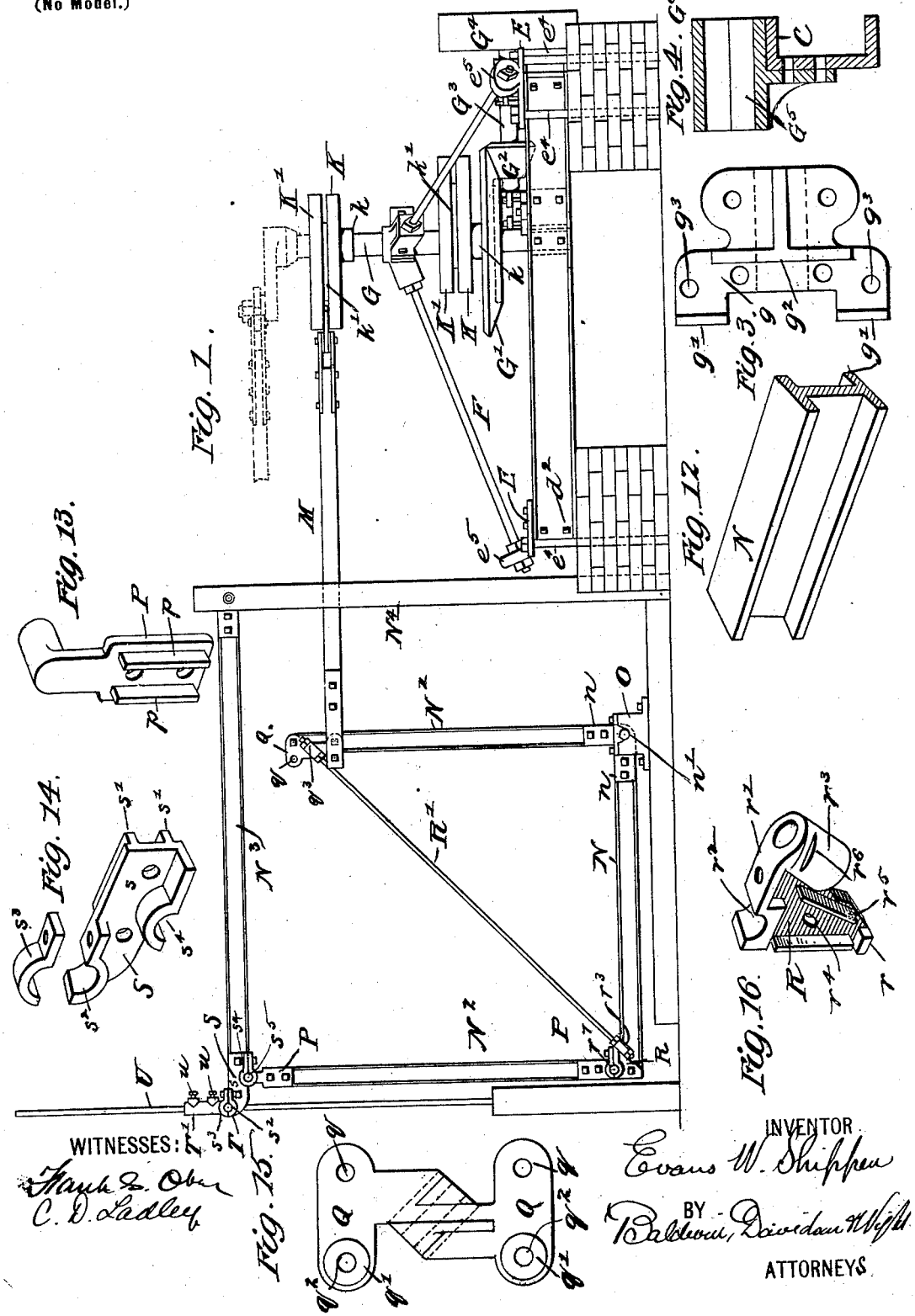
No. 647,533. Patented Apr. 17, 1900.

E. W. SHIPPEN.

PUMPING RIG.

(Application filed Dec. 19, 1899.)

(No Model.) 3 Sheets—Sheet 1.



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PUMPING RIG.

