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W. S. HOTCHKINS.

CONCRETE MIXING MACHINE.

No. 441,563. Patented Nov. 25, 1890.

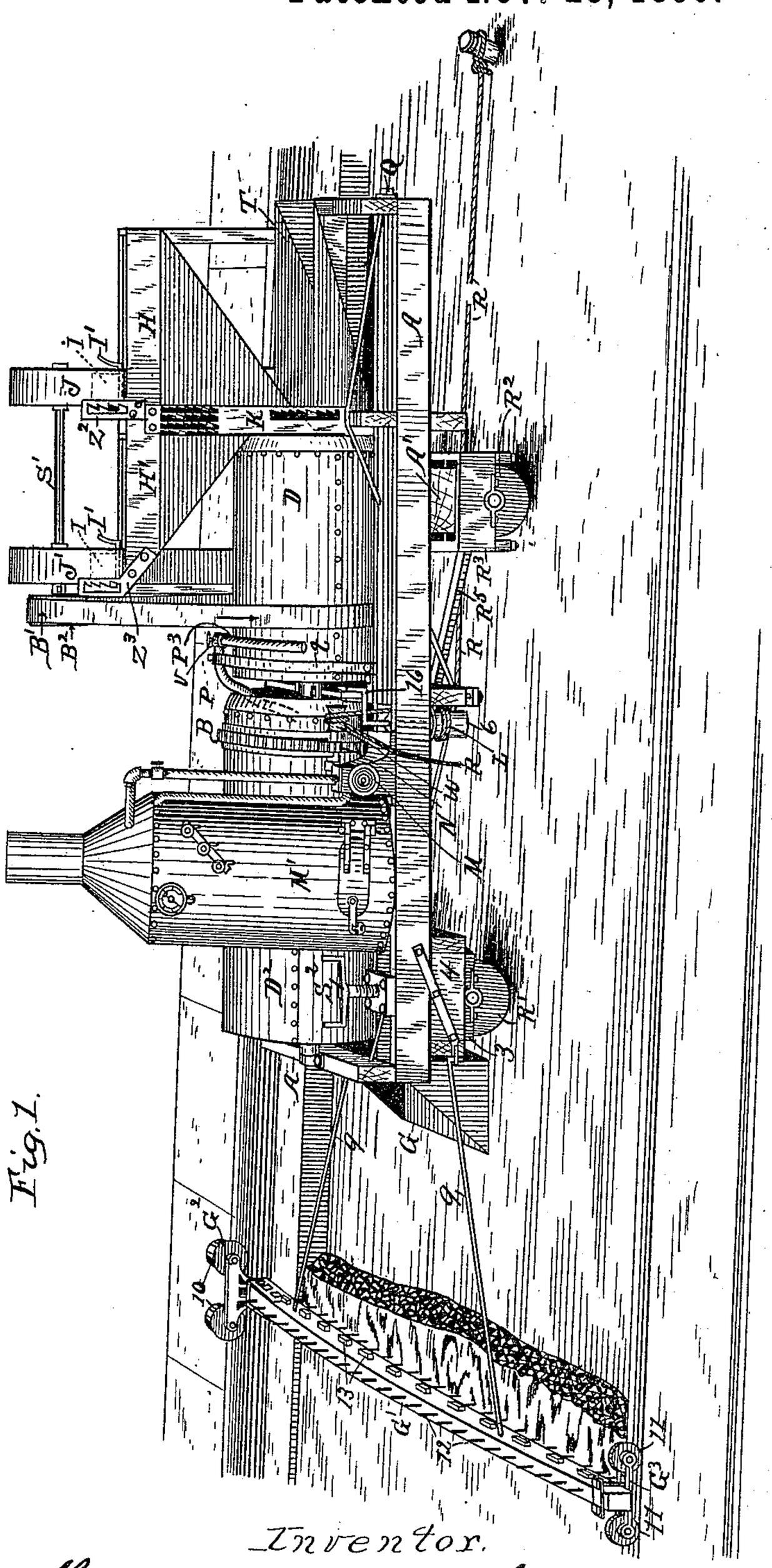

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

W. S. HOTCHKINS.

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Fig. 2.

