(No Model.) 2 Sheets—Sheet 1.

J. H. ELWARD.

HORSE POWER.

No. 277,835. Patented May 15, 1883.

Fig. 1.

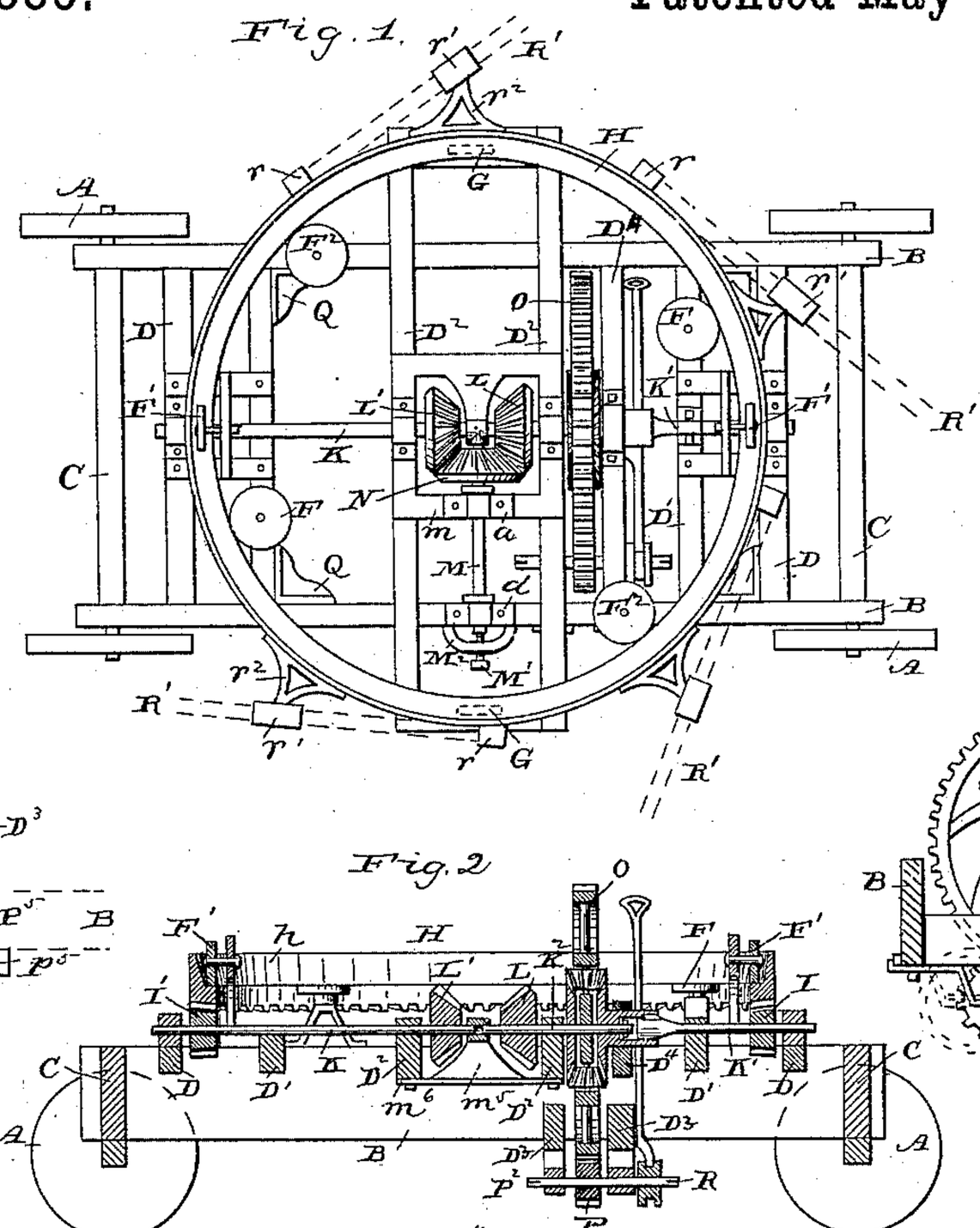


Fig. 11.

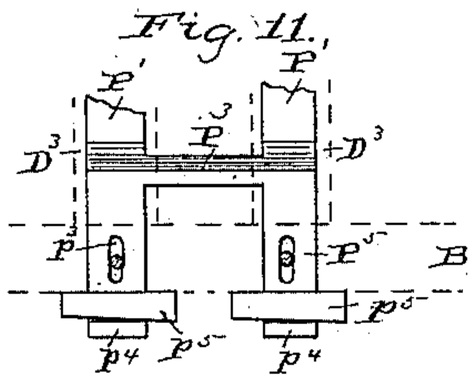


Fig. 2

Fig. 13.