(Application filed Dec. 19, 1899.)

(No Model.) 3 Sheets—Sheet 2.

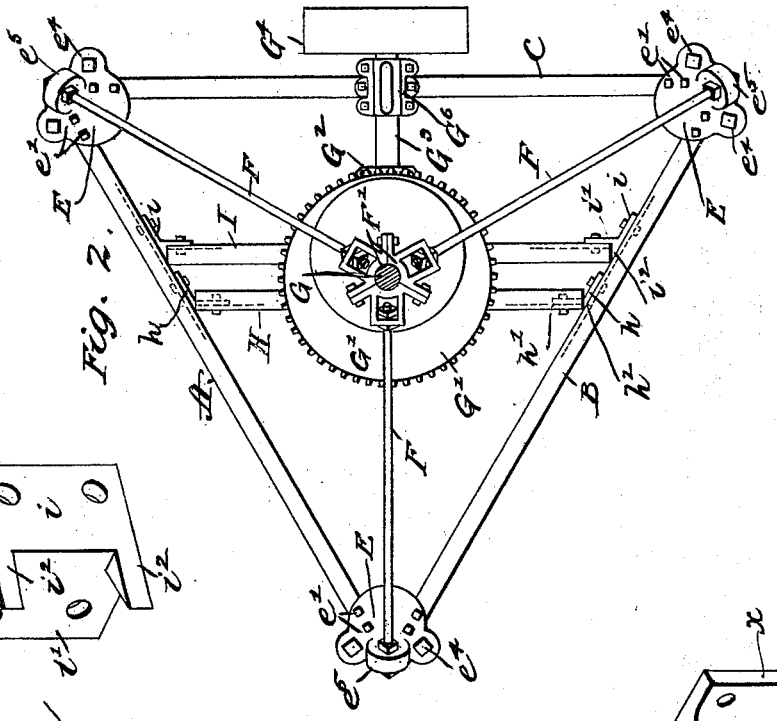

Fig. 2.

Fig. 6.

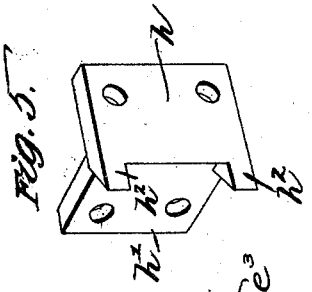

Fig. 5.

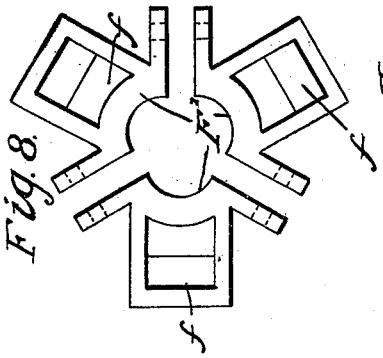

Fig. 8.

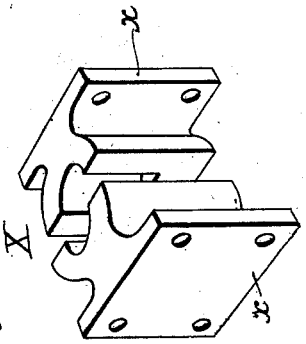

Fig. 9.

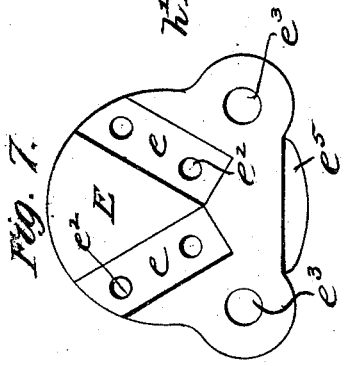

Fig. 7.

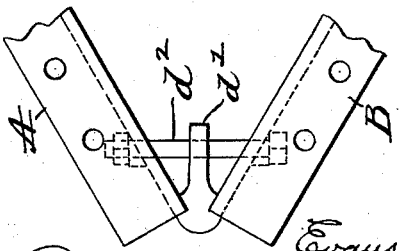

Fig. 11.