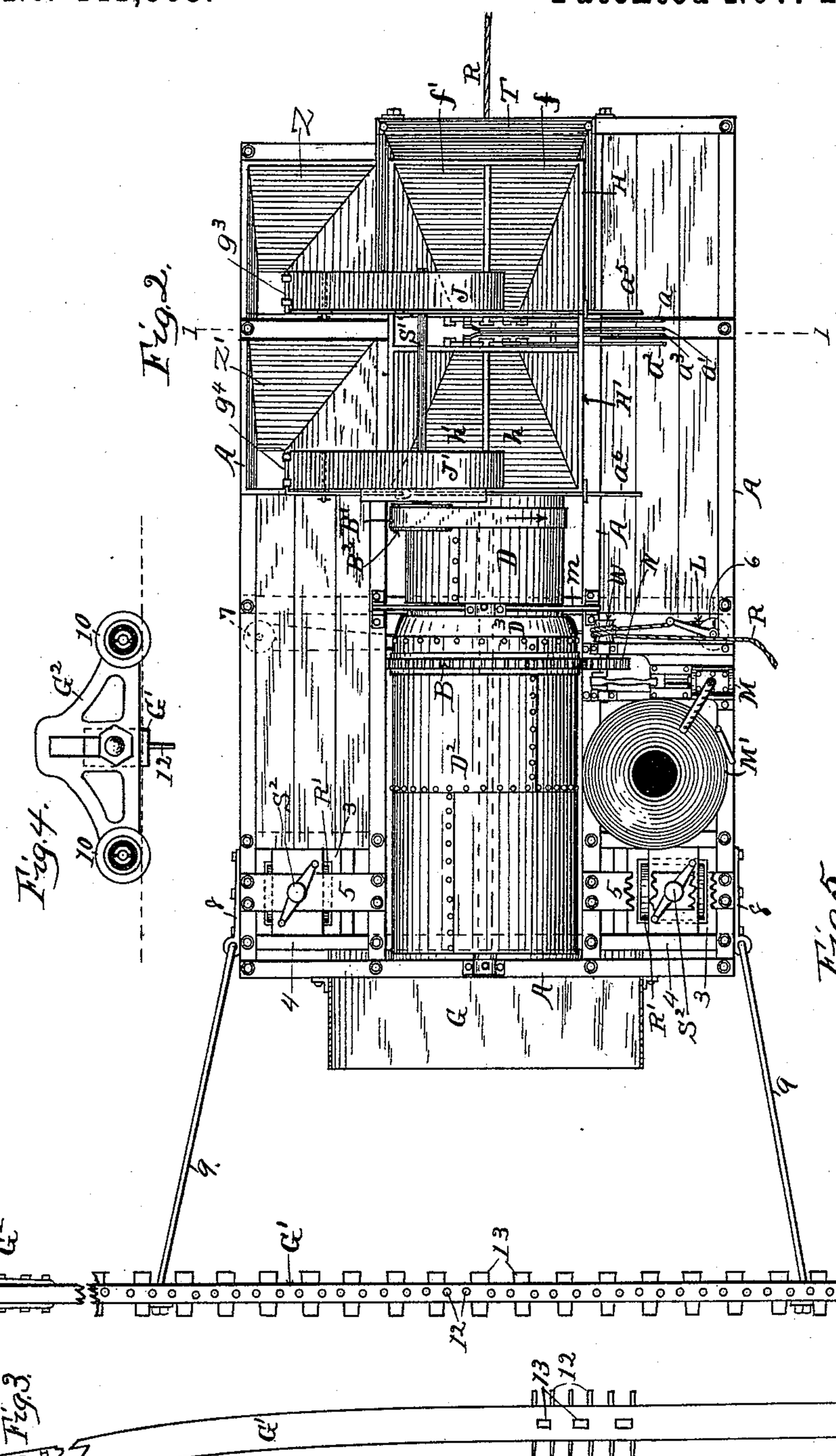

Fig. 4.

Fig. 5.

Fig. 3.

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(No Model.) 4 Sheets—Sheet 3.

W. S. HOTCHKINS.

CONCRETE MIXING MACHINE.

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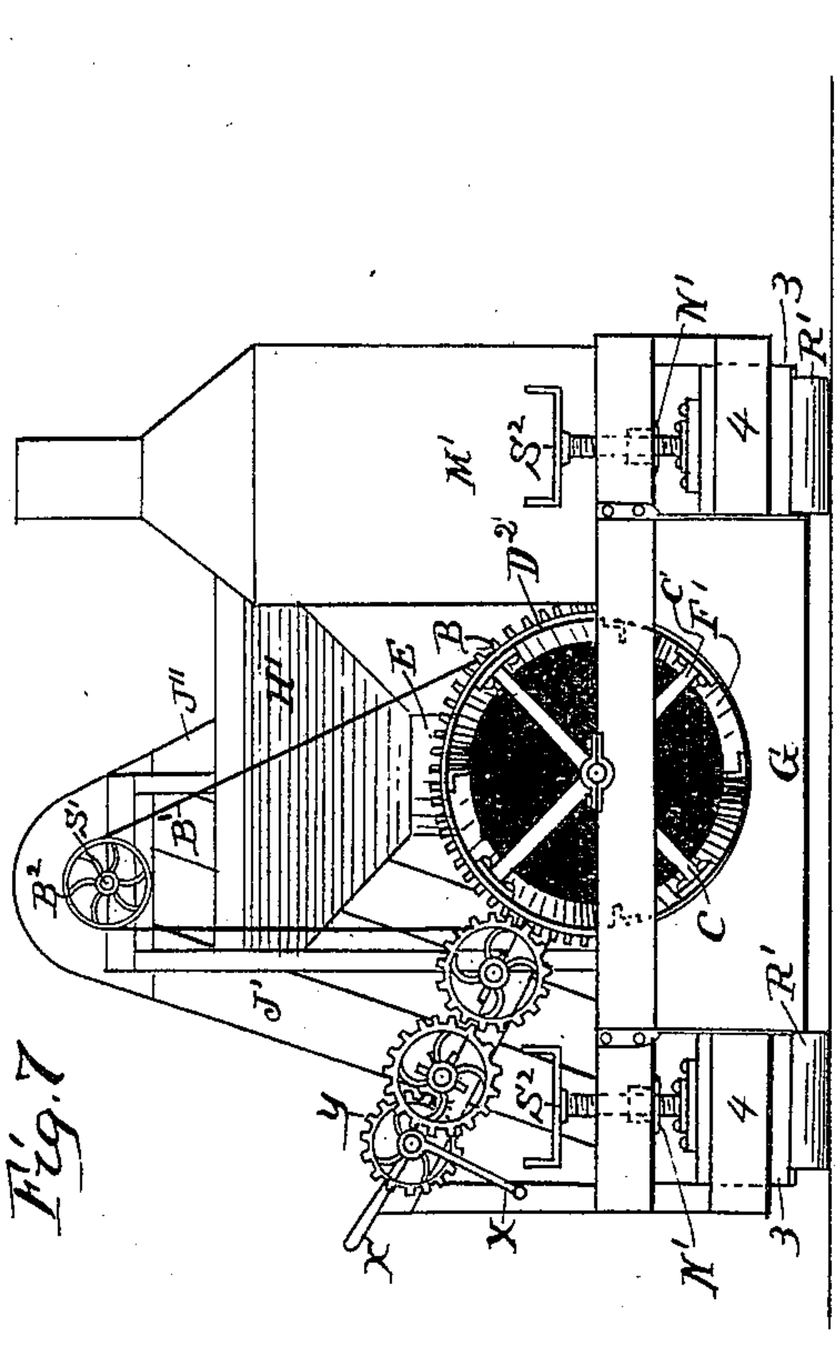

Fig. 7.