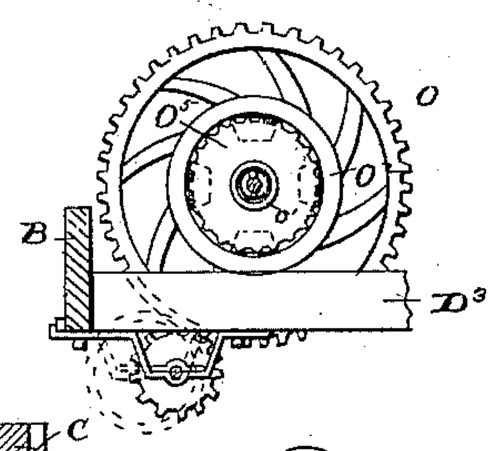


Fig. 8.

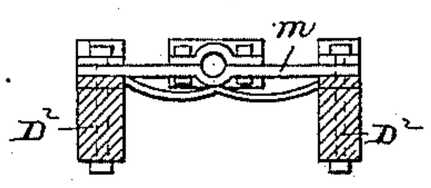


Fig. 9

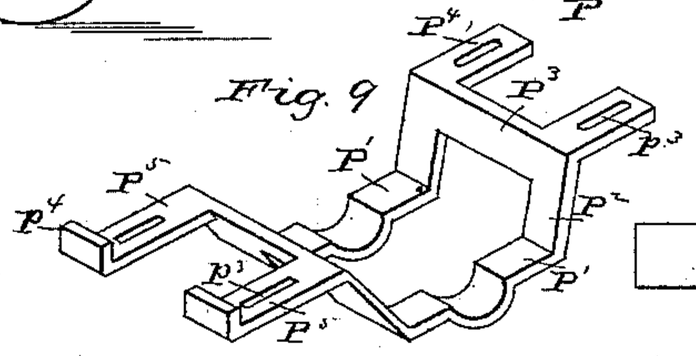


Fig. 10.

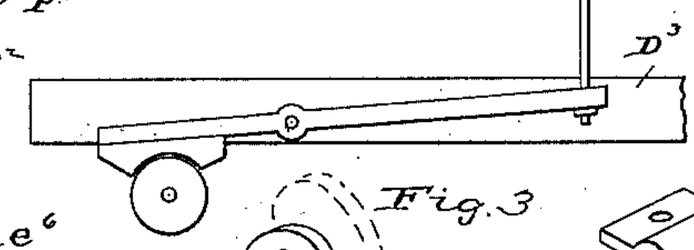


Fig. 7.