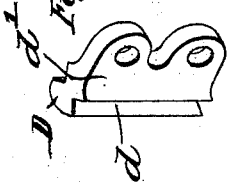

Fig. 10.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 17.

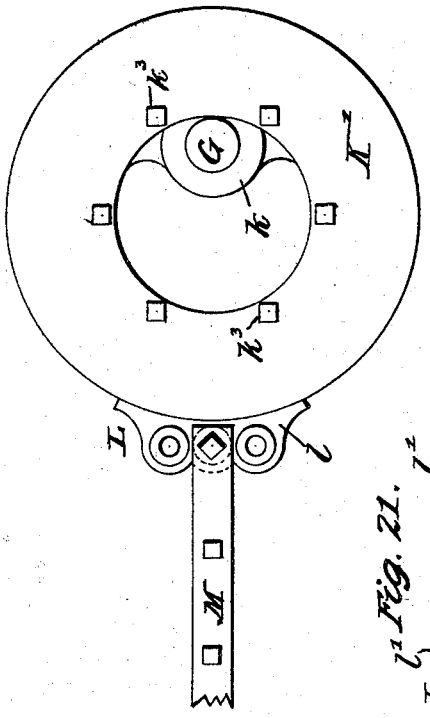


Fig. 18.

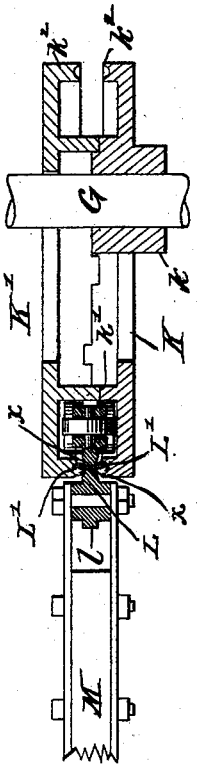


Fig. 21.

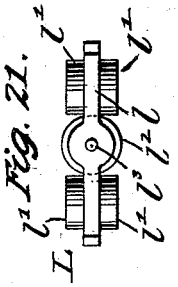


Fig. 19.

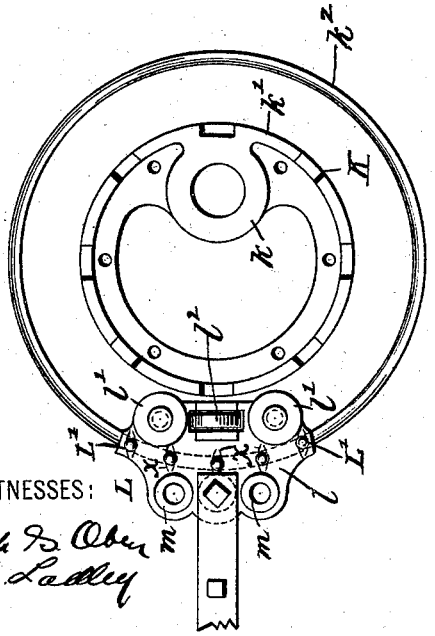
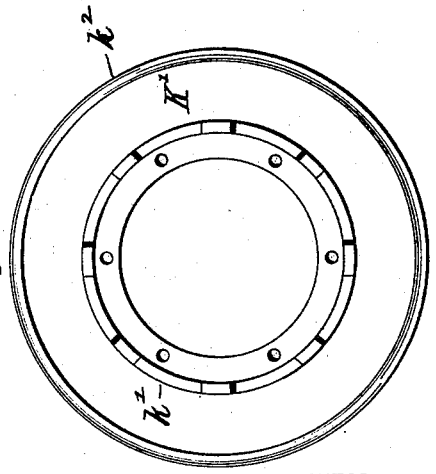


Fig. 20.



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PUMPING-RIG.

SPECIFICATION forming part of Letters Patent No. 647,533, dated April 17, 1900.

Application filed December 19, 1899. Serial No. 740,904. (No model.)

To all whom it may concern:

Be it known that I, EVANS W. SHIPPEN, a citizen of the United States, residing at Meadville, county of Crawford, State of Pennsylvania, have invented certain new and useful Improvements in Pumping-Rigs, of which the following is a specification.

The objects of this invention are to lighten, cheapen, and improve the general construction of the pumping-jack or "grasshopper" and the apparatus for applying power thereto.

