No. 840,067. PATENTED JAN. 1, 1907.

W. J. JUDD.

MACHINE FOR MIXING CONCRETE AND THE LIKE.

APPLICATION FILED SEPT. 15, 1902.

9 SHEETS—SHEET 1.

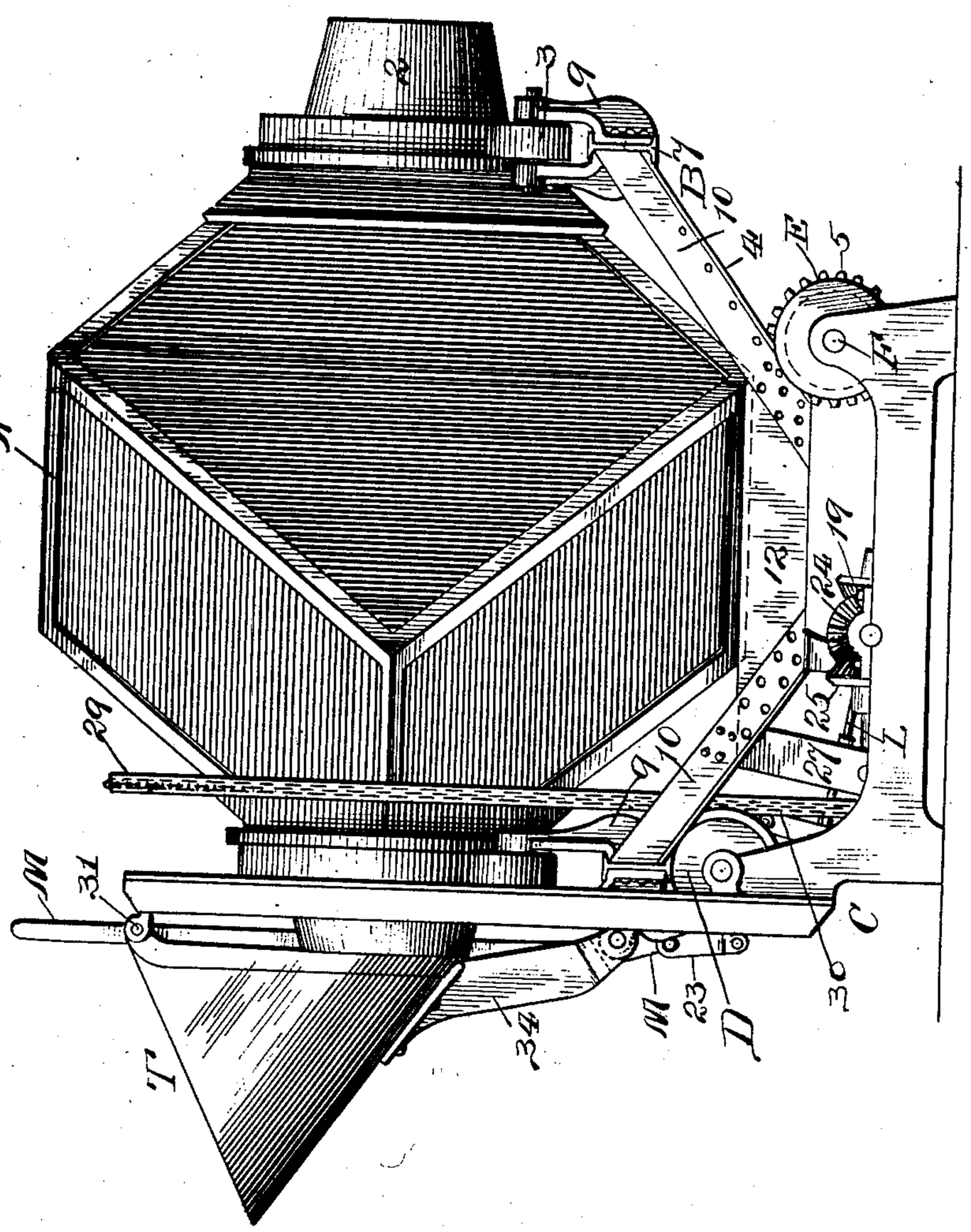

Fig. 1.

Witnesses:
J. B. Weir
Fred W. Lobitzhead

Inventor:
William J. Judd
by Chas. L. Page
Atty.

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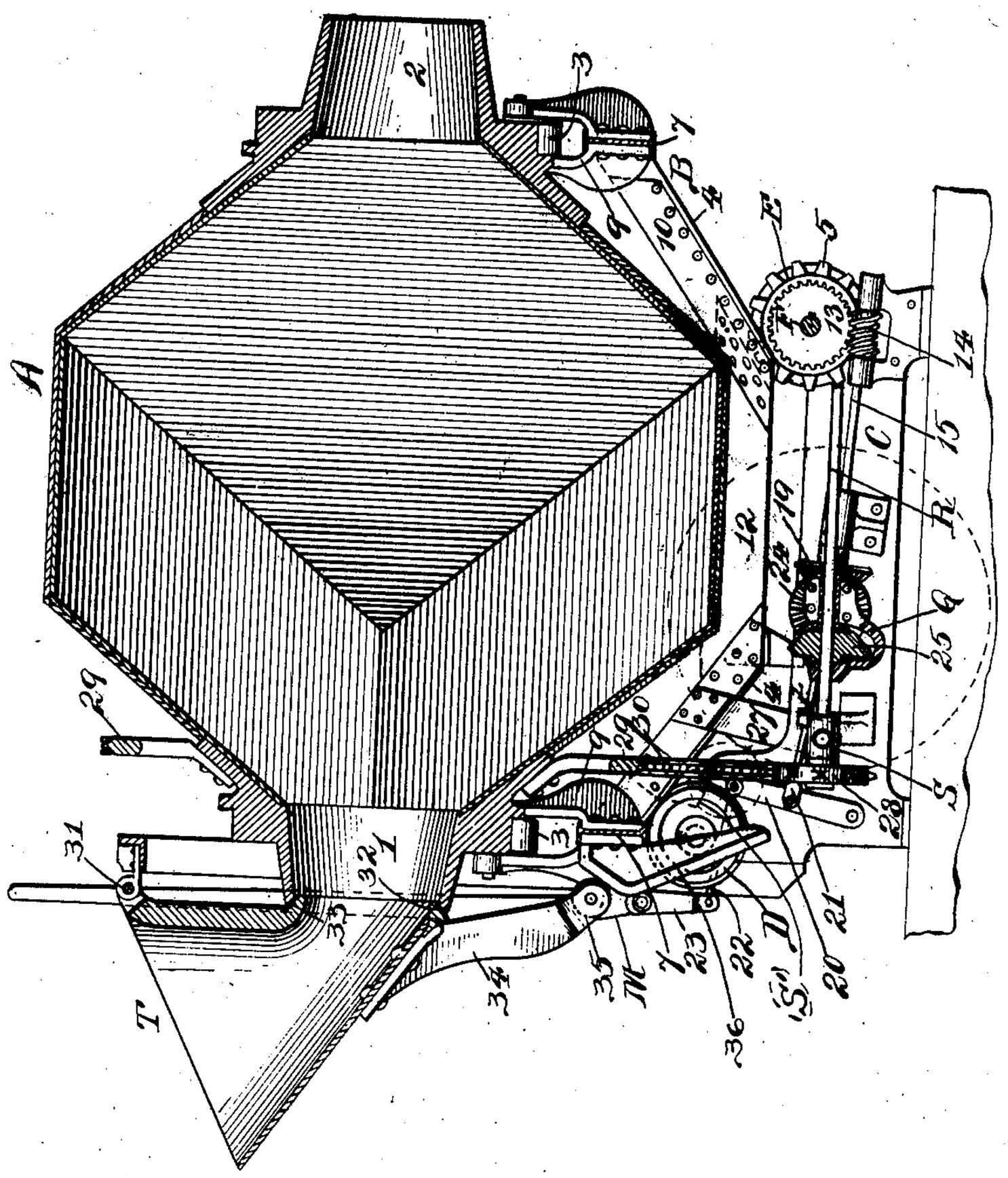
9 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
J. B. Weir
Louis M. V. Whitehead

Inventor:
William J. Judd
By Chas. L. Page
Atty.