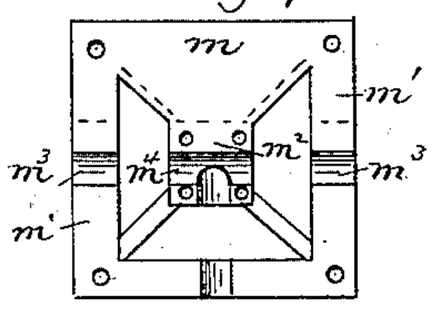


Fig. 4

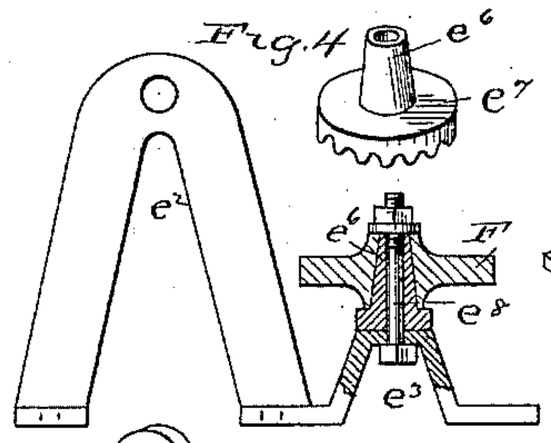


Fig. 3

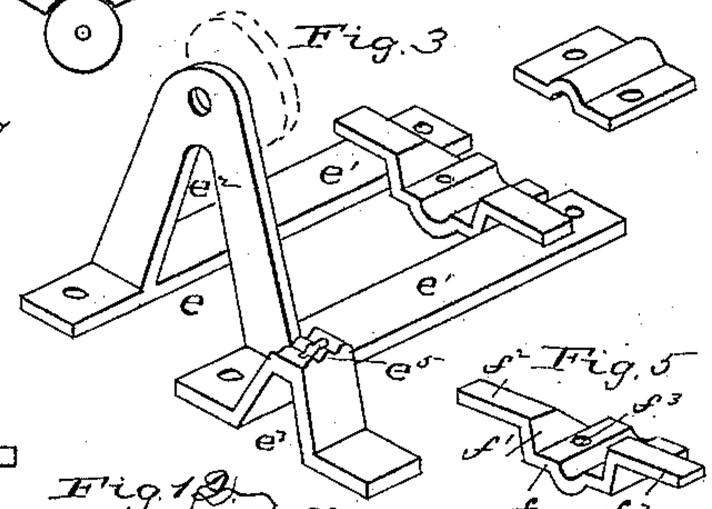


Fig. 5

Fig. 12.

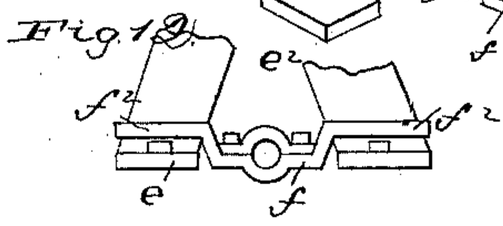
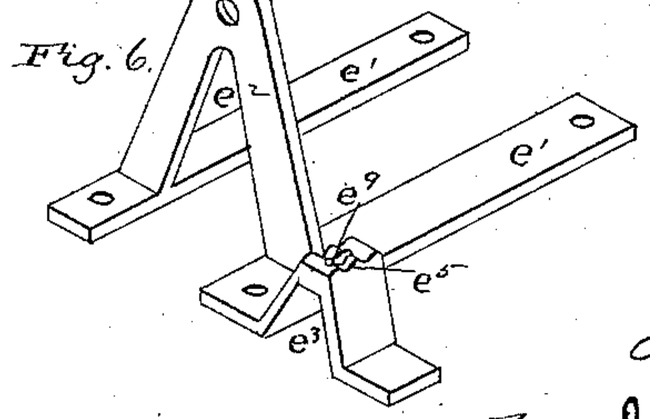


Fig. 6.



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Inventor:

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attys.

(No Model.) 2 Sheets—Sheet 2.

J. H. ELWARD.

HORSE POWER.

No. 277,835. Patented May 15, 1883.

Fig. 15.