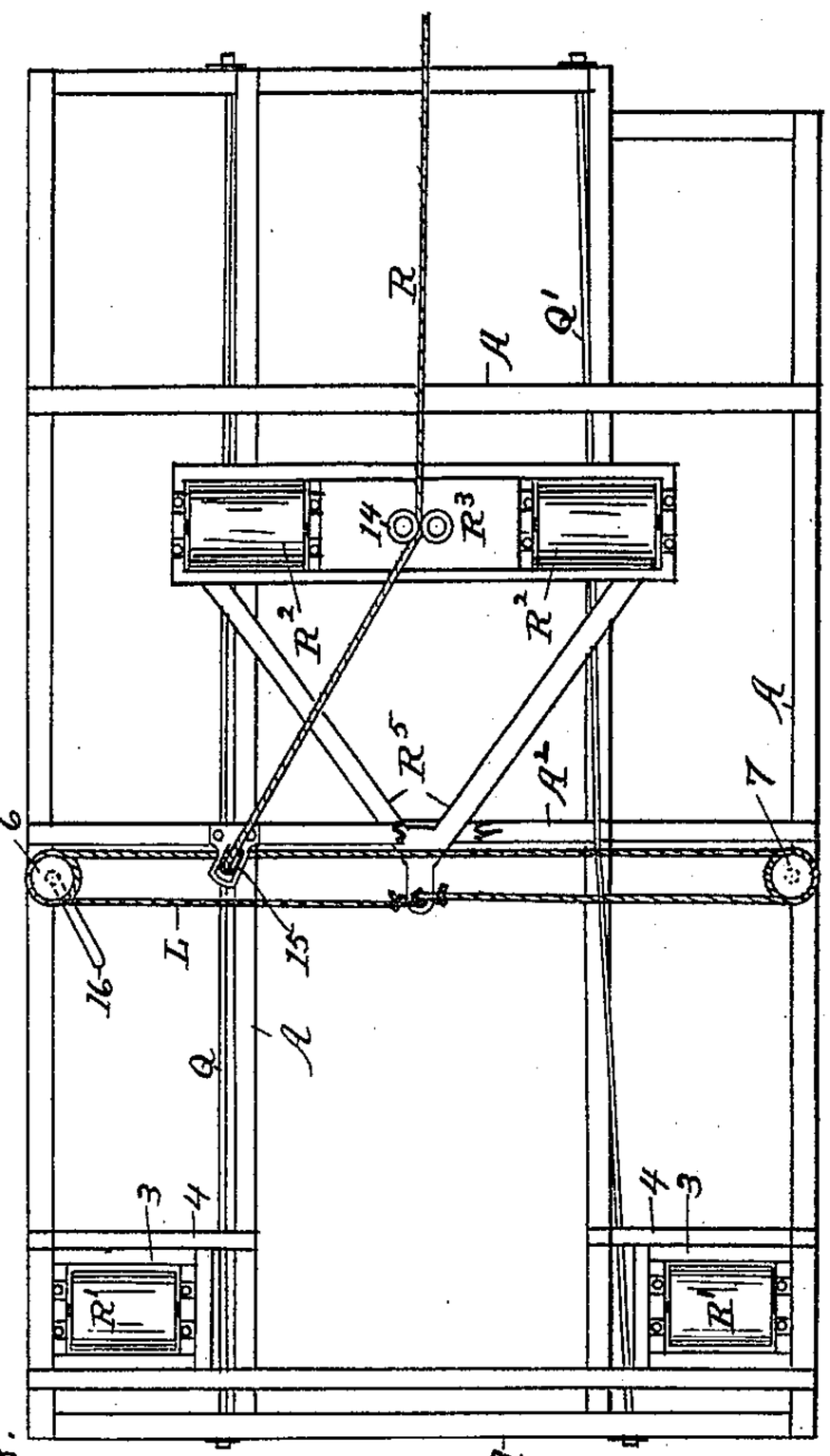

Fig. 8.