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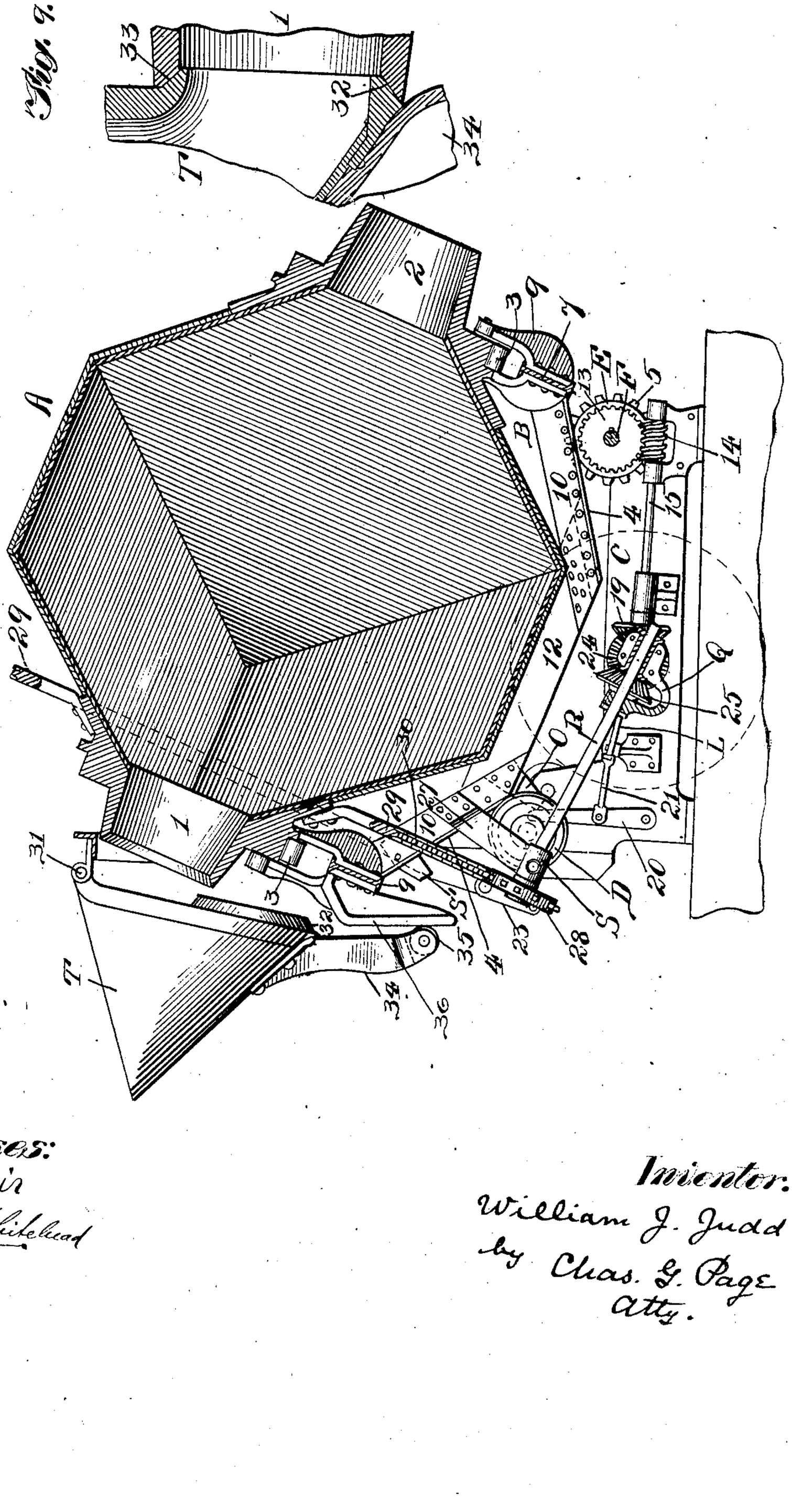
9 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
J. B. Weir
Louis H. Whitehead

Inventor:
William J. Judd
by Chas. G. Page
Atty.

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9 SHEETS—SHEET 4.

Fig. 4.

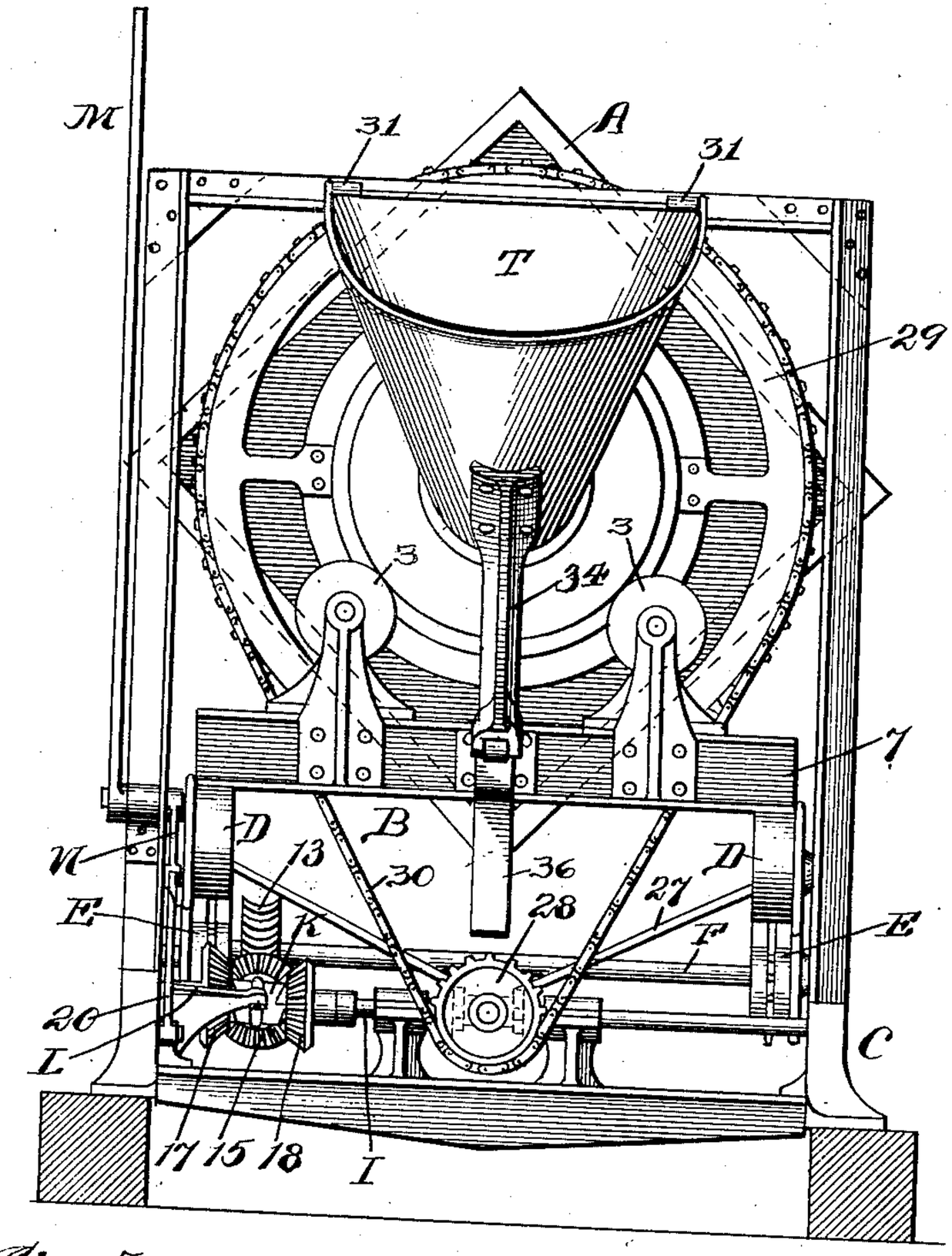
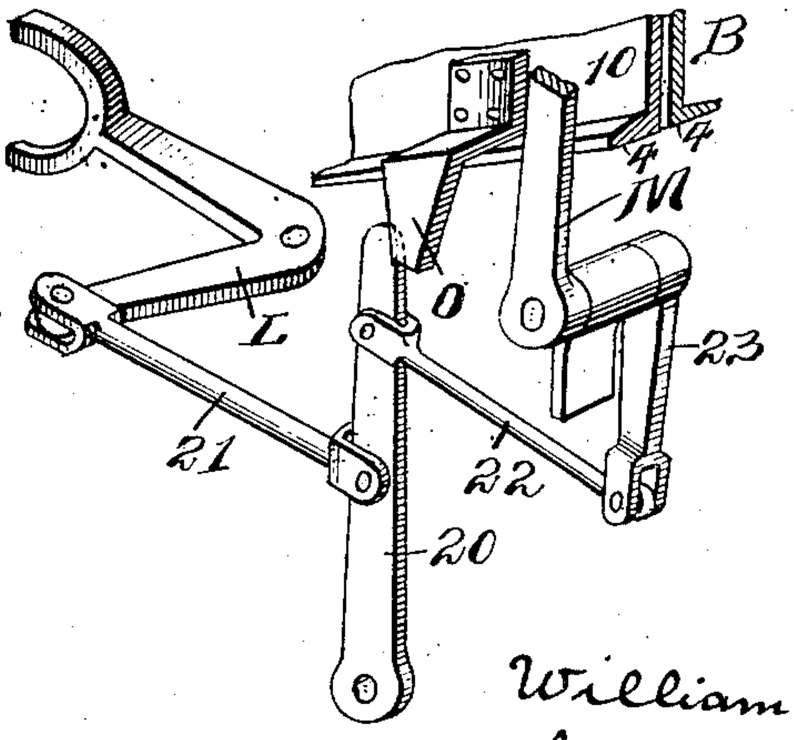