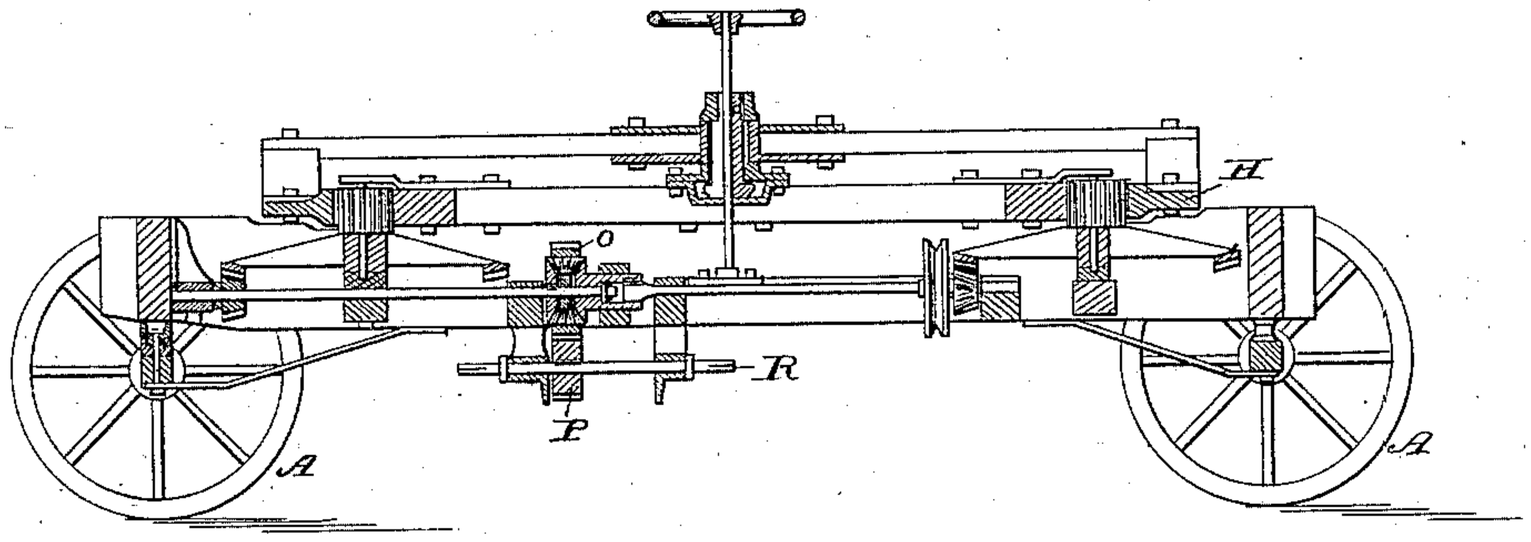
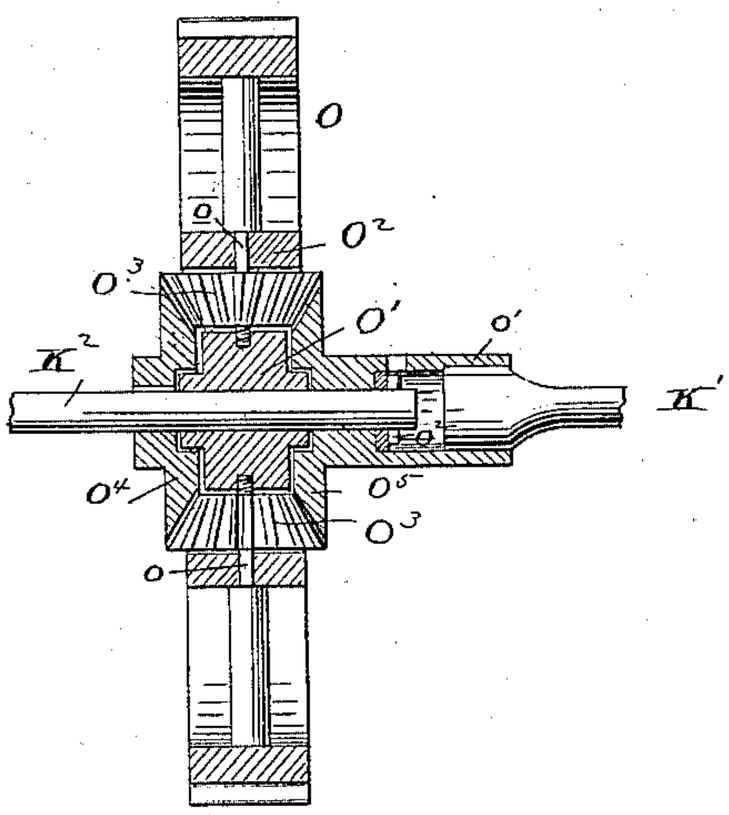


Fig. 14.



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UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF POLO, ILLINOIS, ASSIGNOR TO MARY ELWARD, OF SAME PLACE.

HORSE-POWER.

SPECIFICATION forming part of Letters Patent No. 277,835, dated May 15, 1883.

Application filed October 31, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, a citizen of the United States, residing at Polo, in the county of Ogle and State of Illinois, have invented certain new and useful Improvements in Horse-Powers, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a top plan view of a horse-power embodying my improvements. Fig. 2 is a central longitudinal section. Fig. 3 is a perspective of one of the supporting-brackets and of an outer bearing for one of the radial power-shafts. Fig. 4 is an end view of the same. Fig. 5 is a view in perspective of the outer bearing for the shaft detached. Fig. 6 is a perspective of the bearing of one of the anti-friction grinding-rollers. Fig. 7 is a top plan view of the cast frame which supports the inner ends of the counter-shafts. Fig. 8 is an edge view of the same. Fig. 9 is a perspective of the bracket for supporting the power pinion-shaft. Fig. 10 is a detail view of the friction-brake. Figs. 11 and 12 are detail views of other parts. Fig. 13 is a side or face view of the wheel by which the power is taken to the tumbling-rod shaft and of the compensating-gear attached thereto. Fig. 14 is a section on an elongated scale through the said wheel, shown in Fig. 13. Fig. 15 shows a horse-power of an ordinary form having some of my improvements applied thereto.

In the drawings, A A are supporting and transporting wheels; B B, sills; C C, end girts; and D D D′ D′ D^2 D^2 D^3 D^4 are the intermediate girts of the main retangular frame-work upon which the operating parts of the power are supported.

H is a master-wheel, provided upon its lower face with cogs, and with an upwardly-projecting flange, *h*, which latter is arranged to provide a seat or track for anti-friction guide-rollers, as shown in Fig. 2.

