(No Model.) 4 Sheets—Sheet 1.

G. & A. RAYMOND.

HORSE POWER.

No. 353,967. Patented Dec. 7, 1886.

Fig. 6.

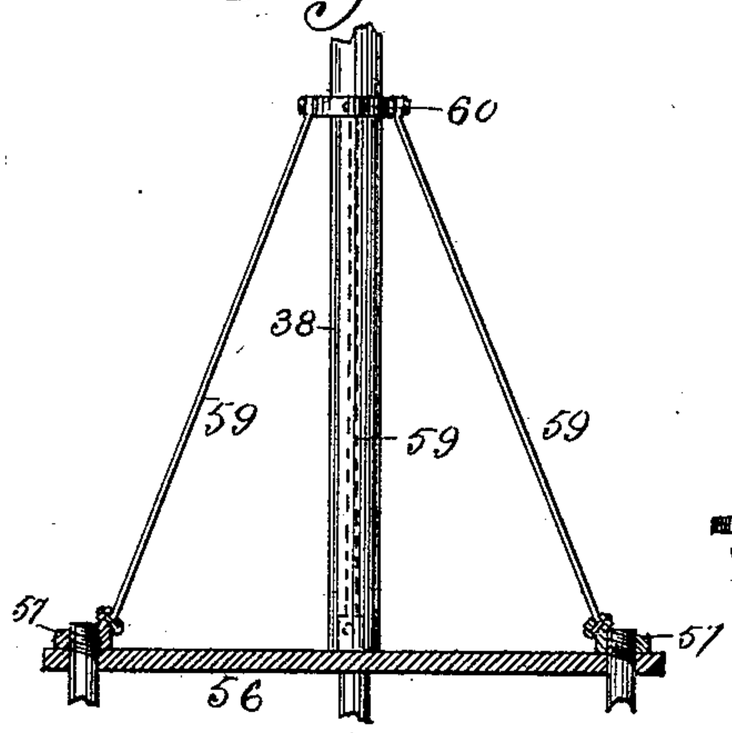
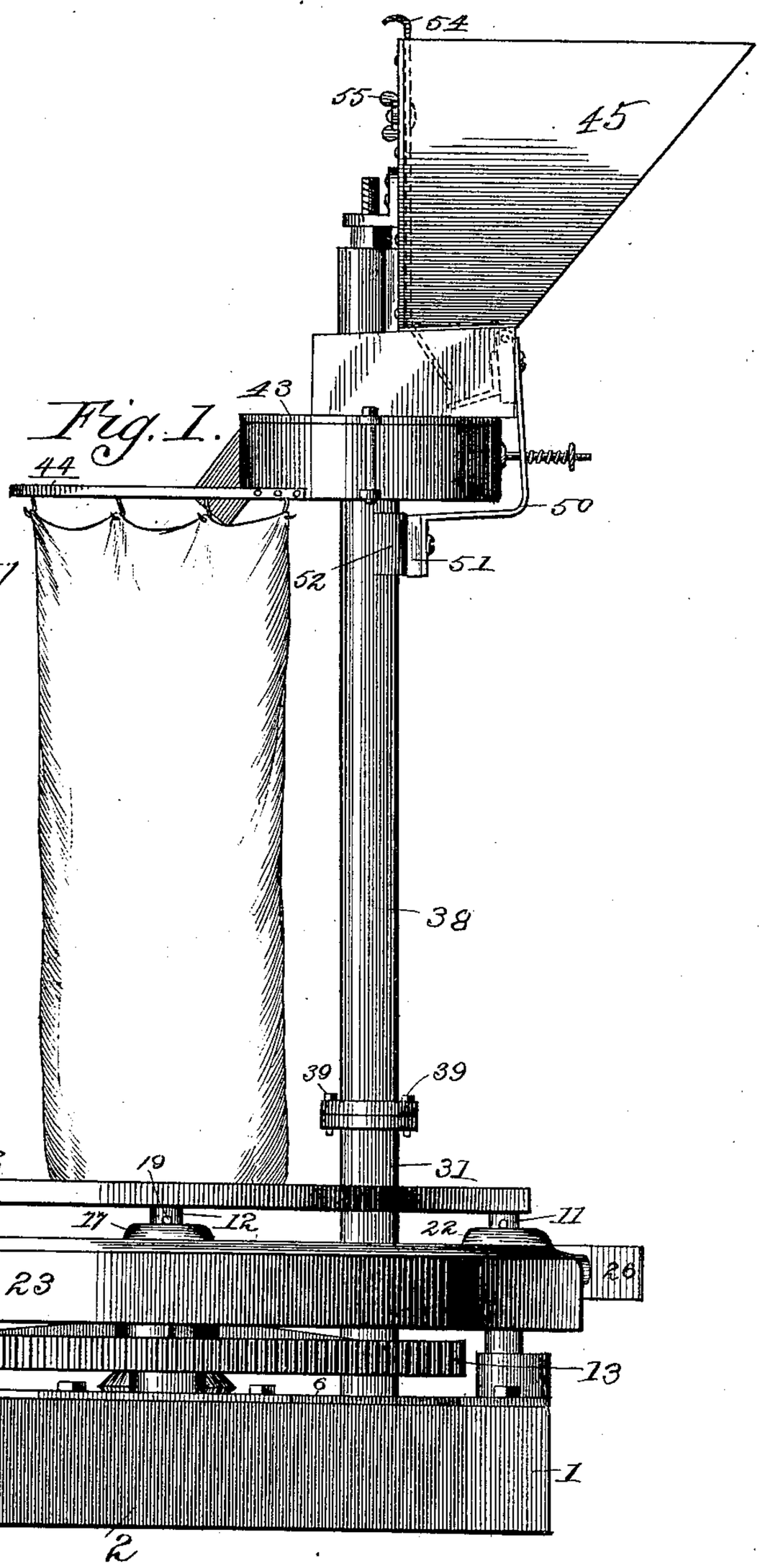