The invention, however, particularly consists in a novel organization involving the employment of an eccentric on the power-shaft to which are connected the pitmen or devices for transmitting power to the pumping devices located at the wells.

The several features of the invention are hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of the entire rig; Fig. 2, a plan view, with the vertical power-transmitting shaft in section, of the right-hand side of Fig. 1. Fig. 3 is a detail view of the under side of a casting that forms the lower part of the box or bearing for the inner end of the horizontal shaft, which is driven from the source of power; Fig. 4, a sectional view showing the frame-beam and the outer box or bearing for the same shaft. Figs. 5, 6, 7, 8, 9, 10, and 11 are respectively detail views of castings or parts by which the frame-beam and shaft of the apparatus for transmitting power to the wells are united and mounted. Fig. 12 is a detail view showing the character of structural iron that may be employed in the construction of the grasshopper or pumping-jack located at the well. Figs. 13, 14, 15, and 16 are detail views of castings or parts uniting or attached to the frame-bars of the pump-jack, as hereinafter more specifically described. Fig. 17 is a plan view, and Fig. 18 a vertical section, showing the eccentric that is applied to the power-shaft and the devices for connecting therewith the power-transmitting pitman or arm. Fig. 19 is a plan view of the upper face of the lower half of such eccentric; Fig. 20, a similar view of the under face of the upper half of the eccentric. Fig. 21 is a detail elevation of the inner end of a roller carriage or truck which is mounted upon and coöperates with the eccentric and to which the pitman or power-transmitting arm is attached.

The construction of the frame in which is mounted the shaft through the medium of which power is applied to the pump-actuating rods is as follows: The base is preferably triangularly shaped and may be formed by three horizontally-disposed beams A B C, of channel iron, (the cross-section of which is shown at C, Fig. 4,) the three angles or points of junction of the three bars resting upon foundations, columns, or supports, which may be of masonry, as indicated in Fig. 1. The ends of the bars are united at their junctions and held rigidly in proper angular relation to each other by plates or junction-pieces D, as seen in Figs. 10 and 11. Each of these plates has opposite angular grooves *d d*, in which the webs of the channel-iron fit and the flanges of which extend outward or away from each other.

The part *d'* of the plate lying within the angle formed by the ends of the beams has apertures for the passage of clamping-bolts d^3, Fig. 1, which also pass through the webs of the beams. A foot-block or corner-piece E, preferably an iron casting, is applied at each corner or angle of the frame and is shaped as shown in Figs. 6 and 7. In its flat under face are two recesses *e e*, arranged at proper angular relation, and in which recesses the upper flanges of the beams lie, and bolts *e'*, Fig. 2, pass through the flanges and through apertures e^2 in the bottoms of the recesses. The outer corners e^3, which project beyond the beams, also have bolt-holes to receive anchor-bolts e^4, Figs. 1 and 2, which may pass down through the masonry columns or be otherwise anchored in the ground or foundation. Between the corners e^3 is a projecting lug e^5, having an aperture to receive the brace-rod F, which extends to and supports the upper bearing of the vertical shaft G. This bearing is made in three segmental sections F', flanged and adapted to be all bolted together, as shown in Figs. 1, 2, and 8. Each section has a chamber *f*, into which the end of its brace-rod F projects and receives an ordinary nut. Between two oppositely-inclined sides of the frame extend transverse beams H I, which may be of similar channel-iron and the flanges of which are turned toward each

other, so that the opposite channeled faces of the beams each receive, respectively, half of a longitudinally-divided step or end bearing-block X, in which the lower end of the vertical shaft G is stepped. This block is seen in Fig. 9, and the flat or flanged face x of each half is provided with bolt-holes to receive clamping-bolts, which pass through both webs of the transverse frame-bars H I and bind the divided block between them. The beam H is at each end secured to the frame-bar A or B by a bracket (see Fig. 5) consisting of a casting having two flat portions $h\,h$, arranged at an obtuse angle to each other, and from the junction or angles of these two parts, at the top and bottom corners, extend two inclined or beveled projections h^2. The angular relation of the two parts h h' depends upon the inclination of the frame-beam A B and is such that the beam H forms the base of the isosceles triangle inclosed by it, the part h being bolted to the web of the frame-beam A B, and h' to the web of the cross-beam H. The bevel of the projections h^2 is such as to then fit squarely against the ends of the flanges of the cross-beam. The brackets, Fig. 6, for the beam I are similarly shaped, except that the projections i^2 are considerably longer to fill in the longer angular space between the frame-beams and cross-beam I, due to the fact that the flanges of the latter beam extend in the reverse direction from those of the beam H.

