the edge of said lip 46 which projects into the conduit 45; and since the meeting portions of said lips move in opposite directions, materials thrown from the lip 46 onto the surface of the lip 49 will be instantly thrown back onto the lip 46 to start on further movement upward. In handling the materials in this way, the sand, cement, and other component dry parts are thoroughly mixed before reaching the top of the elevator 39. In arranging to add the water to the materials as a final part of the complete mixing process, mixing mechanism is provided and placed at the upper end of the elevator 39. This mixing mechanism comprises a vertical cylindrical casing 64 which is set at even height with the tops of the conduits 44 and 45 and secured in contact with both of them, the lower part of this casing being reduced in size and formed into an outwardly-curved delivery spout 65. A cast-iron cap 66 closes the upper ends of the conduits 44 and 45 and casing 64, and forms a bearing for the shafts 48 and 51 of the conveyers. A vertical shaft 67 extends down through the axial center of the casing 64 and through the lower wall 68 of the spout portion 65, the upper end of this shaft being journaled in the cap 66 while its lower end is journaled in a bracket 69 bolted to the conduits 44 and 45. The shafts 48 and 51 of the conveyers are provided above the cap 66 with gear-wheels 70 similar to those at the lower ends of said shafts, these gear-wheels 70 being connected by a third gear-wheel 71 mounted on said cap. The upper end of the shaft 67 of the casing 64 is also provided with a gear-wheel 72, and is driven by engagement of said gear-wheel with the gear-wheel 71. Inside the casing 64, the shaft 67 is provided with a series of lateral arms 73 which act to more thoroughly mix the materials delivered into said casing by the conveyers 47 and 50, these arms being set in a spiral line around said shaft and being curved in advance direction in order to avoid too centrifugal an action on the material.

To supply water to the material, a tubular ring 74 is arranged at the upper part of the casing 64 and provided with a line of small perforations 75 entirely around it. Water is supplied to the ring 74 through a pipe 76 leading up from a suitable source, this pipe being branched to clear the casing 64 and entering the ring at two points. The water from the ring 74 is sprayed down through the materials as the fine particles of the latter are being agitated and mixed by the arms 73, with the result that every grain of the material is brought into contact with the water and a superior quality of concrete produced.

A flaring protector 77 is fitted and secured in the casing 64 just above the ring 74 to prevent the perforations in said ring being choked by the cementing properties of any of the materials used.

Having thus described the invention, I claim:—

1. In a machine of the class described, a vertically disposed elevating mechanism comprising two circular conduits opening into each other, revolving spiral conveyers arranged in said conduits, the lips of one conveyer projecting at a right angle to its core, or shaft, while the lip of the adjacent conveyer is inclined to its core and projects beneath and works in contact with the first-named lip, said conveyers serving to raise the material in a dry state, a return conveyer adapted to receive the discharge of said conduits, means contained in said return conveyer for agitating the contents thereof, and a sprinkler system contained within said return conveyer adjacent the top thereof, substantially as described.

2. In a machine of the class described, mechanism comprising a vertically disposed elevating means consisting of parallel conduits opening into each other and containing spirally flanged coacting conveyers, means for rotating said conveyers in the same direction, which serve to mix and raise material in a dry state and a return conveyer projecting downward and adapted to receive the discharge of the two conduits at the top, and means for agitating and spraying contents of the return conveyer, as described.

3. A device of the character described consisting of a conduit having combined elevating and mixing means therein and a second conduit connected with and leading downwardly from the upper end of said elevating and mixing means conduit and having agitating and sprinkling means therein.

Witness my hand this 11 day of March, A. D. 1914.

AUGUST W. ALTHOFF.

Witnesses:
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