Fig. 1.



Witnesses,
L. F. Mann.
Frederick F. Goodwin

Inventors
George Raymond
Albert Raymond
By, Offield Towle & Phelps
Atty's.

(No Model.) 4 Sheets—Sheet 2.

G. & A. RAYMOND.

HORSE POWER.

No. 353,967. Patented Dec. 7, 1886.

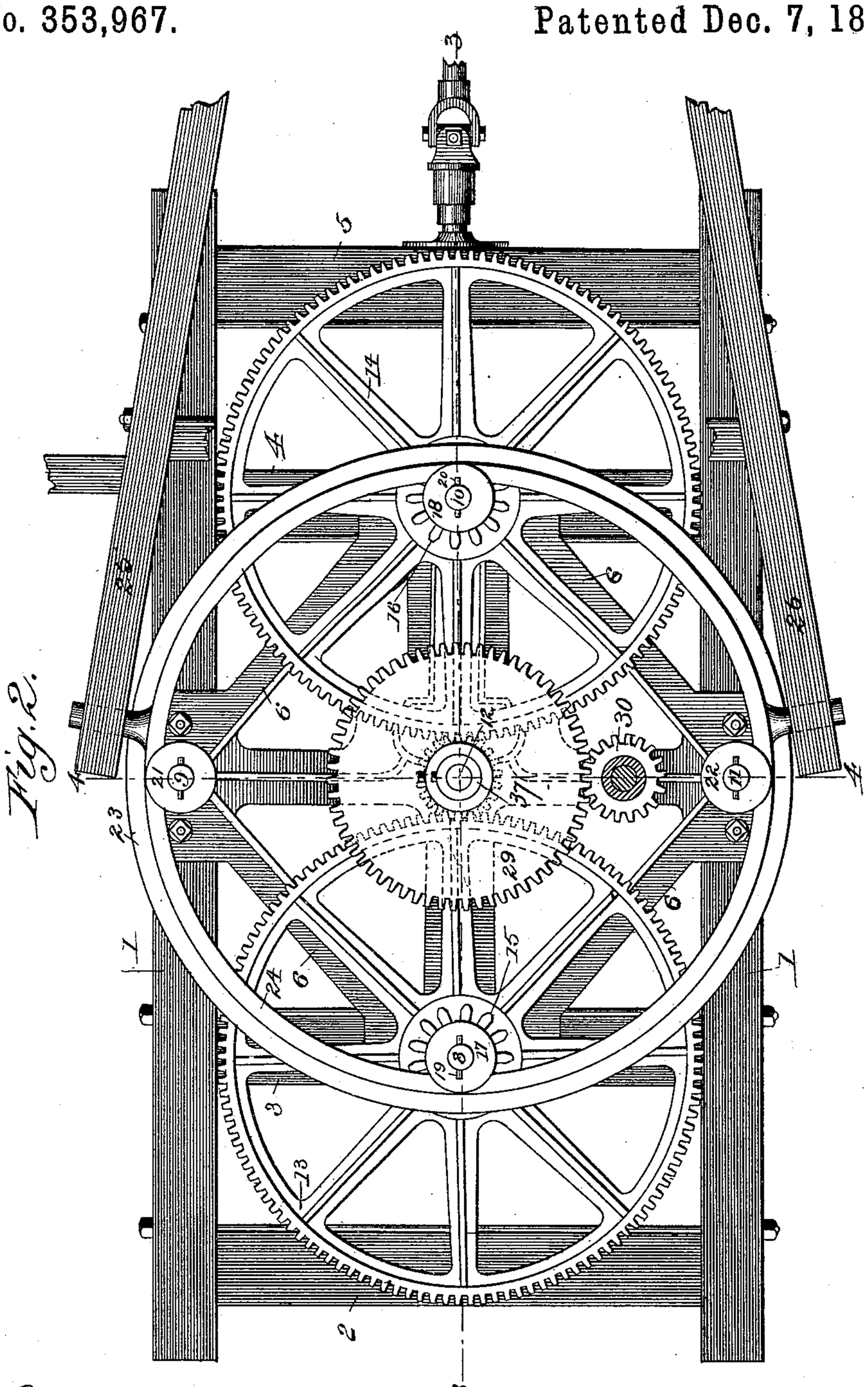