The vertical shaft G has near its lower bearing a beveled gear-wheel G', driven by a bevel-pinion G^2 on a horizontal shaft G^3, to which power may be applied by means of a belt-pulley G^4 or otherwise. The outer bearing-box for this shaft is indicated in Figs. 2 and 4. It consists of a bearing G^5, having a flange at its bottom bolted to the vertical web of the frame-beam C, and an ordinary cap G^6. The inner bearing is of a similar character, but consists of a casting, Fig. 3, having a shaft seat or bearing in its upper face and in its under face a transverse recess g, formed by flanges g' g^2, and in the bottom of which are bolt-holes g^3 for the passage of bolts which secure the casting to the upper flange of the cross-beam I. An ordinary cap closes the shaft-bearing. The structure described is composed of separable pieces, each strong and light and easily carried to relatively-inaccessible sites, and yet may very readily be assembled and rigidly united into a strong and stable structure particularly well adapted to meet the conditions of work to which such apparatus is subjected.

The means of transmitting power from the vertical shaft G to the rods or pitmen, which, as is well understood in oil-well work, may or must extend in various directions from the shaft, are shown in Figs. 1 and 17 to 21, inclusive. I employ an eccentric of a novel construction operating in a new way in conjunction with the devices for transmitting power to the pumping-stations, the apparatus having capacities or functions not obtained heretofore where ordinary eccentrics and their ordinary eccentric straps or rings have been employed. Generally stated, this organization consists of an eccentric actuated from a center of motion (whatever it may be and however the eccentric may be mounted or connected) and having a peripheral portion or flange, against the inner face of which one or more independent devices having each one or more power-transmitting rods connected therewith work.

In the particular manner in which I have shown the invention embodied and which I now consider the form best known to me, but to which I do not intend to limit the invention, the eccentric is formed of two parts—a lower part K, having a hub k, which may be fixed on the shaft G, and inner and outer (preferably concentric) upwardly-extending flanges k' k^2, and an upper part K', which need have no hub, as k, having like downwardly-projecting flanges k' k^2. The flanges k' abut and are each formed on the edge with alternate notches and projections. The two edges interlock, and the two portions of the eccentric are secured together by bolts k^3, Fig. 17, located inside of the inner flanges k'; but the outer flanges k^2 being shorter than the inner ones their edges do not come in contact. Within the annular space or channel runs one or any desired number of roller-trucks L, consisting of a substantially-flat frame-plate l, having at or toward each end within the annular space short shafts, upon each of which are two rollers l' l', which run, primarily, against the inner face of the outer flanges k^2, but which under certain conditions run upon the outer faces of the inner flanges. Between these two sets of rollers is another one, l^2, turning with or upon a short shaft l^3, placed radially with reference to the center of motion. This latter roller runs against the upper or lower portion of the eccentric, according to the line of strain, due to the angular position of the rod—say M—connected with the carriage. Each carriage may have one, two, or more points m for the connection of the rods to be actuated, three being shown in the drawings. The opposite edges of the flanges k^2 are grooved circumferentially and are occupied by antifriction-balls L', also respectively seated in depressions x in the upper and lower faces of the carriage-frame l. I may employ such number of carriages as the exigencies of the case may demand, to the point of filling the annular channel in the eccentric, and to each carriage several rods may be attached. One of the important advantages attending this construction is that the rods M may be disposed at varying angles to the horizontal or to the plane of the eccentric, and the carriages will accommodate themselves to the line of strain and friction be reduced to a minimum.