I I′ are pinions keyed to the radial shafts K and K′ K^2. The outer ends of said shafts are supported in suitable bearings attached to the cross-girts D D, and the pinions I I′ engage with the teeth on the under side of the master-wheel.

Much trouble has been experienced and great expense incurred in using horse-powers of the general character of that shown as they have been heretofore constructed. It has been customary to combine with the radial counter-shafts and the beveled pinions on the inner ends thereof two other beveled pinions diametrically opposite to each other, said pinions being mounted on a cross-shaft, and both arranged to engage with both of the aforesaid pinions on the radial counter-shafts. I have found this construction and arrangement of parts to be much inferior to that which I have devised and herein shown. When four pinions have been arranged in the manner heretofore followed and above described, much loss has resulted, from the fact that it is in practice impossible to keep the pinions on the cross-shaft in proper position relatively to those on the counter-shafts, and therefore the teeth of the pinions are rapidly worn and broken, so as to render it necessary to be constantly replacing them with new ones.

My improved mechanism is constructed and arranged as follows: The supporting cast frame is secured to the central cross-girts, D^2 D^2, it consisting of the cross bars or plates *m*, connecting-bars *m′ m′*, and a central bearing-plate, m^2.

At m^3 m^3 bearings are arranged for the inner ends of the radial counter-shafts.

At m^4, in the central plate, m^2, there is a supplemental bearing to receive the ends directly.

The pinions L′ L are keyed respectively to the shafts K and K′ K^2, and are situated between the aforesaid girts D^2 D^2.

M is a shaft mounted at right angles to the shafts K and K′ K,^{2} bearings being provided for it in or upon one of the sills B. On the inner end of this shaft there is a pinion, N, arranged to mesh with both the pinions L L′ and transmit power from one to the other. The shaft M is shouldered in such way as to have its longitudinal thrust bear against the boxings at *a a′*. To supplement the resistance thus provided for the shaft I combine with it a set-screw, M′, arranged to bear against the end of the shaft, it being mounted preferably in a bracket, M^2, secured to the frame. With these parts, when thus arranged, I have suc-

ceeded in preventing entirely the looseness between the pinions which has been heretofore experienced and in preserving a constant, smooth, and easy engagement in such way as to obviate the extraordinary wearing and breakage incident to these machines as heretofore made.

The power is transmitted from the countershafts K and K′ K² through wheel O to the power-shaft R by means of a pinion, P, keyed to said power-shaft R. The power-shaft R is preferably constructed in the form shown, and mounted on the under side of the girts D³ D³, it being adapted to be connected with the tumbling-rod by means of squared ends.

I have provided a simple and ready means of reversing the motion of the cylinder of the thrashing-machine or the other driven parts, said means consisting in arranging both ends of the power-shaft so that the tumbling-rod can be applied to either, and it will be readily seen that when it is attached to one end the motion will be the reverse of that obtained when it is attached to the other. The pinion P and the shaft R are mounted in a stirrup frame or bracket depending from the under side of the frame, and consisting preferably of the bars P′ P′, the legs P² P², cross-bars P³ P³, and arms P⁴ P⁵, by which latter the frame or bracket is bolted firmly but adjustably in place. The master-wheel is held in proper position laterally and vertically by means of guiding anti-friction wheels or rollers F F G G F′ F′ F² F². The wheels or rollers G G are supported upon the outer ends of the girts D² D². The wheels or rollers F′ F′ are arranged above the master-wheel in such manner as to travel in the track formed by the rim or flange *h*. The wheels or rollers F are arranged horizontally to bear against the inner face of the master-wheel and hold it properly laterally. The wheels F and F′ are each mounted in a peculiarly-shaped bracket, consisting of the bifurcated standard *e*², provided with base-plates *e e*, which latter are expanded rearwardly into arms *e′ e′*. The bifurcated standard is near its upper end provided with a hole, in which is secured a horizontal stud or pin for carrying the anti-friction roller F′.

With one of the bed-plates there is formed a lateral extension, *e*³, preferably in the form of a thin upwardly-curved plate, the upper part of which is corrugated or grooved, as shown at *e*⁵. Upon this part rests a conical bearing-piece, *e*⁶, having a ribbed or corrugated lower end, *e*⁷, by which it engages with the part *e*⁵. This conical bearing-piece is fastened in place by means of the bolt *e*⁸. The anti-friction guiding-roller F is mounted upon this conical bearing-piece, and when thus mounted there is no danger under ordinary circumstances of having the bearing of the wheel broken, strained, or misplaced. The outer bearings for the shafts K and K′ K² are situated between the arms *e′ e′*, as shown in Fig. 1, said bearings consisting of plate *f*, arms *f′*, and lateral projecting bars *f*². (See Figs. 3, 5, and 12.) The plate *f* is provided with bolt-apertures *f*³, by which it can be fastened to the girts of the frame independently of the fastening of the bracket-arm *e′*.