Fig. 5



Witnesses:
J. B. Weir
Louis W. Whitehead

Inventor:
William J. Judd
by Chas. G. Page
Atty.

No. 840,067.

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9 SHEETS—SHEET 5.

Fig. 6.

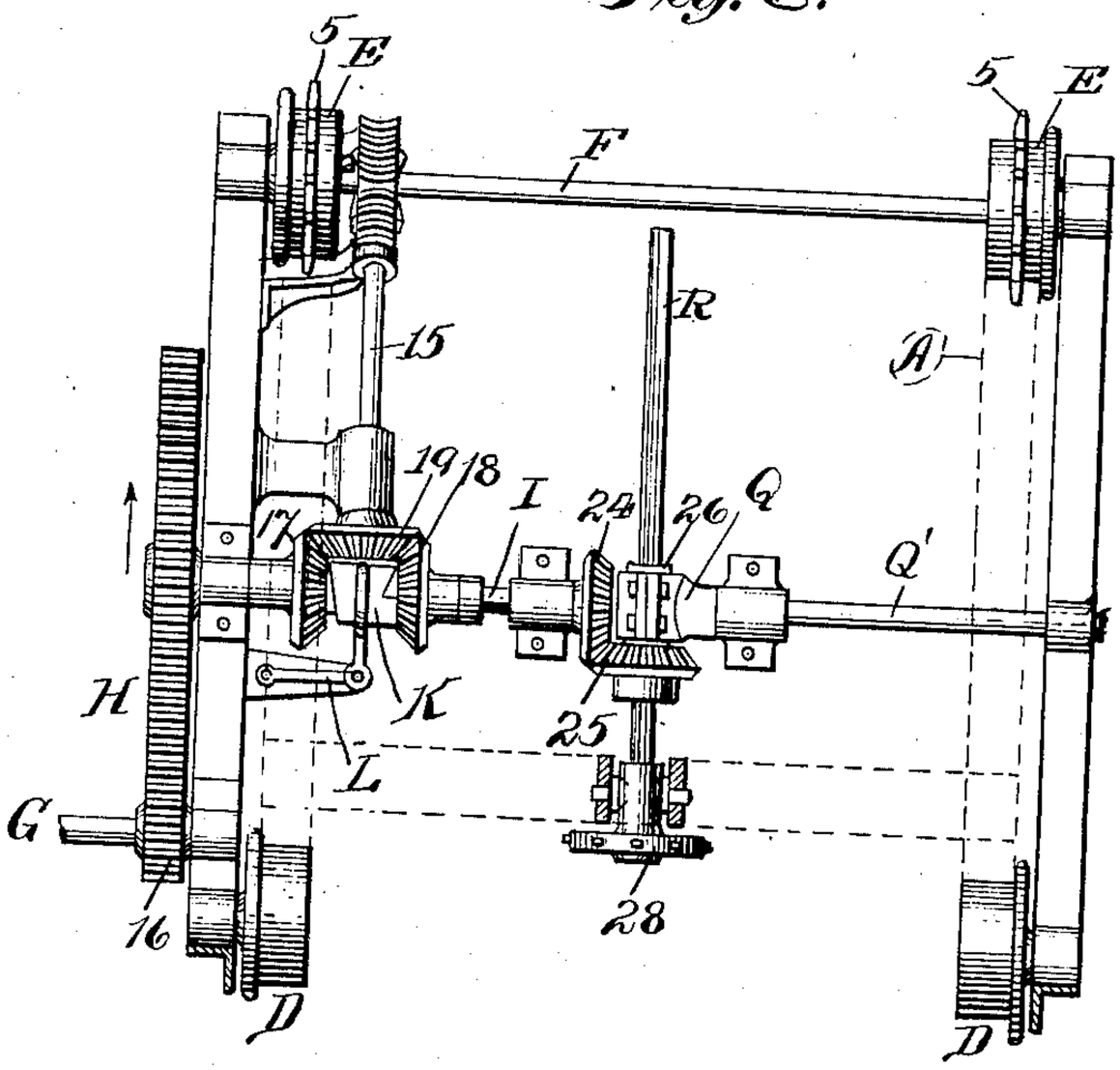

Fig. 7

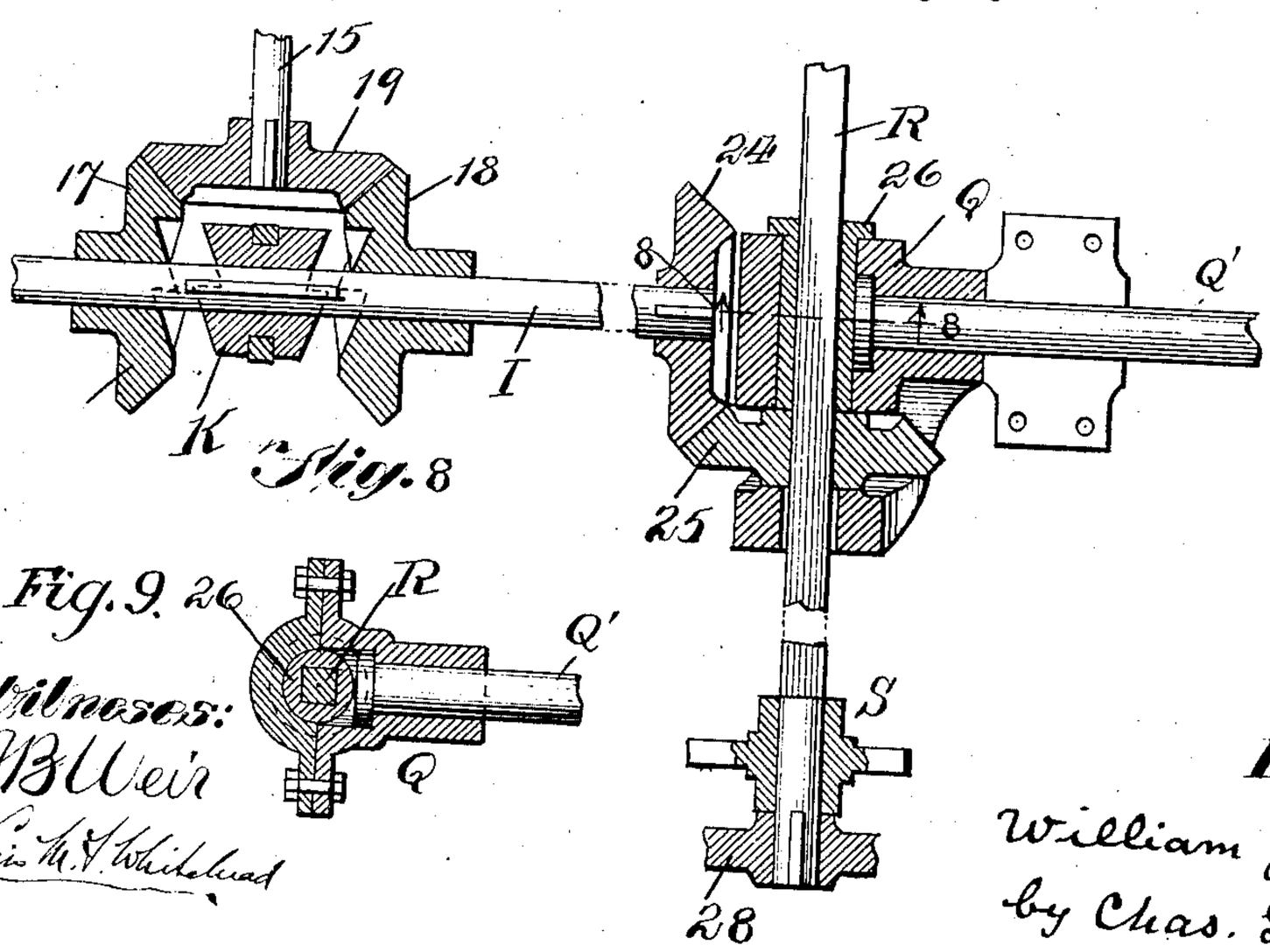

Fig. 8

Fig. 9.

Witnesses:
J. B. Weir
Louis M. A. Whitehead

Inventor.
William J. Judd