Fig. 2.

Witnesses,
L. F. Mann
Frederick F. Goodwin

Inventors
George Raymond
Albert Raymond
By Offield Towle & Phelps
Atty's.

(No Model.) 4 Sheets—Sheet 3.

G. & A. RAYMOND.

HORSE POWER.

No. 353,967. Patented Dec. 7, 1886.

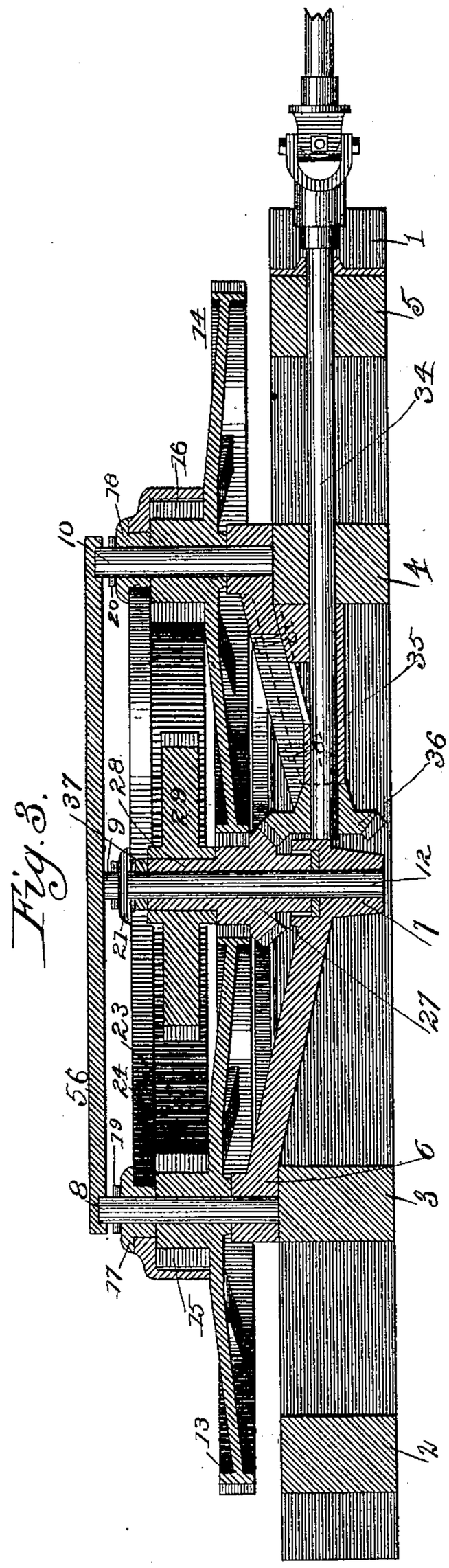


Fig. 3.