Heretofore the bearing-piece has been secured in place on the frame by means of bolts passing through both the bearing-piece and the bracket-arm. From this it results that when the master-wheel is lifted up from any cause against the vertical roller the tendency has been to tear loose the shaft-bearing and also to throw the wheel and pinion out of gear.

I arrange the bars *f*² at a short distance above the arms *e′*, preferably from one-half of an inch to an inch, (see Fig. 12,) and when the roller is pressed upwardly from any cause said bars operate to stop upward movement and insure that the pinion and wheel shall not be entirely thrown out of gear—that is to say, said bars act as guards to insure that if the roller-bracket should be loosened from carelessness or otherwise it (said bracket) shall not move upward beyond a limited extent. When there is no safeguard of this character series accidents result from the fact that the bracket and shaft bearings are sometimes suddenly torn entirely loose before the machine can be stopped.

When the parts are constructed and arranged as I have described, attention will be instantly called to a partial disarrangement if it should occur, further disarrangement being prevented in time to obviate breakage or serious accident.

The frame or bracket P′ P² P³ P⁴ is so constructed and arranged that it can be adjusted in position relatively to the main power-wheel O, in order to permit use of pinions of different sizes when it is desired to vary the speed of the tumbling-rod. (See Fig. 13.) The bolt-apertures *p*³ *p*³ in the arms P⁴ P⁵ are elongated, so that said arms P⁴ P⁵ can be slipped longitudinally to a limited extent in either direction without requiring the use of more than one bolt-aperture in the frame.

In order to prevent the large wheel O from dragging the pinion too far inward, I combine with the pinion support-stops, which prevent inward movement of said support, said stop consisting preferably of inwardly-turned lips or ears *p*⁴, situated outside of the frame, and wedges *p*⁵, of wood or other suitable material, adapted to be driven tightly between said ears. (See Fig. 11.)

The anti-friction rollers or wheels F F can be adjusted upon their support *e*³, such adjustment being rendered necessary from wear or straining of the parts. To permit this adjustment the aperture *e*⁹ for the bolt *e*⁸ is elongated and the bottom piece, *e*⁷, can be moved forward and clamped in a new position and held there by the corrugations and the bolt.

In order to furnish a supplemental bearing for the center bearing-plate, *m*², I prefer to combine with it a bolster or standard, *m*⁵, which is beveled or cut away sufficiently to allow free movement of the pinions L L′, and has lateral extensions *m*⁶, by means of which

it can be bolted to the sills D^2 D^2; or a bar of metal or wood can be attached to the bolster and bolted to said sills.

Heretofore much trouble has been experienced from the straining and breaking of the main frames of horse-powers of this character, owing to the fact that the connections between the longitudinal sills and the cross-girts have been of the character of mortises and tenons only. I have succeeded in obviating this trouble by combining with the frame angular metallic brackets 2 2, of such shape and size as to strengthen the parts which tend to be torn apart. These brackets are preferably of the character shown, though they may be varied more or less and yet attain their object.

R′ R′ represent the sweep-arms.

The master-wheel is provided with sockets peculiarly shaped, and arranged to permit the attachment of the sweeps upon the outside of the periphery, one socket, *r*, receiving the rear end of the sweep and the other, *r′*, being carried by a bracket, r^2, and inclined to the radius at that point, so as to bring that socket in line with the one at the other end. When the sweeps are thus arranged and attached they are held firmly, although in a simple manner, and the whole of the space of the periphery of the wheel is left free.

Having thus described a machine containing some of my improvements, I will now set forth the manner of combining with some or all the parts above mentioned the means which I employ for insuring that the power shall be received uniformly from both sides of the wheel and carried evenly to the tumbling-rod shaft, and which prevent the breaking of the teeth on the wheels or the throwing of any parts out of proper position.

The shaft K′ K^2 is made in two parts, loosely connected together at the ends, the part K′ being mounted in the girts D D′, and the part K^2 mounted in the girt D^2, and in the hub of a bevel-pinion, O^5, to be described.