by Chas. L. Page
Atty.

No. 840,067. PATENTED JAN. 1, 1907.

W. J. JUDD.

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9 SHEETS—SHEET 6.

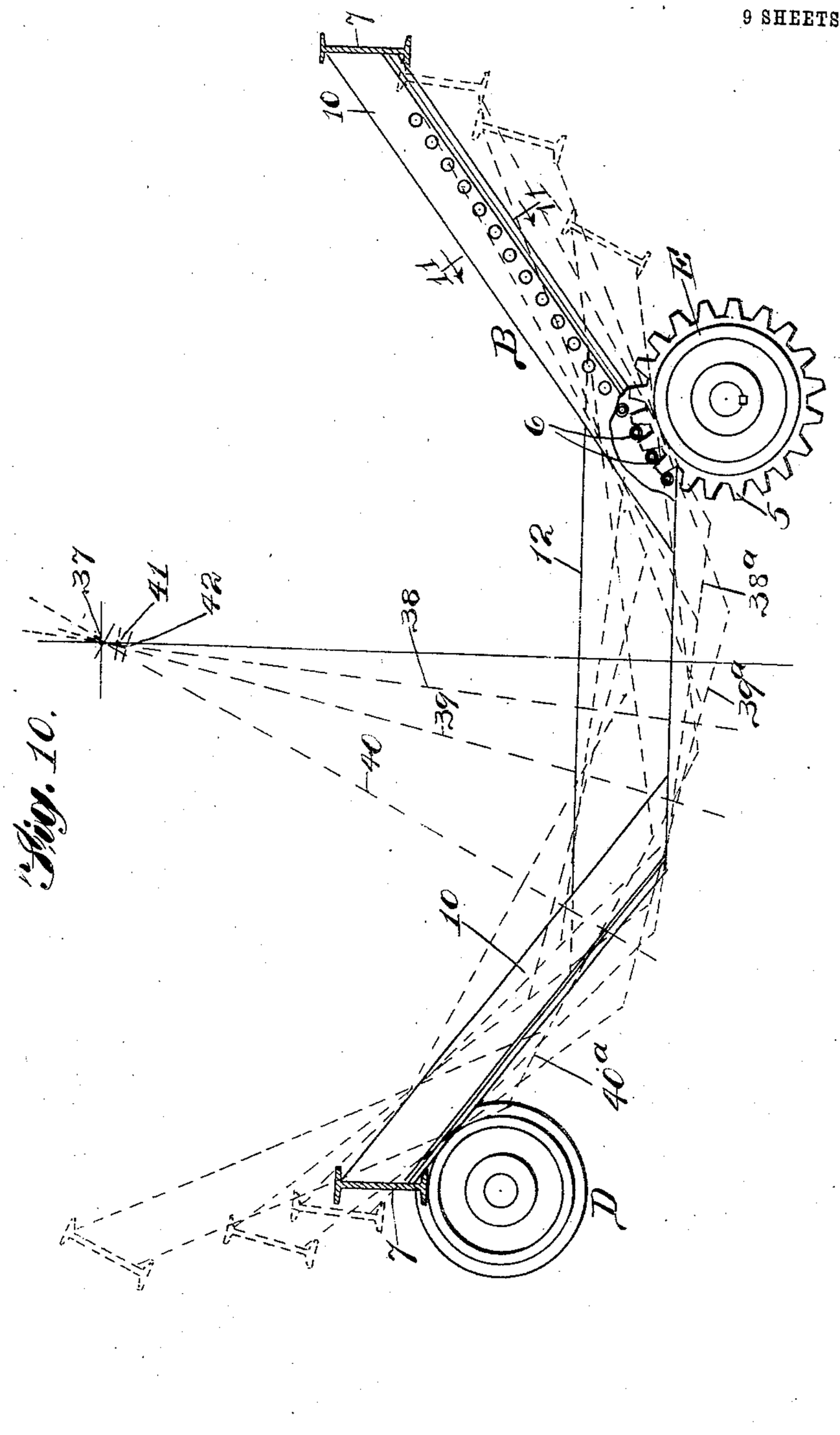

Fig. 10.

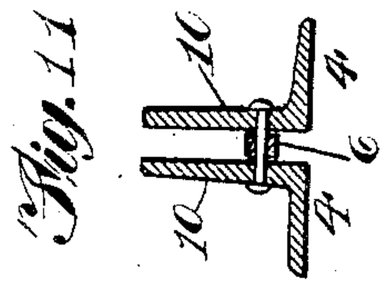

Fig. 11.

Witnesses:
J. B. Weir
Louis W. Whitehead

Inventor:
William J. Judd
by Chas. E. Page
Atty.

No. 840,067. PATENTED JAN. 1, 1907.