Witnesses,
L. F. Mann.
Frederick F. Goodwin

Inventors
George Raymond
Albert Raymond
By, Offield Towle & Phelps
Att'ys.

(No Model.)

4 Sheets—Sheet 4.

G. & A. RAYMOND.

HORSE POWER.

No. 353,967. Patented Dec. 7, 1886.

Fig. 5.

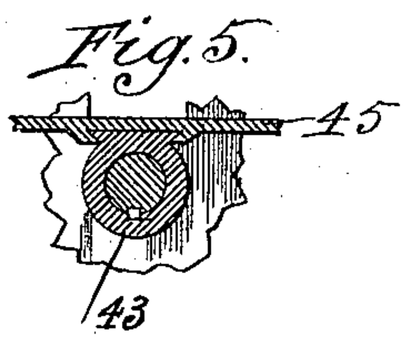
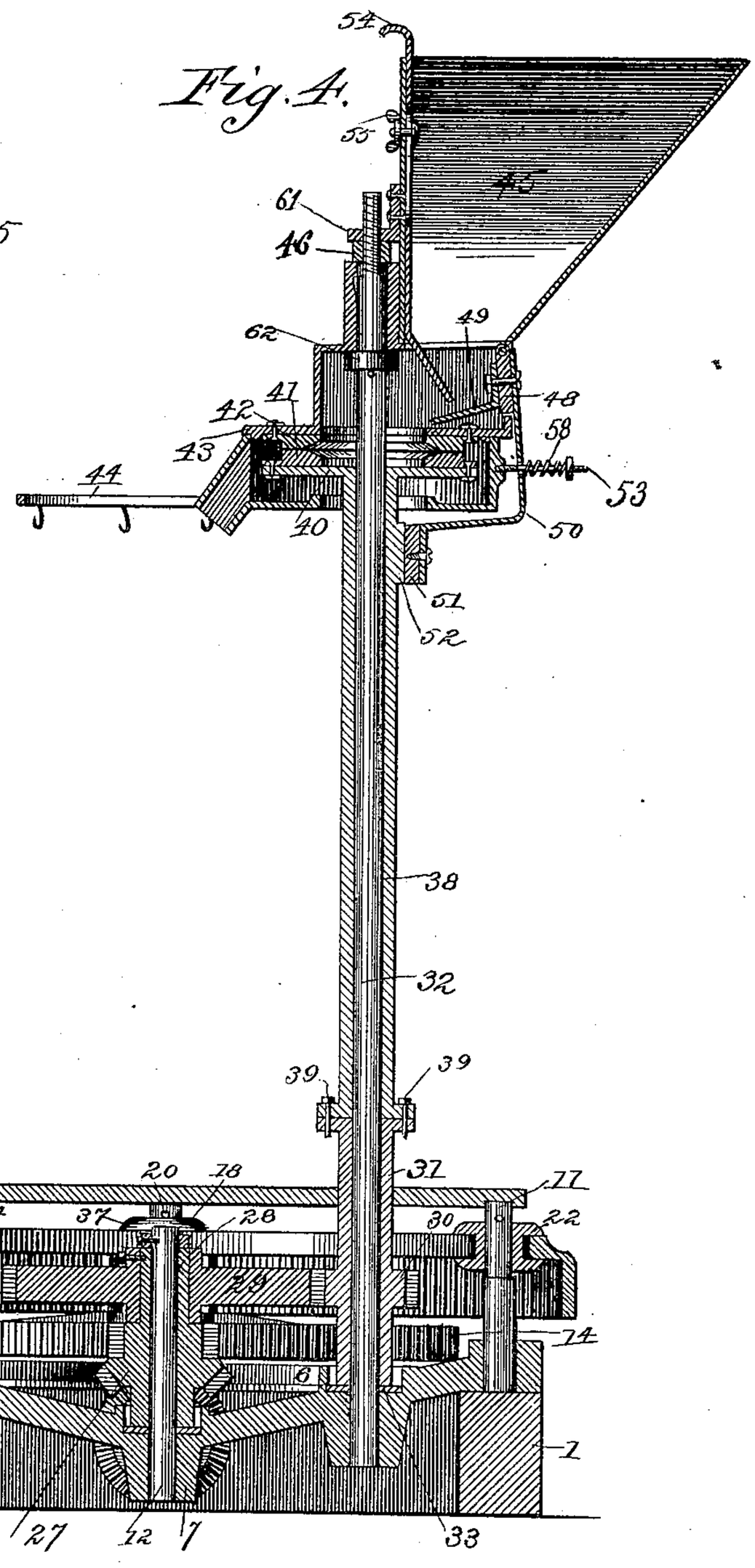