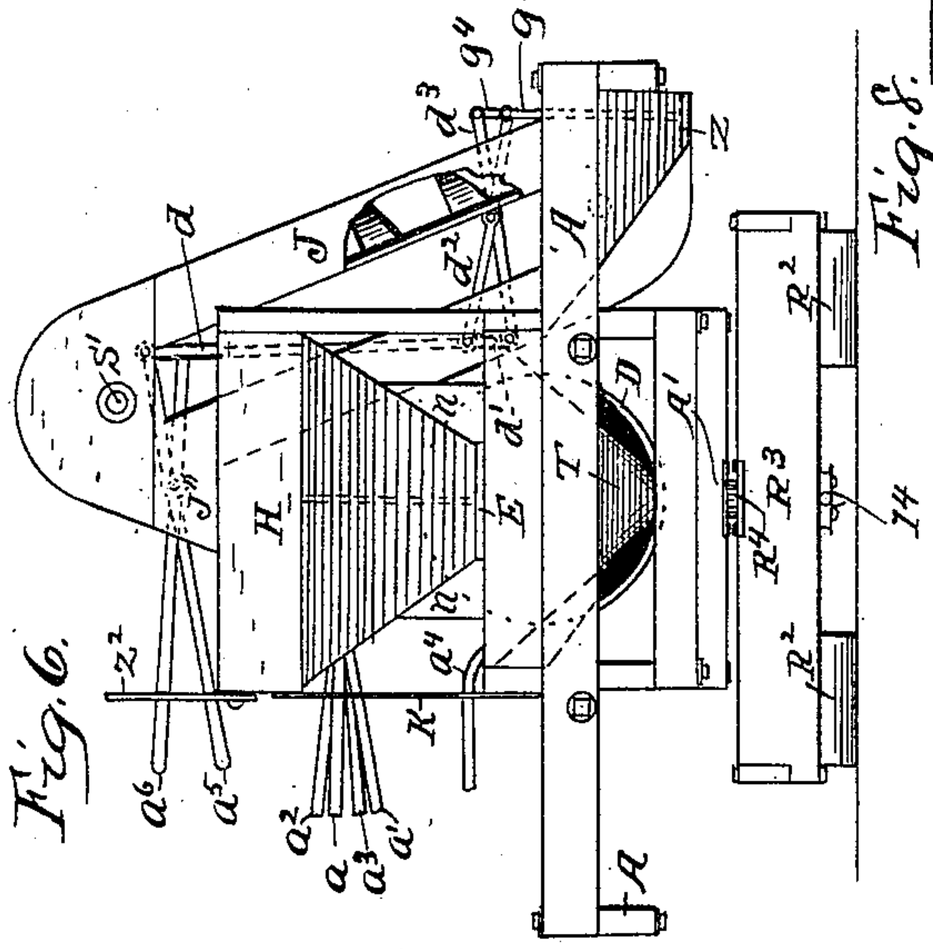

Fig. 6.

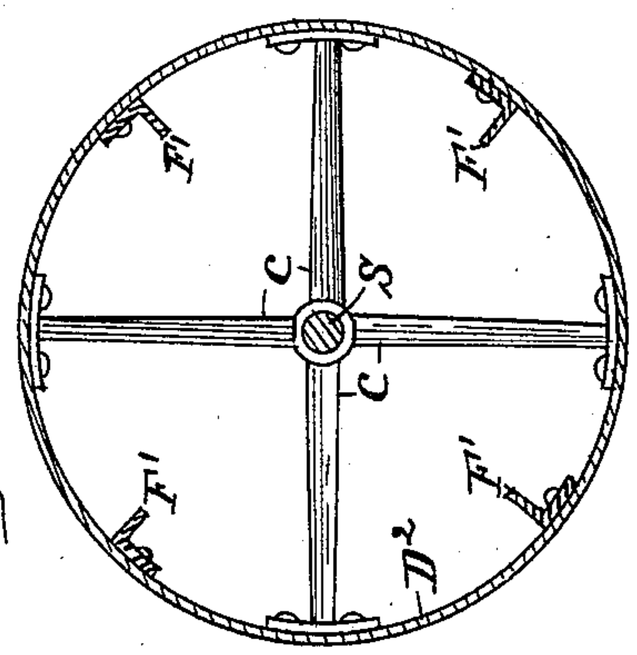

Fig. 9.

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(No Model.) 4 Sheets—Sheet 4.

W. S. HOTCHKINS.

CONCRETE MIXING MACHINE.

No. 441,563. Patented Nov. 25, 1890.