W. J. JUDD.

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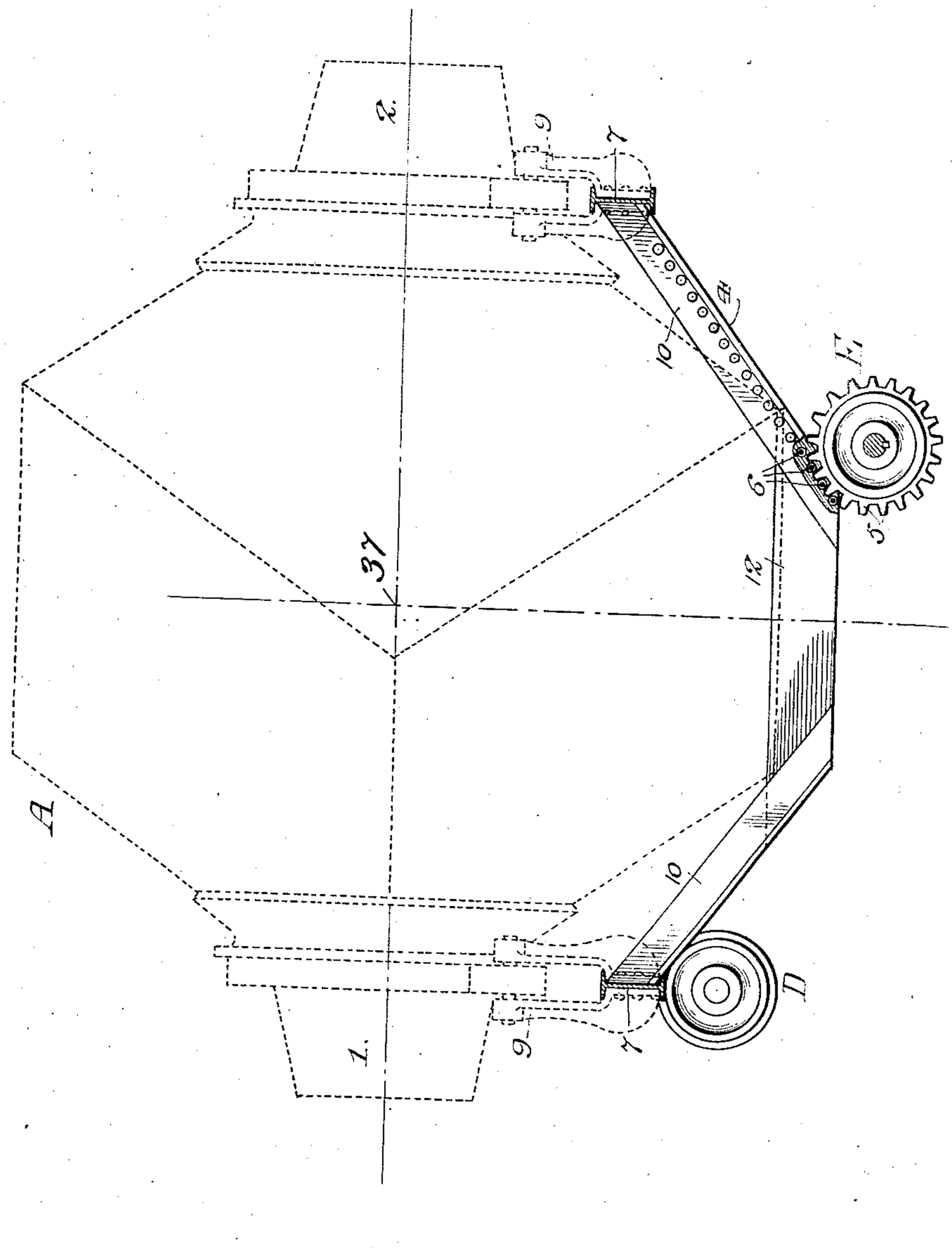
9 SHEETS—SHEET 7.

FIG. 12.



Witnesses:-
Louis M. Whitehead
Ottilie C. Freiberg

Inventor:
William J. Judd
by Chas. L. Page
Atty.

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W. J. JUDD.

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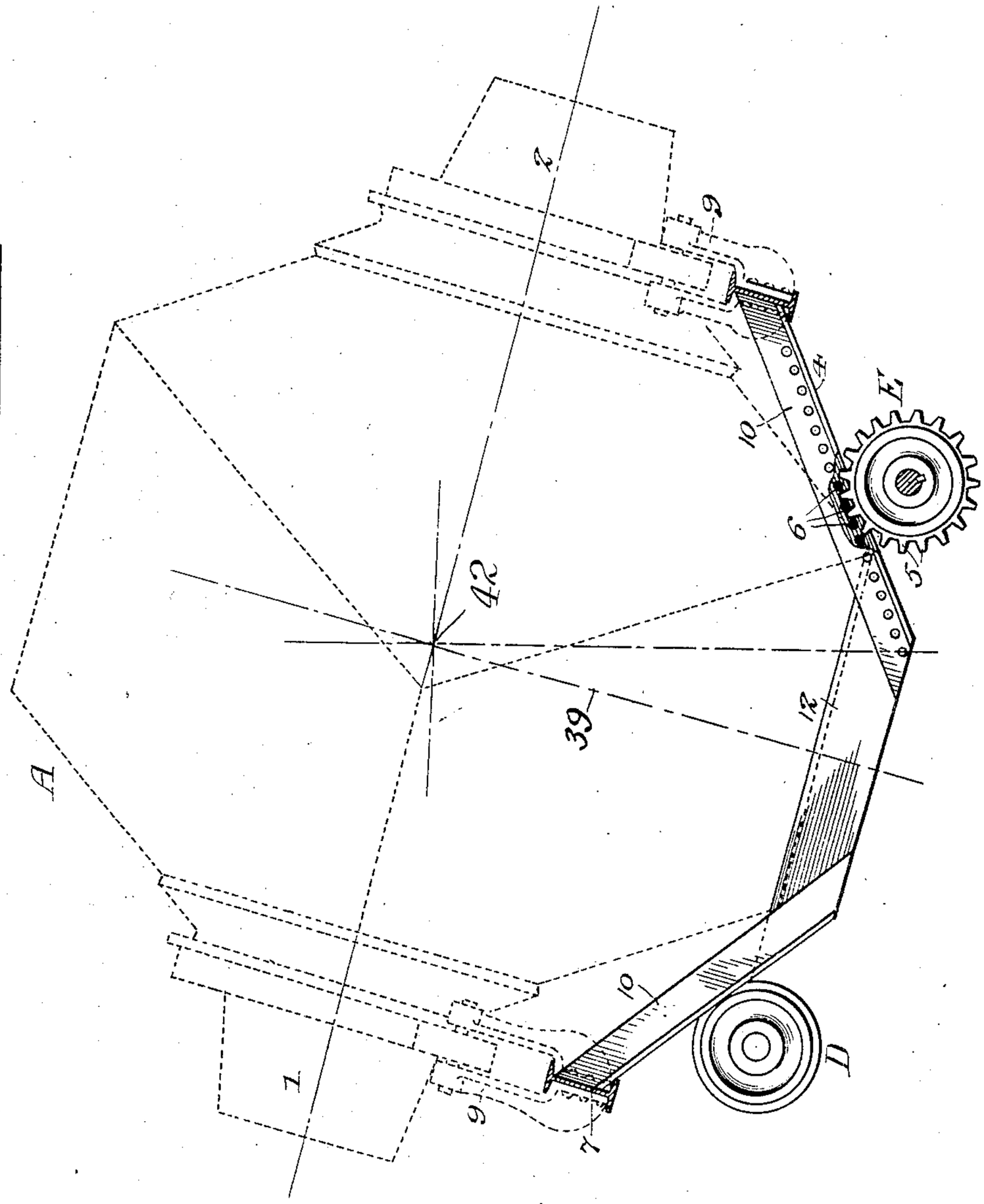
9 SHEETS—SHEET 8.

FIG. 15.



Witnesses:

Louis M. F. Whitehead

Ottilie C. Freiberg

Inventor:

William J. Judd

by Chas. L. Page

atty.

No. 840,067. PATENTED JAN. 1, 1907.