Fig. 4.



Witnesses,
L. Smaus.
Frederick F. Goodwin

Inventors
George Raymond
Albert Raymond
By, Offield Towle & Philipp
Attys.

UNITED STATES PATENT OFFICE.

GEORGE RAYMOND AND ALBERT RAYMOND, OF CHICAGO, ILLINOIS.

HORSE-POWER.

SPECIFICATION forming part of Letters Patent No. 353,967, dated December 7, 1886.

Application filed November 14, 1885. Serial No. 182,847. (No model.)

To all whom it may concern:

Be it known that we, GEORGE RAYMOND and ALBERT RAYMOND, citizens of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Horse-Powers, of which the following is a specification.

In horse-powers of this character it is necessary, in order to get sufficient leverage, to apply the power to wheels of large diameter, and in using such wheels it is necessary either to use double or triple gearing from them, in order to balance the strain on opposite parts of the wheel, or to make the entire wheel of such weight and strength as to enable it to transmit the entire force applied to it from a single point without giving way. The great weight which must be given to large wheels to be used in the latter way is a source of expense and inconvenience, and their use is attended with frequent accidents. Double or triple geared wheels have therefore come to be more generally used; but with these the difficulty has been found that the cutting of the cogs is almost always somewhat irregular, so that if the wheel is mounted to maintain at all times precisely the same position the entire strain is liable at any time—to wit, when the irregularity of the cogs causes the large wheel to bear upon one only of the driven pinions—to be thrown upon the wheel at a single point—a situation which is likely to result in the breaking of the wheel.

Our invention consists, chiefly, in providing a simple and inexpensive means for allowing the gear-wheels to automatically adjust themselves to each other when any inequality in the cutting of the cogs presents itself, so that the strain can never be thrown upon a single part of the large wheel; and to this end we propose to furnish the large or master wheel with two points only, upon which it can bear horizontally, these points consisting of two rotating collars placed within the rim of the master-wheel and at opposite ends of a diameter, the master-wheel being thus fixed without possibility of lateral movement in one direction, but having a play allowed it within certain limits in the direction perpendicular thereto. This play permits the requisite automatic adjustment of the wheel to its driven pinions, which are placed within the wheel, or without it, if desired, at or near the bearing-collars.

Our invention further consists in certain details of construction, hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is an elevation of our improved horse-power, the same being shown geared to a grinding-mill. Fig. 2 is a plan view of the same, the standard and upper part being removed. Fig. 3 is a cross-section on line 3 3 of Fig. 2. Fig. 4 is a cross-section of the whole structure on line 4 4 of Fig. 2. Fig. 5 is a detail of the means by which the hopper is attached to the shaft, and Fig. 6 represents a means of bracing the upright portion of the mill.

The horse-power is mounted upon a framework formed of longitudinal timbers 1 1, united by cross-timbers 2 3 4 5. A quadrilateral cast-iron framing, 6, with arms extending inward to a center or core, 7, is bolted to this frame, and has fixed within it five short shafts, 8, 9, 10, 11, and 12. Upon each of the shafts 8 and 10 are fixed, respectively, cogged wheels 13 14, to which are made fast pinions 15 and 16. Flanged collars 17 and 18 ride upon these pinions, and are held down by pins 19 and 20, passing through the said shafts 8 and 10. Upon the shafts 9 and 11 are two similar double-flanged collars, 21 and 22, free to revolve upon the shafts, but restrained from vertical movement by a pin above and a shoulder below each collar.