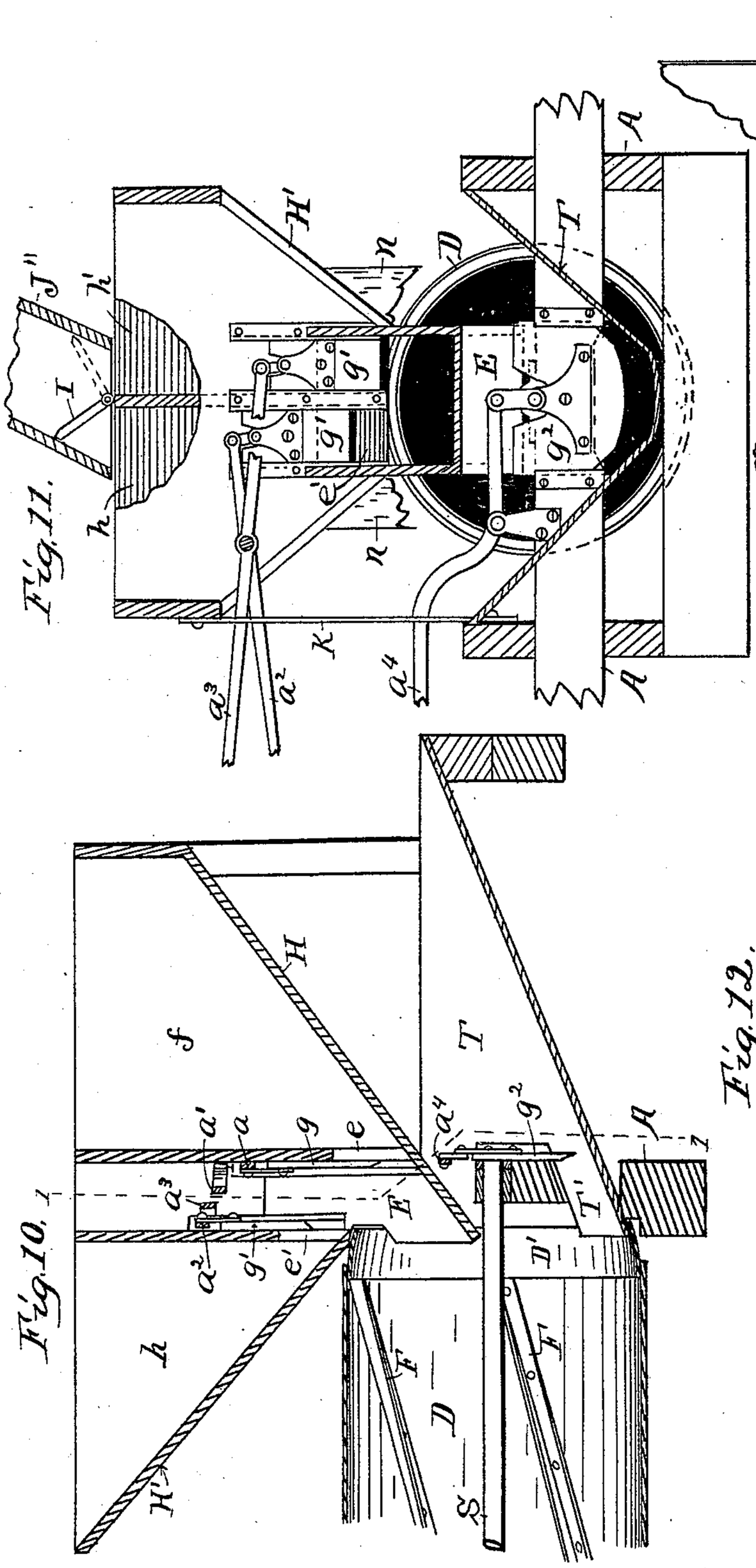

Fig. 11.

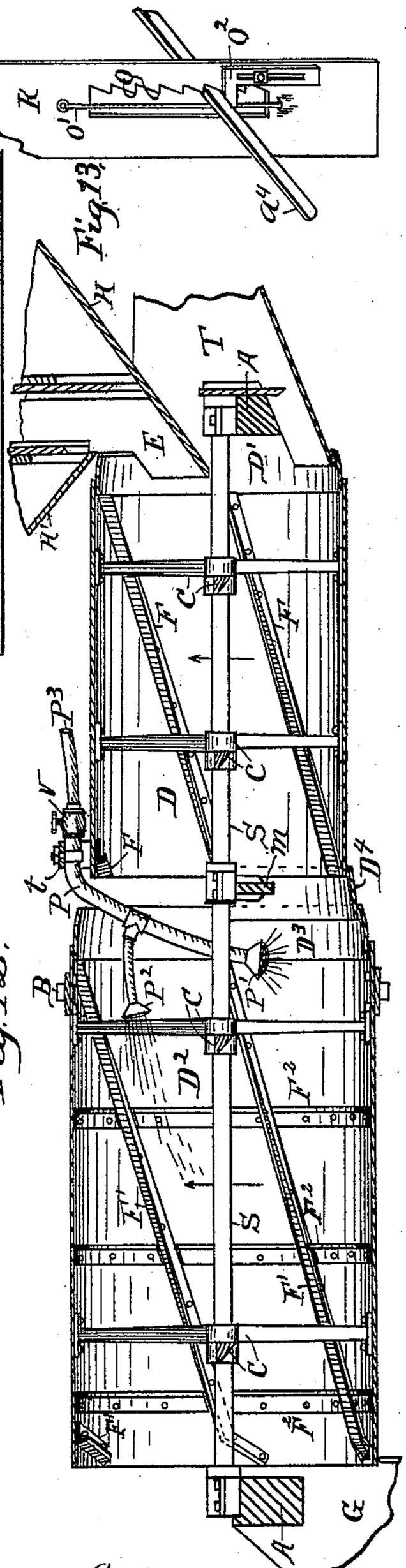

Fig. 13.

Fig. 10.

Fig. 12.

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UNITED STATES PATENT OFFICE.

WRIGHT S. HOTCHKINS, OF WICHITA, KANSAS.

CONCRETE-MIXING MACHINE.

SPECIFICATION forming part of Letters Patent No. 441,563, dated November 25, 1890.

Application filed February 25, 1890. Serial No. 341,743. (No model.)

To all whom it may concern:

Be it known that I, WRIGHT S. HOTCHKINS, a citizen of the United States of America, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Concrete-Mixing Machines, of which the following is a specification, reference being had therein to the accompanying drawings and the letters and figures of reference thereon, forming a part of this specification, in which—

Figure 1 is a perspective elevation of the machine, viewing it from one side, showing it as it would appear in use upon a street. Fig. 2 is a top plan view of the same. Fig. 3 is a side plan of the drag-rake thereof. Figs. 4 and 5 are end elevations of the drag-rake carriages. Fig. 6 is a front elevation of the machine. Fig. 7 is a rear elevation of the same. Fig. 8 is a bottom plan view of the machine-frame, showing the trucks and the means for guiding the forward trucks. Fig. 9 is a cross-sectional view of one of the cylinders of the machine. Fig. 10 is a detail vertical longitudinal section at the forward part of the machine through the hoppers and the entrance to the cylinders. Fig. 11 is a vertical cross-sectional view of the machine at the same point as taken on line 1 of Figs. 10 and 2. Fig. 12 is a longitudinal sectional view of the two cylinders of the machine; and Fig. 13 is a detail perspective view of a portion of one of the levers of the machine and of the mechanism for holding the lever when adjusted.

This invention relates to certain improvements in machines for mixing concrete such as is used when paving streets, placed as the foundation material upon which asphalt or the like is placed, or for other similar purposes; and it consists, essentially, in a portable frame carrying a pair of inclined rotary cylinders; elevators and hoppers for conducting the different materials which form the concrete compound to the entrance of the cylinders; of a water-pipe leading into and adapted to discharge water into one of the cylinders, and of an engine and boiler for operating and propelling the machine.