It will be observed from Fig. 1 that the depressions x in the carriage-frame in which the

antifriction-balls work are extended laterally or are longest in a direction substantially or generally in line with the radius of the circular flange k^2. This permits the carriage to move inwardly under certain conditions and carry the rollers away from flange k' and into contact with flange k^2. For instance, should the pump-rod at the well not fall quickly enough, because of the presence of water or for other reasons, the carriage-rollers will pass into contact with the flange k^2 and a thrust be imparted to the rod M that will positively push the pump-rods down into the wells.

The rods M may run directly to the pumping-jack or grasshopper, as indicated in Fig. 1, or be connected therewith through the medium of jointed rods and rocker-supports, according to the locations of the wells, all as well understood. The grasshopper or V-jack is composed of I-iron N N' (shown in detail Fig. 12) and is constructed as follows: The two pieces of about equal length are rigidly secured together at right angles, N being horizontal and N' vertical. They are united by a coupling n, Fig. 1, formed in two parts applied on opposite sides of the joint and each having two parts at right angles to each other with an outwardly-projecting trunnion n, which two trunnions are mounted in a box O of ordinary construction. Each half of this two-part coupling or "saddle," as I term it, has two projecting parts, to which the letters n n are applied in Fig. 1, constructed as is the piece or casting P, Fig. 13—that is to say, both projections n may have parallel flanges p p, which rest against the web of the I-beam, with bolt-holes between them for the passage of the clamping-bolts. The power-transmitting rod M is attached to the upper end of the beam or bar N' by means of the castings (shown in detail in Fig. 15) and shaped or constructed as follows, there being two such castings, one applied to each side of the bar N': Each casting is generally of I shape. The cross-bars Q Q at the upper and lower ends have in corresponding ends bolt-holes q and at opposite ends bosses q', through which also bolt-holes q^2 are formed. When applied to the upper end of N', the bosses q' bear upon the web of the beam to which the castings are rigidly secured by bolts passing through the apertures q^2. The bolt-holes q afford means for attaching the rod M at either of two points, according to the extent of stroke which it is desired to give to the jack or V-frame. Each casting also has upon its outer face an apertured boss q^3, the axis of which is disposed at an angle of forty-five degrees, or, in other words, it is parallel with the hypotenuse of the right angle formed by the beams N N'. To each side of the outer end of the beam N is applied a casting, the general shape of which is shown in detail in Fig. 16. It consists of a side or back plate R, a lateral projection r at the bottom thereof, and a lateral projection r' at the top thereof. Near one end of this latter projection is formed a bearing or box r^2, while at the opposite end is formed an inclined boss or cylindrical portion r^3, the axis of which when the casting is applied to the beam is coincident with the axis of the boss q^3 of the casting applied at the top of the beam N'. Between the parts r r' are projecting upright flanges r^4 r^5, which may be inclined relatively to each other, and between the ends of which and the projections r and r', respectively, a space is left for the reception of the flanges at one side of the I-beam. When these castings are applied to the beam, the faces of the flanges r^4 r^5 bear against the web of the beam, while the flanges thereof, as stated, enter the spaces below and above the ends of the flanges on the castings. I also form a cut or notch r^6 in the side of r^3 to receive the edge of the upper flange of the beam. When these castings are applied in position, two brace-rods R' are passed through the respective bosses q^3 and r^3, and nuts are applied on each side of each boss, so that the V-frame is braced rigidly in both directions. A casting P, Fig. 13, is applied at each side of the lower end of a second vertical I-beam N^2, and their trunnions work in the boxes or bearings r^2 (which are provided with a suitable cap r^7) of the castings R, applied to the other end of N. To each side of the upper end of the beam N^2 is applied a casting P, Fig. 13, and the oppositely-projecting trunnions of the two castings work in boxes or bearings in castings S, Fig. 14, applied to opposite sides of the outer end of a horizontal beam N^3, the opposite end of which is pivoted in a vertical post N^4. Each casting S consists of an apertured flat plate s, with inwardly-projecting flanges s', which bear against the web of the beam to which it is applied. At one end of the plate and projecting laterally therefrom is a box or bearing s^2, for which there is a corresponding cap s^3, and projecting laterally from its lower edge is a similar box or bearing s^4. The trunnions of the castings P P, applied to the upper end of the beam N^2, work in the box s^4, which is provided with a suitable under cap s^5. In the boxes or bearings s^2 work trunnions T, projecting from opposite sides of a sleeve T', applied to the pump-rod U and adjustably clamped thereon by two side screws u u.