The wheel O is constructed with hub O′, mounted loosely on the part K^2 of the shaft, and with suitable spokes, and a ring or part, such as shown at O^2, for supporting the bearings for two or more pinions, O^3. I have shown these pinions O^3 as being mounted in the wheel O by means of pins or short shafts *o*, each of which has one end resting in part O^2 and the other end in the hub O′.

O^4 is a bevel-wheel, adapted to engage with the pinions O^3, and is keyed to the part K^2 of the shaft.

O^5 is a corresponding bevel-wheel, mounted loosely relatively to the part K^2 of the shaft, the latter passing through the wheel proper and some distance into the elongated hub *o′*. Said hub, while free to turn upon the part K^2, is prevented from longitudinal movement by means of a pin, o^2, or by other suitable means. The part K′ of the shaft is keyed to the hub *o′*, so that it is rigidly connected with the wheel O^5 and rotates said wheel.

It will be seen that the wheel O^4 is rotated by shaft K^2, and that therefore the wheels O^4 and O^5 and their respective parts K′ K^2 of the shaft are independent of each other, and can move at different speeds. Further, therefore, it will be seen that if the master-wheel H should be applying greater power to one of the radial shafts than to the other the mechanism last above described will insure that there shall be no twisting or straining of any of the transmitting devices, but that the force shall be carried smoothly and evenly to the pinion P. When the same amount of power is being applied to each of the two pinions I I′, the bevel-wheels O^4 and O^5 will rotate together but if there should be a tendency for either of said pinions I I′ to go more slowly than the other its corresponding bevel-wheel O^4 or O^5 can be retarded without any serious results.

The compensating or equilibrating devices herein shown and described have been devised as improvements upon and to overcome defects in the devices combined with horse-powers heretofore used. As heretofore made, they have transmitted the power to the shaft upon which the compensating devices have been placed by means of pins passing through the shaft, the leverage of which pins has been depended upon for rotating the shaft. With pins of this last-described nature it is impracticable to apply more than two pinions without enlarging the shaft and necessitating an expensive construction thereof.

I am not aware of there having been combined with a master-wheel and two countershafts on opposite radii thereof a compensating-gear mounted directly upon one of said radial shafts.

I do not claim, broadly, the combination of a master-wheel provided with cogs, two shafts within the master-wheel and upon opposite radii thereof, bevel-wheels upon the inner ends of said shafts and intermediate bevel-pinion, for I am aware that, broadly considered, such a combination is old; but I am not aware that with devices constructed and arranged as I have shown for taking the power from the master-wheel there has ever been combined the simple but strong means of support at the center of the machine which I have shown and described; nor do I claim, broadly, the combination of the master-wheel, two short radial shafts within the master-wheel, bevel-pinions on the inner ends of said shafts, and the single intermediate pinion engaging therewith, as I am aware this combination, broadly considered, has been used heretofore; but I am not aware that use has heretofore been made of the combination, with the master-wheel, of two radial shafts provided with bevel-pinions at their inner ends, a power-transmitting wheel mounted (as is the wheel O herein) directly on one of said radial shafts, a single intermediate pinion between the two pinions on the radial shafts to take the power from one radial shaft to the other, which has the transmitting-wheel on it, and a support

for the inner ends of the three shafts of a nature equivalent to mine.

The rollers F^2 F^2 are mounted in a horizontal plane in a manner similar, if desired, to that in which the rollers F F are mounted—that is to say, they may have metallic brackets for supporting them, and adapted to permit an adjustment in or out. These rollers F^2 F^2 are placed diametrically opposite to each other, the diameter on which they are located being preferably at as large an angle as possible to the diameter which are located the other rollers, F F. When a compensating and equalizing mechanism is employed of substantially the character which I have shown, I have found that supports and braces of the character of these rollers F F^2 for the master-wheel to be necessary, as there is an unusual liability for said wheel to be thrown out of proper position, from the fact that one side thereof in the construction herein shown is permitted to move at times more rapidly than the other, and it becomes necessary to prevent this from resulting in a disarrangement of the entire wheel relatively to the other parts. When one of the radial shafts is formed in two parts, as shown at K′ K^2, the part K′ being thus still more isolated than ordinarily from the shaft K, it is requisite that the master-wheel should be held as truly and firmly as possible in the desired relation with this comparatively isolated portion K′ of the radial shaft.

I do not wish to be limited to the exact positions shown for the rollers F and F^2 when they are combined with a compensating-gear arranged radially relatively to the master-wheel and driven directly thereby, though I of course do not mean to be understood as claiming, broadly, a series of anti-friction rollers inside of a master-wheel; but I am not aware that use has heretofore been made of the above-mentioned combination which I have shown, to wit: a horizontally-rotating master-wheel, radial shafts driven directly thereby, a compensating-gear on one of the said radial shafts, and three or more anti-friction guides or braces within the wheel.