W. J. JUDD.

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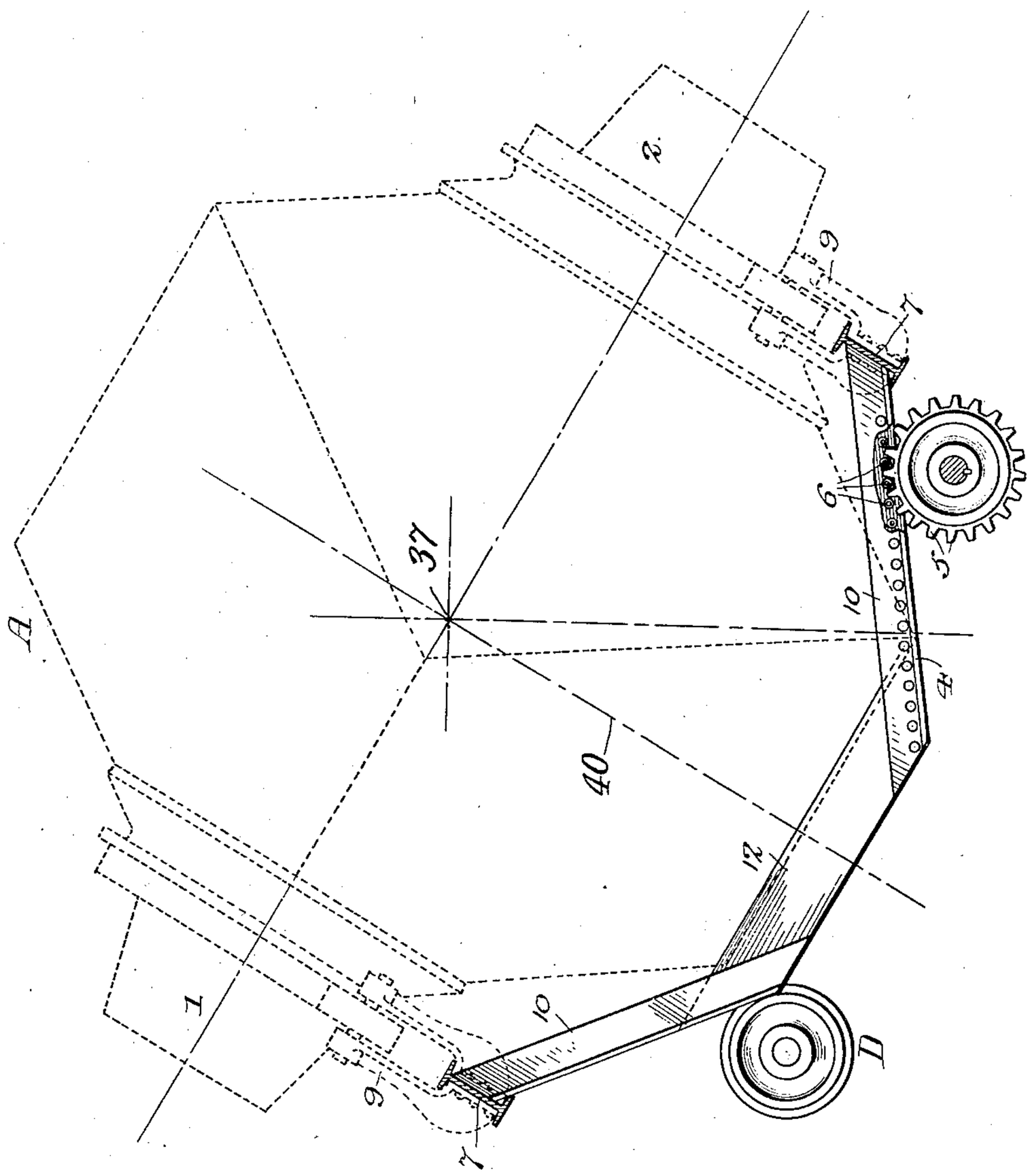
9 SHEETS—SHEET 9.

Fig. 14.



Witnesses:-
Louis M. T. Whitehead
Ottilie C. Freiberg

Inventor
William J. Judd
by Chas. L. Page
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM J. JUDD, OF NEW YORK, N. Y., ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

MACHINE FOR MIXING CONCRETE AND THE LIKE.

No. 840,067. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed September 15, 1902. Serial No. 123,467.

To all whom it may concern:

Be it known that I, WILLIAM J. JUDD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Machines for Mixing Concrete and the Like, of which the following is a specification.

My invention relates to machines for mixing up concrete, mortar, and the like, and is more particularly designed as an improvement upon the mixing-machine described in Letters Patent of the United States No. 705,676, granted to me July 29, 1902.

In the machine described in said Letters Patent the rotary mixing-receptacle is mounted upon an oscillatory or rocker support having a curved bearing portion supported by antifriction-rolls.

Objects of my invention are to lessen the power required in dumping the contents of the mixing-receptacle, to permit the weight of the contents of the rotary mixing-receptacle to operate as counterbalance during the operation of dumping, to provide a construction of rocker-support which can be more readily made, and to provide certain novel and improved matters of combination and detail.

In the accompanying drawings, Figure 1 is a side elevation of a mixing-machine embodying my improvements. Fig. 2 is a longitudinal central section through the machine on a vertical plane, the mixing-receptacle being in mixing position. Fig. 3 is a like section with the mixing-receptacle in position for dumping. Fig. 4 is an end elevation of the machine. Fig. 5 is a detail perspective view of the automatic lever movements for controlling the charging and discharging positions of the mixing-receptacle. Fig. 6 is a top plan view of the mechanism or machinery for controlling the various movements of the box. Fig. 7 is an enlarged detail section of the gearing employed for rotating the mixing-receptacle. Fig. 8 is a section on line 8 8 in Fig. 7. Fig. 9 is a detail view showing in section a portion of the hopper and a portion of the hollow journal forming an opening for the mixing-receptacle. Fig. 10 is a diagrammatic view illustrating the movement of the rocker-support for the mixing-receptacle. Fig. 11 is a section on line 11 11 in Fig. 10. Figs. 12, 13, and 14 are diagrammatic views further illustrating the movements illustrated by Fig. 10.

A indicates the rotary mixing-receptacle, and B denotes the rocker-support upon which the rotary mixing-receptacle is mounted. The mixing-receptacle illustrated is constructed with hollow journals 1 and 2, respectively for charging and discharging, and is supported upon antifriction-rolls 3, which are carried by the rocker-support B. The rocker-support B has its bearing portion formed by the downwardly-converging straight or plane faces of bars or angle-irons 4 4, with transverse appropriate rotary supports or bearings mounted upon the stationary bed-frame C, the effect of such arrangement being that the rocker-support in place of having a curved bearing, as in said patent, has its bearing formed by downwardly-converging plane-face portions, thereby forming an angular rocker-support. This angular rocker-support bears upon one or more antifriction-rolls D at one end of the stationary bed-frame C, and at the opposite end of said frame C it bears upon rolls E, having sprocket-teeth 5, which engage racks 6, Figs. 10 and 11, on the rocker-support as a means for operating the latter.

In the construction shown the rocker-support consists of a frame having its ends formed by I-beams or channel-irons 7, provided with brackets or bearings 9 for the antifriction-rolls 3, as best shown in Fig. 4. These end bars or beams 7 are secured to channel-bars 10, arranged to provide the bearing-faces 4, hereinbefore referred to. These angle-irons 10 are at one end portion of the rocker-support preferably arranged in pairs, as in Fig. 11, and bolted together so as to leave between each pair of such bars or beams a space sufficient for a rack 6, Figs. 10 and 11, and in this way each pair of these bars will form two plane bearing-faces, arranged to bear upon bearing portions of a sprocket wheel or roll E at opposite sides of the teeth 5 with which such roll or wheel is provided. The corresponding bars 10 at the opposite end portion of the rocker-support may also be secured together in pairs, if desired, or they may be arranged as single bars adapted to bear upon the antifriction-rolls D. In the construction shown, however, the bars 10 are all arranged in pairs and rigidly connected together at their lower ends by short

longitudinal bars 12, having their ends fitted in the spaces between the bars and bolted thereto. The rocker-support B is operated by the wheels E, forming pinions which engage the racks on the rocker-support. The wheels or pinions E are secured upon a rotary shaft F, which is supported upon the stationary bed-frame and provided with a worm-wheel 13, Fig. 3.

The worm-wheel 13 is fixed upon the rotary shaft F and is engaged and operated by a worm 14 on a rotary shaft 15, which is supported upon a stationary bed-frame. The shaft 15 is connected with and disconnected from the driving power by a clutch device whereby it can be operated as may be desired. As an example of such arrangement the main driving-shaft G, Fig. 6, is provided with a pinion 16, secured thereon and arranged to engage a gear-wheel H, which is in turn secured upon a rotary shaft I. The gear H and the shaft I may be driven continuously in one direction—for example, in the direction indicated by the arrow. A pair of bevel-gears 17 and 18 are loosely arranged upon a shaft I and positioned to mesh with a bevel-gear 19, which is secured upon the rotary shaft 15.