The master-wheel 23, cogged upon its inner surface and having an inwardly-projecting flange, 24, rests upon the upper surfaces of the two pinions 15 and 16, and is kept from vertical displacement by the flanges of the collars 17, 18, 21, and 22. Sweeps 25 and 26 are attached, as shown in Fig. 2, to the master-wheel, and the motion of the master-wheel is communicated, by means of the cogs on its inner face, to the pinions 15 and 16, and thence through the wheels 13 and 14 to the pinion 27, arbored upon shaft 12. The pinion 27 has an upwardly-projecting extension or sleeve, 28, upon which is secured a gear-wheel, 29, meshing with a pinion, 30, which is in one piece with a cylinder, 31, revolving about the main

shaft 32 of the mill, and resting upon a washer, 33. A second horizontal shaft, 34, is arbored in the cross-timbers 4 and 5, its extremity being supported by a casting, 35, bolted to the primary frame-work 6. Upon the inner end of this shaft is fixed a beveled pinion, 36, gearing with a second bevel-gear formed upon pinion 27. This shaft and gearing permit the mill to be driven by power applied from a steam-engine or other motor independent of the sweep, and it also enables any surplus power to be taken off from the machine for the purpose of operating a second mill or other mechanism by means of the power of the sweep.

It will be observed that a collar, 37, is fixed upon the shaft 12 above the sleeve 28, in order to prevent upward motion of the pinion 27 and sleeve 28 under the upward pressure of pinion 36.

It will be observed that the master-wheel 23 has a slight horizontal play outside the collars 21 22, and that it has no play outside of the collars 17 18. It will result from this, as above explained, that in case of any inequality in the cutting of the cogs on the master-wheel, or the pinions 15 and 16, the master-wheel will be permitted to shift its position, so as to maintain an equal strain upon the cogs of the two pinions 15 and 16, and it will be impossible for the entire strain to be thrown upon the cogs on one side only of the master-wheel. It will also be observed that the friction between the master-wheel and the pinions 15 16, upon which it rests, tends to revolve those pinions in their normal direction of motion, and therefore the power used to overcome this friction is not, as has heretofore been the case, lost power.

Referring now to Fig. 4, a second cylinder, 38, surrounding the main shaft, rests upon the cylinder 31, and is attached to it by means of wooden pins 39, passing through flanges formed on the engaging ends of the two cylinders, respectively. The cylinder 38 carries at its upper end, upon a circumferential flange, 40, the revolving millstone 41, which receives its motion through the supporting-cylinders 31 and 38. The upper millstone, 42, is bolted to a casting, 43, fitted with a spline upon the upper end of the shaft, and carrying a hooked arm, 44, for the bag or other receptacle for the grain. A nut, 46, on the screw-threaded upper end of the shaft, is provided for regulating the distance between the stones when grinding, this nut serving to determine the vertical location of casing 43. A piece of rubber, 62, supported by a pin passing through the shaft, serves to hold the stones apart when there is no grain between them. The hopper 45 is dovetailed upon the upper part of the casing 43, as shown in cross-section in Fig. 5. An angle-piece, 61, is bolted to the hopper and passes freely over the upper end of the shaft, bracing the hopper.

Bolted to the block 48, hinged to the bottom of the hopper, is the shake-pan 49. An arm, 50, also bolted to the block 48, extends down around the casing 43, and has screwed to it a shoe, 51, which bears upon the cylinder 38, and is operated by the cam 52 to vibrate the shake-pan as the cylinder 38 rotates. The degree of pressure of the arm 50 upon the cylinder is regulated by spring 58, held between the said arm and a nut on screw-bolt 53. A slide, 54, held upon the face of the hopper by a thumb-screw, 55, passing through a slot in the said slide, regulates the size of the aperture at the bottom of the hopper, according to its location, it being adjustable through the play afforded by the slot upon the bolt of the thumb-screw. The wooden pins 39 afford the usual guard for the millstones against injury from foreign substances coming accidentally between them, breaking in case of such accident, and permitting the cylinder 38 and running-stone to stop.

In order to insure firmness and rigidity of the upright shaft and cylinder, we have devised the bracing arrangement shown in Fig. 6. When this is used three of the shafts, 8, 9, 10, and 11, are caused to project through the top piece or cover, 56, which protects the lower part of the mechanism, and nuts 57 are screw-threaded upon them, said nuts having attached thereto three brace-rods, one of them being only shown in dotted lines in Fig. 6, attached to a collar, 60, surrounding the shaft 38, and holding it rigidly and firmly in position.