What I claim is—

1. The combination of a master-wheel, two short shafts situated within the master-wheel on opposite radii, the power-transmitting wheel O on one of said radial shafts, the bevel-pinions on said radial shafts, arranged to have the inner end of the shaft project inside the pinions, the single intermediate bevel-pinion, and the support for the inner ends of the three shafts inside of the pinions arranged to provide bearings for them all, substantially as set forth.

2. The combination, with the master-wheel, the radial shafts K and K′ K^2, rotated thereby, the pinions upon the inner ends of said shafts, and the intermediate pinion, of the supporting plate or frame having the bar *m*, which is provided with a bearing for the shaft of the intermediate pinion, the bars *m′ m′*, having bearings for the radial shafts, the plate m^2, provided with bearings for the inner ends of the three shafts, whereby said frame or plate *m m′* m^2 furnishes two bearings for each of the three shafts, substantially as set forth.

3. The combination of the master-wheel, the shafts K and K′ K^2, the pinions on the inner ends thereof, the single intermediate pinion, N, the shaft M, carrying said pinion N, and mounted in two bearings outside of the pinion and the collars or shoulders upon said shaft, and respectively arranged in proximity to said bearings to prevent the thrust of said single pinion from causing its disengagement, substantially as set forth.

4. The combination, with the master-wheel, the shafts rotated thereby, and the pinions on the inner ends of said shafts, of the intermediate pinion, the shaft thereof, and the set-screw, arranged, substantially as described, to prevent endwise movement of the shaft and pinion.

5. The combination, with the master-wheel, the bracket having the arms *e′ e′* and the standard e^2, and the shaft for receiving power from the master-wheel, of the bearing for said shaft, bolted to the main frame independently of the bracket-arms, substantially as set forth.

6. The herein-described support for a vertical guiding anti-friction roller and a horizontal roller for the master-wheel, it consisting of the standard or upright e^2, adapted to carry a vertical roller above the master-wheel, the support part e^3 for a horizontal roller, and the base-plates *e′*, for securing said parts in position, said parts e^2 e^3 *e′* all being formed in one piece of metal, substantially as set forth.

7. The combination, with the master-wheel, and the horizontal anti-friction guide-roller, of the conical bearing for said roller, and the corrugated seat for said bearing, substantially as set forth.

8. The combination, with the master-wheel and the horizontal anti-friction guide-roller, of the adjustable bearing for said roller, substantially as set forth.

9. The combination, with the master-wheel, the tumbling-rod shaft, and the intermediate devices for communicating power thereto from said wheel, of the adjustable bracket or support for said shaft, and means for locking it in position, substantially as set forth.

10. The combination, with the master-wheel, the shafts rotated directly thereby, the pinions of said shafts, and the center bearing-plate for the inner ends of the shafts, of the bolster or supplemental support m^5, constructed and arranged substantially as set forth.

11. The combination, with the master-wheel provided with the socket *r*, the bracket r^2, and the incline socket *r′*, of the sweep R, secured in said socket entirely outside the periphery of the wheel and below the upper edge thereof, substantially as set forth.

12. In a horse-power, the combination, with the master-wheel, the shaft K, driven directly by said master-wheel, and shaft K′ K^2 on a radius of the master-wheel opposite to that of

shaft K, the pinion L on shaft K′ K², pinion L′ on shaft K, the power-wheel O, mounted loosely and directly around the radial shaft K′ K², the wheel O⁴, keyed to the part K², the wheel O⁵, keyed to the part K′, the hub O′ of wheel O, loosely mounted on the part K², and the pinions O³, mounted upon said hub, substantially as set forth.

13. In a horse-power, the combination, with the master-wheel, the opposite radial shafts within the master-wheel driven directly thereby, one of said radial shafts being formed in two parts rotatory relatively to each other, the compensating-gear having a bevel-wheel keyed to each of said independent parts of the radial shaft, the loose pinions O³, and the power-wheel O around said pinions, and provided with a hub loose upon the shaft, whereby three or more of said pinions O³ can be employed without affecting the shaft, substantially as set forth.

14. In a horse-power, the combination, with the horizontal master-wheel, the radial shafts driven directly by said master-wheel, the compensating-gear connected with said radial shafts, and the anti-friction rollers, guides, or braces within the master-wheel, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:
H. H. BLISS,
M. P. CALLAN.