The object of this invention is to provide means whereby the different materials used to make the concrete compound can be mixed on the street, at the place where it is to be used, by mechanical energies, placing the separate materials in one end of the machine and by the mechanical operation thereof cause them to be thoroughly mixed together and delivered at the opposite end, where the concrete is taken and placed on the street, thereby accomplishing more, more evenly gaging the different materials used, and more thoroughly mixing them than can be done by physical strength at the same average expense.

Referring to the drawings, A represents the machine-frame adapted to support the several parts of the machine, and provided with forward bolster A′ and the rear boxes 4 4, and is supported off the ground in an inclined position by means of the truck-rolls R^2 R^2 at the forward end, which are set in the box-frame R^3, upon which the frame-bolster A′ rests, the center plates R^4 acting as a pivotal bearing between the bolster and box-frame, and at the rear part by means of the rolls or broad-faced wheels D′ D′, which are set in the boxes 3 and 3, which boxes telescope with the boxes 4 4 vertically, and are adjusted vertically in said boxes 4 4, respectively, to adjust the incline of the machine-frame and its operative parts, by means of the hand-screws S^2 S^2, which turn through the nuts N′ N′, (see Fig. 7,) which are set in the fixed cross-plates 5 (see Figs. 1 and 2) above said boxes, the screws being arranged to turn against similar metallic capped plates across the upper part of boxes 3 3, as shown. To the rear part of the forward truck is secured two converging arms R^5, meeting at their outer ends, where they are secured together and serve as an arm by means of which the trucks are turned to guide the course of the machine.

Depending from the machine-frame and properly boxed to the frame opposite the arm R^5, one at either side, is a pair of drums or broad-faced wheels, one of which (shown at 6) is provided with a crank 16, extending above the frame, the opposite one being shown at 7.

L is a rope arranged across under the frame, wound about each said drum, and secured at its ends to arm R^5, and by means of

which the said arm is moved sidewise by the turning of the drums, (which will cause the rope to travel,) and thus guide the forward truck.

A^2 is a cross beam or bar secured to a cross-beam of frame A as a means of support for arm R^5.

M and M′, respectively, represent an ordinary engine and boiler secured upon one side of frame A, and serve as a means for providing power to operate and propel the machine, the crank-shaft of which engine is provided with a spur gear-wheel N for operating the machine, as will hereinafter be explained, and with a winch W, about which the rope R for propelling the machine is wound, and the manner of propelling is as follows: The said rope is first paid out in advance of the machine and its advanced end secured to a stake, as shown in Fig. 1, or to some fixed object. Its opposite end is then passed between the sheaves 14, (see Figs. 6 and 8,) which are secured to the under central part of the box-frame R^3. From thence it is passed up over the sheave 15 (see Fig. 8) to and once or twice about the winch W, and thence to one side of the frame adjacent the engine, where it is convenient to grasp, and when it is desired to advance the machine said rope end is pulled, which tightens its grip on the winch and winds the rope on from below and off from the side, thus causing the machine to advance, and when advanced far enough the rope is slackened, which will cause its grip on the winch to loosen and the machine will stop.

D and D^2 represent the two inclined mixing-cylinders of the machine, respectively, provided with the arms C and fixed on the shaft S, as shown, which shaft is boxed at each end and centrally to the frame, the center bearing being supported by means of the metallic cross-beam *m*, (shown in Figs. 2 and 12; see, also, Fig. 1,) and respectively provided with the longitudinal spiral flanges F F′, fixed to their inner wall surface, as shown in Fig. 12. Cylinder D is less in diameter and shorter than its fellow cylinder, and is arranged in advance for the purpose of receiving the several dry materials which are used to make the concrete compound, thoroughly mix them together, and deliver them in such mixed condition to cylinder D^2, where the mixture is subjected to a spray of water from the pipes P^3 and P, which are provided with the perforated exits P′ and P^2 within cylinder D^2, and during the passage of the mixture through cylinder D^2 it is thoroughly mixed with the water, thus formed into a concrete, and finally delivered from the rear end of the cylinder upon the apron G, which is fixed depending from frame A, and extends rearward far enough to provide a convenient place from which to shovel the concrete and from which it is taken and placed on the street. Each of said cylinders is somewhat converged at its forward end, as shown, respectively, at D′ and D^3, for the purpose of preventing material used in the mixture from dropping out at such places.

D^4 is a curved and inclined stationary apron, (see Fig. 12,) arranged to support and direct the materials in their proper course when passing from cylinder D to D^2.

B represents a circular toothed rack fixed about cylinder D^2 in such manner as to mesh with and be driven to rotate the cylinder by the gear N of the engine crank-shaft.

In order to properly explain the further construction of the machine, I desire to state that the materials commonly used to make the concrete compound are sand, cement, and crushed rock, mixed together and saturated with water, which materials I prefer to use, and the usual way of using them is to distribute them along the center and sides of the street and compound them as the work of placing the concrete advances, which way I prefer to adopt, and shovel or otherwise place each kind of material in its respective hopper, as the demand requires.

T is the stone or crushed-rock hopper supported by means of the frame A at the forward part of the machine, having its rear lower part terminate in a chute T′, (see Fig. 10,) leading into cylinder D, and divided from the chute by means of the gate g^2, arranged to slide vertically within suitable guides to either cut off or permit the passage of the rock into the cylinder, and is provided with a connected lever a^4 for operating it, which lever extends to one side of the hopper, where it is grasped, and when adjusted to properly open the gate is held by means of a ratchet-rack, which will be more fully explained hereinafter.