A clutch K is keyed to slide along and rotate with the shaft I and is arranged between the gears 17 and 18, which are adapted to also form clutch members. By this arrangement the clutch can be operated to apply the driving power to the gears 17 and 18 in alternation, whereby the shaft 15 can be alternately driven in opposite directions for the purpose of reciprocating the rocker-support and also whereby power can be disconnected from the shaft 15 by causing the clutch member K to assume a position midway of and free from the gears 17 and 18. The clutch member K is operated by a bell-crank L. (See also Figs. 4 and 5.) This bell-crank L is operated from a hand-lever M through the medium of suitable power-transmitting connection—as, for example, one arm of the bell-crank L is connected with a vibratory lever-arm 20 by connecting-rod 21, and said lever-arm 20 is by a connecting-rod 22, Fig. 5, connected with a pendent arm 23 of the hand-lever M.

As hereinbefore described, the driving power is disconnected from the rotary worm-shaft 15 when the clutch member K is in position midway of the two gears 17 and 18, and when the driving power is thus disconnected from said shaft the vibratory lever M is in its middle position—that is to say, it is in position midway of the two extremes of its permissible swinging movement. When it is desired to tilt the frame or support whereon the mixing-receptacle is mounted, an attendant can manually swing the lever M in one or the other direction, according to the direction in which it is desired to tilt the mixing-receptacle support, it being seen that when the lever M is swung from its middle position to a suitable extent in one direction the clutch member K, which is splined on rotary shaft I, will be shifted so as to engage the clutch-gear 17 and that when said lever is swung from its middle position to a suitable extent in an opposite direction the said clutch member K will be shifted so as to engage the clutch-gear 18. When, therefore, the clutch member K engages clutch-gear 17, the worm-shaft 15 will be revolved, and thereby cause the mixing-receptacle support to tilt in one direction, and when such clutch-member K engages clutch-gear 18 the worm-shaft 15 will be revolved in an opposite direction, and thereby cause the mixing-receptacle support to tilt in a direction reverse to that in which it was caused to tilt during the engagement of clutch member K with the clutch-gear 17. When, therefore, the materials within the mixing-receptacle have been properly mixed, the attendant can by manually operating the lever M so apply the operating power to the tilting mechanism as to cause the mixing-receptacle support to tilt from the position shown in Fig. 2 to the discharging position in Fig. 3, and when the tilting support reaches the position shown in Fig. 3 the attendant can disconnect the operating power from the tilting mechanism by simply shifting lever M in direction and to an extent to cause clutch member K to again assume a position midway of the clutch-gears 17 and 18.

It is also obvious that after the contents of the mixing-receptacle has been discharged the attendant can swing lever M in direction for so applying the power to the tilting mechanism as to cause the mixing-receptacle support to tilt back from the position shown in Fig. 3 to the position shown in Fig. 1 and that when such tilting support arrives at the position shown in Fig. 2 the attendant can again move the lever M, so as to cause clutch member K to assume its middle position. It will also be seen that while the mixing-receptacle support is tilting from the position shown in Fig. 2 to the position shown in Fig. 3 the attendant can at any instant disconnect the operating power from the tilting mechanism by simply shifting the lever M in direction and to an extent to cause clutch member K to assume a position midway of the two clutch-gears 17 and 18, and when the power is thus disconnected the tilting movement of the mixing-receptacle support will terminate. This arrestment of the tilting movement of the mixing-receptacle support is sometimes desirable—for example, when it is necessary to restrict the discharge—and in such case the power can be disconnected from the tilting mechanism during the movement of the mixing-receptacle support from the position shown in Fig. 2 toward the position shown in Fig. 3, but before it has reached

the position shown in the last-named figure. In order, however, to relieve the attendant from manually operating lever M for the purpose of disconnecting the power from the tilting mechanism at each extreme of the tilting movement of the mixing-receptacle support, the latter is provided with two stops or tappets O and S′, Fig. 3, one for engaging and shifting lever M when the mixing-receptacle support is tilting one way and the other for engaging and reversely shifting lever M when the mixing-receptacle support is tilting the other way, it being observed, however, that while these tappets are timed for effecting disconnection of the driving power from the tilting mechanism connection of the driving power with the tilting mechanism is effected by manually operating the lever M. When, for example, it is desired to tilt the mixing-receptacle from the charging position (shown in Fig. 2) to the discharging position, (shown in Fig. 3,) the attendant will shift lever M from its middle position into a position to cause connection between the driving power and the tilting mechanism, and thereupon the mixing-receptacle support will tilt toward the position shown in Fig. 3 and so continue to tilt until tappet O has engaged the lever M and moved the latter back into its middle position, thereby moving clutch member K into its middle position, and hence disconnecting the driving power from the tilting mechanism, and the driving power being thus disconnected the action of the tilting mechanism will cease and the mixing-receptacle support will stop in the position shown in Fig. 3. In order to cause the converse of such action after the mixing-receptacle has discharged its contents, the attendant will again shift the lever M from its middle position, so as to again shift the clutch member K, and thereby again apply the driving power to the tilting mechanism, and thereupon the mixing-receptacle support will tilt from the position shown in Fig. 3 toward the position shown in Fig. 2, and during such movement the stop or tappet S′ will engage and shift lever M into its middle position, thereby again bringing clutch member K into its middle position, so as to disconnect the driving power from the tilting mechanism.

As a means for revolving the mixing-receptacle the rotary shaft I, Fig. 6, is provided with a bevel-gear 24, which is secured thereto. The bevel-gear 24 engages a bevel-gear 25, which is arranged upon a rocking bearing Q. The said rocking or oscillatory bearing Q is supported by a rod or shaft Q′, which is in turn supported by suitable bearings. A transversely square or polygonal counter-shaft R is fitted to slide through a correspondingly square or polygonal opening in the gear 25, said counter-shaft being also fitted to slide through an internally square or polygonal sleeve 26, Fig. 7, which is arranged to turn in the rocking bearing Q. The counter-shaft R has one end portion fitted to turn in a bearing S, which said bearing is attached to the rocker-frame by arms 27, Figs. 2 and 3. At a point beyond the bearing S the counter-shaft R is gear-connected with the rotary mixing-receptacle.

In the construction shown the counter-shaft R is provided with a sprocket 28, which is connected with a sprocket 29 on the rotary mixing-receptacle by a sprocket-chain 30. In place of this form of power-transmitting gearing I may, however, employ any known driving mechanism suitable for rotating the mixing-receptacle.

The counter-shaft R tilts in unison with the tilting movement of the rocker-support B and has an end movement through the rocking bearing Q, the direction of such end movement being determined by the direction in which the rocker-support B is tilted, and by reason of the gear 25, which is connected with the main driving-shaft, as hereinbefore described, the mixing-receptacle can be continuously rotated.

The hopper T is hinged at 31 upon an upwardly-extending portion of the stationary frame C, Fig. 1, and provided with an externally-beveled flange or neck 32 (see Fig. 9) around its discharge-orifice. When the mixing-receptacle is in position to receive from the hopper, the beveled flange or neck 32 of the latter fits in the outer end of the hollow journal 1 of the mixing-receptacle, and in order to provide a suitably-closed joint and to prevent leak the outer end of the hollow journal 1 has an inner bevel, as at 33, Fig. 9.

In order to uncouple the hopper from the mixing-receptacle when the latter is tilted in a direction to dump its contents, the hopper is provided with an arm or projection 34, carrying an antifriction-roll 35, and the rocker-frame is provided with a cam projection 36, which engages the antifriction-roll 35 and forces the swinging hopper in a direction away from the rotary mixing-receptacle when the latter is tilted from the position shown in Figs. 1 and 2 in a direction to bring it into the position shown in Fig. 3.