The particular location of the main shaft which we have shown is not essential to our construction. It may, if desired, be placed in the center as a continuation of the short shaft 12. The arrangement shown is a convenient means of attaining a high rate of speed to the running-stone.

We wish it understood that we do not limit ourselves to the particular arrangement of master-wheel and pinions shown, since our invention consists, broadly, in so mounting a master-wheel that it shall have a play to adjust itself as required by inequalities in the cutting of the cogs and continuously maintained its multiple bearing.

We claim—

1. In a horse-power for grinding-mills, the combination of multiple driven gearing with a master-wheel provided with bearings on which it has a limited amount of lateral play, whereby a uniform division and the distribution of the strain upon the wheel is insured, substantially as described and shown.

2. In a horse-power for grinding-mills, the combination of multiple driven gearing with a master-wheel provided with close circumferential bearings at opposite ends of one diameter, and provided, also, with other bearings at the opposite end of the diameter perpendicular to the diameter aforesaid, and so placed with reference to the master-wheel as to permit the latter to have a limited latitude of movement between them, substantially as described and shown.

3. In a horse-power for grinding-mills, the

combination of a master-wheel consisting of an interiorly-cogged rim with an inwardly-projecting flange, with two pinions situated, respectively, at opposite ends of a diameter of the wheel and engaging with the interior cogs, two collars placed in proximity to the said pinions and affording two interior bearings for the said flange, and two other bearing-collars for the said flange, placed at opposite ends of a diameter of the wheel perpendicular to the diameter before designated, and located so far within the interior contour of the flange as to afford a limited lateral play for the wheel, substantially as described and shown.

4. In a horse-power for grinding-mills, the combination of a master-wheel consisting of a cogged rim provided with a projecting flange, with two pinions situated, respectively, at opposite ends of a diameter of the wheel and engaging with the cogs thereof, two continuous close bearings for the wheel, preventing movement thereof in its plane in one direction, and two other bearings placed at such a distance from the flange as to permit a limited degree of movement to the wheel in its plane in a direction perpendicular to the direction before mentioned, substantially as described and shown.

5. In a horse-power for grinding-mills, the combination of a master-wheel with a pinion driven thereby and vertically supporting the same, and a spool or collar mounted on the shaft of the pinion and separate therefrom, affording a lateral bearing for the master-wheel, substantially as described.

6. In a horse-power for grinding-mills, the combination, with a supporting frame-work, of a quadrilateral casting having inwardly and downwardly projecting arms united at the center, a shaft resting on said casting at its center, gearing mounted on said shaft, gearing supported by the exterior parts of the casting, said exterior gearing engaging with and giving motion to the gearing of the central shaft, and a master-wheel giving motion to said exterior gearing, and also supported from the exterior parts of the casting, substantially as and for the purpose set forth.

7. In a horse-power for grinding-mills, the combination, with a supporting frame-work, of a quadrilateral casting having inwardly and downwardly projecting arms united at the center, a shaft resting on said casting at its center, gearing mounted on said shaft, and gearing supported by the exterior parts of the casting, said exterior gearing engaging with and giving motion to the gearing on the central shaft, whence the mill is driven, substantially as described and shown.

8. In a horse-power for grinding-mills, a master-wheel consisting of a cogged rim provided with a projecting flange, in combination with collars mounted to rotate and having circular flanges projecting above and below the flange of the master-wheel, whereby vertical displacement of the wheel is prevented, substantially as described and shown.

9. In a horse-power for grinding-mills, the combination of a master-wheel consisting of a cogged rim provided with a projecting flange with a driven pinion, and a flanged collar resting upon the said driven pinion and arbored upon its shaft, the said pinion furnishing an under bearing for the said flange and supporting the weight of the master-wheel, the said collar furnishing a lateral bearing for the said flange of the master-wheel, and the flange of the said collar extending above the flange of the master-wheel and preventing vertical displacement thereof, substantially as described and shown.

GEORGE RAYMOND.
ALBERT RAYMOND.

Witnesses:
FREDERICK C. GOODWIN,
E. L. HUBER.