H is a sand-hopper supported above hopper T, and is provided with a central longitudinal partition dividing it into two compartments *f* and *f*′, each compartment being provided with a gate *g* and gateway *e*, leading into a general chute E below the gates, which chute leads into the cylinder D above chute T′, as shown. H′ is a similar but smaller hopper provided with a similar partition dividing it into the compartments *h* and *h*′, and with the gates *g*′ and gateways *e*′, also leading into the general chute E, the latter hopper being for the cement. Said gates *g g* and *g*′ *g*′ are respectively provided with the operating-levers *a*, *a*′, a^2, and a^3, arranged extending to one side through slots in plate K, which slots are respectively provided with a series of ratchet-teeth as shown at *o*, Fig. 13, (see, also, Fig. 1,) and it is intended that each slot shall be provided with a side spring-rod, as shown at *o*′, for yieldingly holding the lever shown at a^4 engaged with the ratchets, and also that adjustable gages—such as shown at o^2—be used with each lever to act as a stop to arrest the movement of the levers, so that when once set to properly open the gates no further attention is required when closing and again opening the gates, as the levers will be arrested by

the stops when properly adjusted to open the gates to such width or height as required to permit the passage of the proper quantity of each material.

Z and Z′ are respectively the hoppers where the sand and cement are first placed on the machine, and are arranged on frame A at one side near the respective sand and cement hoppers above, and J and J′ are elevators of the ordinary pattern arranged to respectively elevate the sand and cement from the hoppers Z and Z′ to the hoppers H and H′, and each elevator is provided at its discharge-spout J″ with a pivoted apron I, having an exterior lever I′, the pivots of which are directly over the hopper-partitions and are for the purpose of directing the course of the elevated material to either compartment of the hoppers, as desired, by turning the aprons from side to side.

S′ is a shaft boxed across and connecting the upper end of the elevators and supports the interior elevator mechanism (not necessary to be shown) and at one end the pulley B^2, and is driven by means of the belt B′, passing about the cylinder D and said pulley.

The object of dividing the hoppers H H′ is that when one compartment is being used the opposite compartment may be filled, and as the compartments are constructed to hold a given quantity a correct account may be kept of the quantity used by permitting each compartment to fill before opening its gate. Should at any time too great a quantity be elevated to supply the hoppers, the elevator-gates g^3 g^4 at the hoppers Z Z′ may be closed down, and thus shut off the supply, by operating their connected levers a^5 a^6, which are held, when adjusted, by ratchet-racks Z^2 Z^3, (see Fig. 1,) similar to that shown in detail and heretofore described, and connected to said gates through the medium of the links or rods d d' and levers d^2 d^3, respectively, as shown in Fig. 6.

As a means of supporting the hoppers H and H′, they are secured together by means of their top side portions and jointly supported from the frame by means of the two center posts or boards n n, (shown in Figs. 6 and 11,) and also by means of the elevators, which are secured firmly to the frame A and the hoppers Z Z′ below.

Each of the several gates of the hoppers and elevators is of the same character and arranged to be operated in like manner, as is shown in Fig. 11.

As a means of supporting the water-pipes P^3 P, an arched standard is arranged above cylinder D, and to its top part is clipped the pipe, and as a means of regulating the flow or cutting off the supply of water to the cylinder D^2 a valve V is arranged intersecting the pipes, which is operated for the purpose last described. The arms C of the cylinders are formed as right-angled triangles in cross-section (see Fig. 12) and arranged with their bevel-faces rearward, so as to engage the material in the cylinders first at an acute angle, and as they pass through said material cause it to be advanced rearward by means of sliding or being crowded along by the said bevel-faced arms.

The spiral flanges of the cylinders are for the purpose of assisting in the mixing by carrying the materials partially about with them as they rotate with the cylinders, and when passing the center line, on the horizontal, permit it to fall, and thereby constantly keep taking the material nearest the bottom and turning it over to the top, thus most thoroughly mixing it. The action of the cylinders is the same without the flanges, but the mixing is more rapid and thorough with them. The object in arranging the said flanges spirally is so that their rearwardly-inclining surfaces, when in operation, will assist in forcing the material rearward, and also to equalize the rising and falling of the material during the mixing, for should they be arranged parallel they would gather a like quantity throughout their length, and when brought to a position at or above a horizontal plane with the axis it would all drop off at once and thus cause an intermittent jerking motion, which is wholly overcome by the arrangement shown and described.

In operation the several materials are placed on the machine in their respective hoppers, the engine is set in motion, and by means of which the cylinders are rotated and by means of the belt B′ the elevators are also operated. An operator taking a position on the frame-platform operates the levers and thereby regulates the flow of materials into cylinder D. He also observes the working of the elevators and operates the spout-aprons I to change the course of the cement and sand to either compartment of their hopper, as desired. It is intended that each gate shall be opened just sufficiently to permit a proper quantity of each material to pass into the cylinder and thereby gage the percentage of each material used. During the passage of the materials through cylinder D they are dry, and thus mixed dry; but when in the cylinder D^2 the water-sprays thoroughly saturate every particle during its passage to the apron G, and as a means of forming a break to prevent the flow of water along the trough of said cylinder D^2 it is provided with the annular flanges F^2 F^2 F^2, which retard the flow of water, but are not of sufficient size to prevent the passage of the material. The degree of angle of the cylinders governs to a great measure the speed at which the material will pass through them, and as a means of adjusting them to place them at a proper angle the rear part of the frame is adapted to be adjusted vertically by means of the screws S^2, as before described. Water may be taken from a hydrant or any convenient supply, and the part P^3 of the pipe is intended to be flexible, or hose connecting the supply, and may be of any length for the purpose. After the material has been mixed and formed