The rotary mixing-receptacle revolves about a tilting axis and tilts about a horizontal axis which is transverse to its axis of revolution. During the oscillatory or rocking action of the rocker-support B the axis about which the mixing-receptacle tilts does not remain stationary, but, to the contrary, shifts its position and is alternately raised and lowered.

In order to explain this feature, reference is made to Fig. 10, in which 37 denotes the position of the axis about which the mixing-receptacle tilts when the mixing-receptacle is in the mixing or receiving position shown in Figs. 1 and 2. When the mixing-receptacle is tilted from the position shown in Figs. 1

and 2 to the position shown in Fig. 3, the axis or center about which it tilts first drops and then rises. This movement may be conveniently explained in the following way:

The full lines shown in Fig. 10 indicate the rocker-support in mixing position. When the mixing is completed and the receptacle is ready to be discharged, the rocker-support is moved in a direction to bring the receptacle in position for dumping. During the first portion of this movement the receptacle and rocker first reach the position indicated by dotted lines 38 and 38ª and then the position indicated by dotted lines 39 and 39ª, and at the concluding portion of such movement the mixing-receptacle and rocker arrive at the position indicated by dotted lines 40 and 40ª.

It will be seen that in moving from the position indicated in full lines to the position indicated by dotted lines 38 and 38ª the axis or center 37 will drop to the point 41, and that in further moving to the position indicated by dotted lines 39 and 39ª the axis or center 37 will drop to the point 42, and that after reaching this last-mentioned position the mixing-receptacle and rocker-support in reaching the position indicated by dotted lines 40 and 40ª will shift, so as to again raise the axis or center from point 42 up to the point 37. By thus dropping the center or axis about which the receptacle tilts from what might be termed its "natural center" the load or contents of the mixing-receptacle will materially assist the operation of dumping, and where the weight of the contents of the mixing-receptacle reaches several thousand pounds this matter of facilitating the dumping is important. This action of the mixing-receptacle and its rocker-support is further illustrated by Figs. 12, 13, and 14, which illustrate three of the positions hereinbefore referred to. In Fig. 12 the reference-numeral 37 indicates the axis or center hereinbefore described in connection with Fig. 10, the mixing-receptacle being understood to be in position for mixing. In Fig. 13 the mixing-receptacle is partially tilted for the purpose of discharge, and the center or transverse axis 37 is now understood to have dropped to the point 42, the dotted line 39 in said Fig. 13 corresponding with the dotted line 39 in Fig. 10, it being here observed that I do not regard it as necessary to illustrate the position of the mixing-receptacle and rocker intermediate of Figs. 12 and 13, for the reason that such position is explained in connection with Fig. 10 and is of minor importance. In Fig. 13 point 42 corresponds with point 42 in Fig. 10, in which dotted line 39 also corresponds with dotted line 39 in Fig. 13. In Fig. 14 the mixing-receptacle and its rocker-support are tilted to the limit for the purpose of discharge, and the axis or center about which such tilting movement is effected has now risen to the point 37, which corresponds with point 37 in Fig. 10, it being also observed that dotted line 40 in Fig. 14 corresponds with dotted line 14 in Fig. 10.

When the oscillatory support is moved in a direction to bring the mixing-receptacle into position for dumping or discharging its contents, and thereby shift the axis of rotation of the mixing-receptacle from a horizontal or substantially horizontal position to an inclined position, more power will be required to effect the first than the second half of such movement where the axis about which the support for the mixing-receptacle oscillates is fixed, as in Patent No. 705,676. With the construction herein involved, however, this excess of power required to effect the first half or portion of the dumping movement in the machine of said patent is materially lessened and a decided advantage thereby secured, particularly where the weight of materials within the mixing-receptacle approximates to a couple of thousand pounds or more.

When my present machine is operated for dumping, the load will be falling during the first portion of the dumping movement, thereby lessening to a considerable and important extent the power required. During the last half of such movement, the axis about which the mixing-receptacle will rise and such movement would naturally involve the need of more power to effect such portion of the movement were it not for the fact that the load has been thrown so far forward that it will automatically act as a counterbalance. In this way, the effect of the entire dumping movement is to equalize, as well as lessen, the power required for dumping.

In the construction of mixing-machine illustrated the rocker-support, which rocks or oscillates about a horizontal axis transverse to the axis of revolution of the rotary mixing-receptacle, is constructed with oppositely-arranged straight bearing portions converging downwardly and inclined as to the axis of revolution of the mixing-receptacle. These oppositely-arranged straight bearing portions, formed by bars, racks, or the like, are respectively forward and rearward of a line perpendicular to the axis of the rotary mixing-receptacle and midway of the ends of the latter, and hence, in effect, the rocker may be said to have its end portions formed or provided with such straight or plane bearing portions. The straight or plane bearing portions thus described are supported at points forward and in rear of its middle portion by bearings—such as rolls, pinion-wheels, or the like—and by such arrangement the eccentric oscillatory or rocking movement of the rocker-support is obviously permitted. The straight work involved in the rocker illustrated can be made more readily than curved work.

I do not confine myself to any particular

form of mixing-receptacle, and in place of having a mixing-receptacle to receive at one end and discharge at the opposite end it may have a single opening adapted for both receiving and discharging, as shown and described in my application for Letters Patent filed July 25, 1902, serially numbered 117,019.

What I claim as my invention is—

1. In a machine for mixing concrete and the like, a rotary mixing-receptacle; a rocker-support for the rotary mixing-receptacle arranged to oscillate about an axis transverse to the axis of revolution of the mixing-receptacle; and bearings for the rocker-support at points forward and rearward of the middle part of the latter; the rocker-support being constructed with a plane or straight bearing portion inclined as to the axis of revolution of the rotary mixing-receptacle and arranged to traverse one of said bearings.

2. In a machine for mixing concrete and the like, a rotary mixing-receptacle; a rocker-support for the rotary mixing-receptacle arranged to oscillate about an axis transverse to the axis of revolution of the mixing-receptacle and having bearing portions formed along downwardly-converging planes; and bearings which are engaged and traversed by said bearing portions of the rocker-frame.

3. In a machine for mixing concrete and the like, a rotary mixing-receptacle; a rocker-support for the rotary mixing-receptacle arranged to oscillate about an axis transverse to the axis about which the mixing-receptacle revolves; a pinion for operating the rocker-support, and annular bearings at opposite sides of the teeth of the pinion; the rocker-support being constructed with a rack engaged by the teeth of said pinion, and having bearing-faces at opposite sides of the rack and engaging upon the annular bearings at opposite sides of the pinion-teeth.

4. In a machine for mixing concrete and the like, a rotary mixing-receptacle; a rocker-support for the rotary mixing-receptacle arranged to oscillate about an axis transverse to the axis about which the mixing-receptacle revolves; a pinion for operating the rocker-support, and annular bearings at opposite sides of the teeth of the pinion; the rocker-support being constructed with a rack engaged by the teeth of the pinion, and a pair of bars between which the rack is secured, and said bars being provided with straight bearing-faces arranged to engage upon the annular bearings at opposite sides of the pinion-teeth.

5. In a machine for mixing concrete, and the like, a rotary mixing-receptacle having a hollow journal forming an opening therefor; a swinging hopper supported independently of the mixing-receptacle and having its discharge opening through a neck adapted to couple with the said hollow journal when the mixing-receptacle is in position to receive from the hopper; an arm projecting downwardly from the hopper, a projection on the oscillatory hopper-support, and an antifriction-roll interposed between the said arm and projection and supported upon one of them.

6. In a mixing-machine for concrete and the like, a rotary mixing-receptacle and a tilting support therefor; mechanism for actuating the tilting support for the rotary mixing-receptacle; a clutch device for applying driving power to the mechanism for actuating the said tilting support; a clutch-shifting device for operating the clutch device; and stops or projections secured to the frame of the tilting support for the rotary mixing-receptacle, said stops or projections being arranged for alternately engaging and operating the clutch-shifting device for the purpose set forth.

WILLIAM J. JUDD.

Witnesses:
A. F. NORRIS,
CHAS. SAXE.