The general mode of operation of the entire apparatus will now be plain, and, moreover, it is well understood and is in fact old, except so far as my improved eccentric apparatus is concerned, and that has already been fully described. I may say, however, with regard to this eccentric apparatus that the rollers are in the main designed to reduce friction and that it would be feasible, if desired, to dispense with the rollers and also the antifriction-balls and to rely upon properly-formed surfaces and lubrication to sufficiently reduce the friction for the practical and efficient operation of the apparatus.

As shown in Fig. 1, I may put several eccentrics upon the shaft G, two being shown,

one above and one below its upper bearing. While in the drawings the upper end is shown as equipped with a crank, a third eccentric might also be mounted there.

I have shown the channel in or on the eccentric as circular; but of course it need not necessarily be so, as obviously it might be oval or of other shape, though I for some reasons prefer to make this track or channel in or on which the carriage or power-transmitting device runs circular. When not circular, the apparatus might with propriety be termed a "cam" or the channel or track characterized a "cam track or groove or channel."

I use the term "eccentric" in the sense that covers all such variations of form in which my invention may be embodied.

I claim as my invention—

1. The rotative eccentric formed of two parts each having a flange extending entirely around the center of motion, which two flanges project toward each other, in combination with a carriage or power-transmitting device running against the inner faces of the flanges, and a power-transmitting rod attached thereto.

2. The rotative eccentric formed of two parts each having a flange extending around the center of motion, which two flanges project toward each other, in combination with a roller-carriage running against the inner faces of the flanges, and a power-transmitting device attached thereto.

3. A rotative eccentric formed of two parts, each having two projecting annular flanges, the corresponding inner flanges abutting and the corresponding outer flanges being separated by a suitable space, in combination with a carriage or power-transmitting device running in the annular space between the said inner flanges and outer flanges.

4. A rotative eccentric formed of two parts, each having two projecting annular flanges, the corresponding inner flanges abutting and the corresponding outer flanges being separated by a suitable space, in combination with a roller-carriage running in the annular space between the said inner flanges and outer flanges.

5. The rotative eccentric formed of parts or plates with a space between them and peripheral flanges projecting toward each other but with an open space between their edges, in combination with a carriage in said space behind said flanges and having one or more rollers running on the inner faces of the flanges, and a roller adapted to run upon the upper or lower inner faces of the two parts of the eccentric, and one or more power-transmitting rods attached to the carriage.

6. The rotative eccentric having upper and lower parts or plates with an intervening space between them and peripheral flanges extending toward each other but with an open space between, the opposite edges of the flanges being circumferentially grooved, in combination with a roller-carriage running in the space back of the flanges and extending out between the edges of the flanges and antifriction-balls interposed between the carriage in the edges of the flanges.

7. The combination of the frame, the vertical shaft, the eccentric formed with a space or channel inside of its peripheral face or edge, a power-transmitting device running in said space, a power-transmitter (as a rod) connected to said device, and a pumping-jack actuated thereby.

8. The triangular frame composed of three beams of I structural iron, junction-plates having grooves to receive the webs of the beams and apertures for clamping-bolts applied at each of the three angles, foot-pieces applied at each angle and each having recesses to receive flanges of the beams and apertures for bolts to secure it to the beams, apertures for the attachment of anchor-rods, and a socket for a guy or brace rod to support the upper shaft-bearing, the upper shaft-bearing, the shaft, cross-bars applied between the frame-beams, and the lower shaft-bearing supported by the cross-bars.

9. The combination of a frame composed of separable bars united by detachable junction-pieces at their ends and separable cross-bars detachably connected at their ends to the frame-beams, a vertical shaft, its lower longitudinally-divided bearing supported by the cross-bars, its upper bearing composed of separable segmental sections and removable brace-rods, one for each segment, extending therefrom to the frame.

In testimony whereof I have hereunto subscribed my name.

EVANS W. SHIPPEN.

Witnesses:

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A. W. MCCOY.