as a concrete it is placed on the street, as shown in the rear of the machine in Fig. 1, and as a means of leveling it a drag-rake G′ is attached to the machine through the medium of the eye-straps 8 and connecting-rods 9, (see Fig. 2,) which rake consists of a long curved beam (see Fig. 3) supplied with a series of teeth 12, held by a series of wedges 13, and supported on the street-curb by a carriage consisting of the attached adjustable head-frame G^2 and the two flanged wheels 10 thereof, and at or near the center of the street by a carriage consisting of the frame G^3, clipped to the beam and thereby rendered adjustable longitudinally, and of the wheels 11 of the said frame. The purpose of curving the rake-beam is to adapt it to the proper grade or contour of the street, and by means of holding the teeth 12 by the wedges they are adapted to be adjusted by loosening the wedges to adapt them to various contours.

By reference to Fig. 12 it will be observed that the rear portions of the spiral flanges F′ of cylinder D^2 terminate with a section at much greater degree of angle than the remaining portions, for the purpose of more readily ejecting the concrete from the cylinder, so it will not be carried too high at that place, but slide off the said sections and not be caught by or interfere with the machine-frame.

In places where an engine would be an objection as a means of rotating the cylinders a train of gears, as shown at *y*, Fig. 7, in mesh with the gear B and operated by a pair of hand-cranks, (shown at X X′,) may be used instead of the engine.

In addition to adjusting the incline of the frame and its attached parts, the hand-screws S^2 may be adjusted independently to hold the machine level laterally when upon inclined ground.

As a means of strengthening the frame A, a pair of truss-rods, as shown at Q Q′, Fig. 8, (see also Fig. 1,) are used extending under the center cross-beam and secured to the end beams.

The head-frame G^2 of the drag-rake is slotted and adapted to be vertically adjusted, or may be reversed to accommodate different curbs. (See Figs. 3 and 4.)

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows:

1. In a concrete-mixing machine, the combination, with the portable frame A, provided with the elevators and the hoppers for holding the dry materials from which the concrete compound is made, of the mixing-cylinders D and D^2, respectively provided with the spiral flanges F and F′, and arms C of the shaft S, supported in an inclined position and arranged carrying said cylinders, one in advance of the other, with their facing ends adjacent each other, the stationary apron for conducting material from one cylinder to the other, and the means described for rotating the cylinders, wherein the former cylinder is of less diameter than the latter and arranged to receive the dry materials from the hoppers to dry-mix them and deliver them to the latter cylinder, wherein they are subjected to a water-spray, wet-mixed, and delivered at the exit of said cylinder compounded for use, substantially as set forth.

2. In the concrete-mixing machine described, the combination, with the portable frame A, provided with the elevators, the hoppers for holding the dry materials from which the concrete compound is made, and with the engine for operating the elevating and mixing mechanism, of the shaft S, supported centrally and at each end in suitable bearings, the cylinder D, provided with the arms C and spiral flanges F, carried upon the forward end portion of the shaft, with its forward end adjacent to and adapted to receive the materials from the hoppers, the cylinder D^2, provided with the arms C and flanges F′ F^2, carried upon the rear end portion of the shaft, with its forward end adjacent to and adapted to receive the materials from cylinder D, the stationary apron arranged to conduct the materials from one cylinder to the other, and the apron for catching and holding the concrete compound as it is delivered from the latter cylinder, substantially as and for the purpose specified.

3. In the concrete-mixing machine described, the combination, with the portable frame A and the hoppers thereof for holding and delivering the dry materials from which the concrete compound is made, of the cylinders D and D^2, supported in an inclined position by means of a single line shaft through the medium of the arms C and adapted to rotate jointly with the shaft, wherein the former cylinder is of less diameter than the latter and adapted to receive, dry-mix the materials, and deliver them into the latter cylinder, wherein they are wet-mixed and delivered therefrom compounded for use, substantially as set forth.

4. In the concrete-mixing machine described, the combination, with the hoppers Z Z′ and the elevators J and J′, respectively provided with discharge-spouts, and the reversible aprons I at their upper part and the gates g^3 g^4 at their lower part, of the hoppers H and H′, centrally partitioned and provided with a discharge-gateway and gate in each compartment, the levers for operating said several gates, and the chute E, communicating with each hopper-discharge gateway and arranged to conduct the materials therefrom to the dry-mixing cylinder, substantially as set forth.

5. In the concrete-mixing machine described, the combination of the frame A, provided with the pivoted forward truck having the rear-extending arm R^5, and with the rear vertical boxes 4 4, of the rolls R′, provided with the boxes 3, arranged telescoping said frame-boxes, the hand-screws S^2, fixed in the

frame and arranged bearing against said roll-boxes, the drums 6 and 7, boxed to the frame, one of which is provided with a crank for rotating it, and the rope L, arranged about said drums and connecting the extending end of the arm of said forward truck, substantially as and for the purpose specified.

6. In the concrete-mixing machine described, the wet-mixing cylinder D^2 thereof provided with the spiral flanges F′, terminating with a greater degree of angle at their rear portion than at other portions of their length, and with the annular flanges F^2, substantially as and for the purpose specified.

7. In combination with the portable concrete-mixing machine described a grading drag or rake provided with supporting and traveling carriages and connected to advance with the machine, substantially as and for the purpose specified.

8. In the concrete-mixing machine described, the combination, with the hopper and elevator-gate-operating levers, of the ratchet-racks, the spring-bars, and the gage-stops thereof, constructed and arranged substantially as and for the purpose specified.

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