(No Model.) 2 Sheets—Sheet 1.

A. B. PERINE.

MEANS FOR CONVERTING MOTION.

No. 594,276 Patented Nov. 23, 1897.

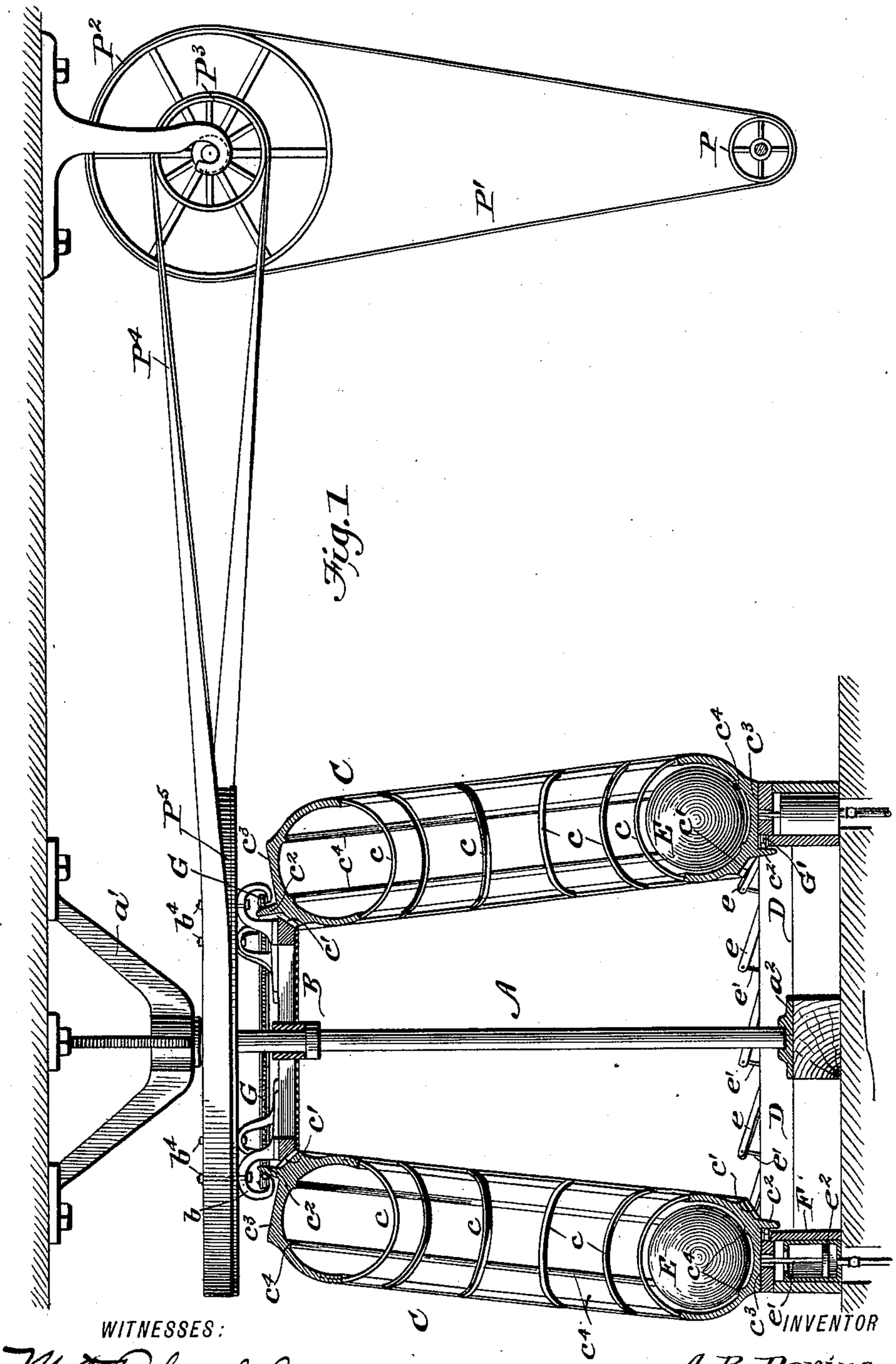

Fig. 1.

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Fig. 2.

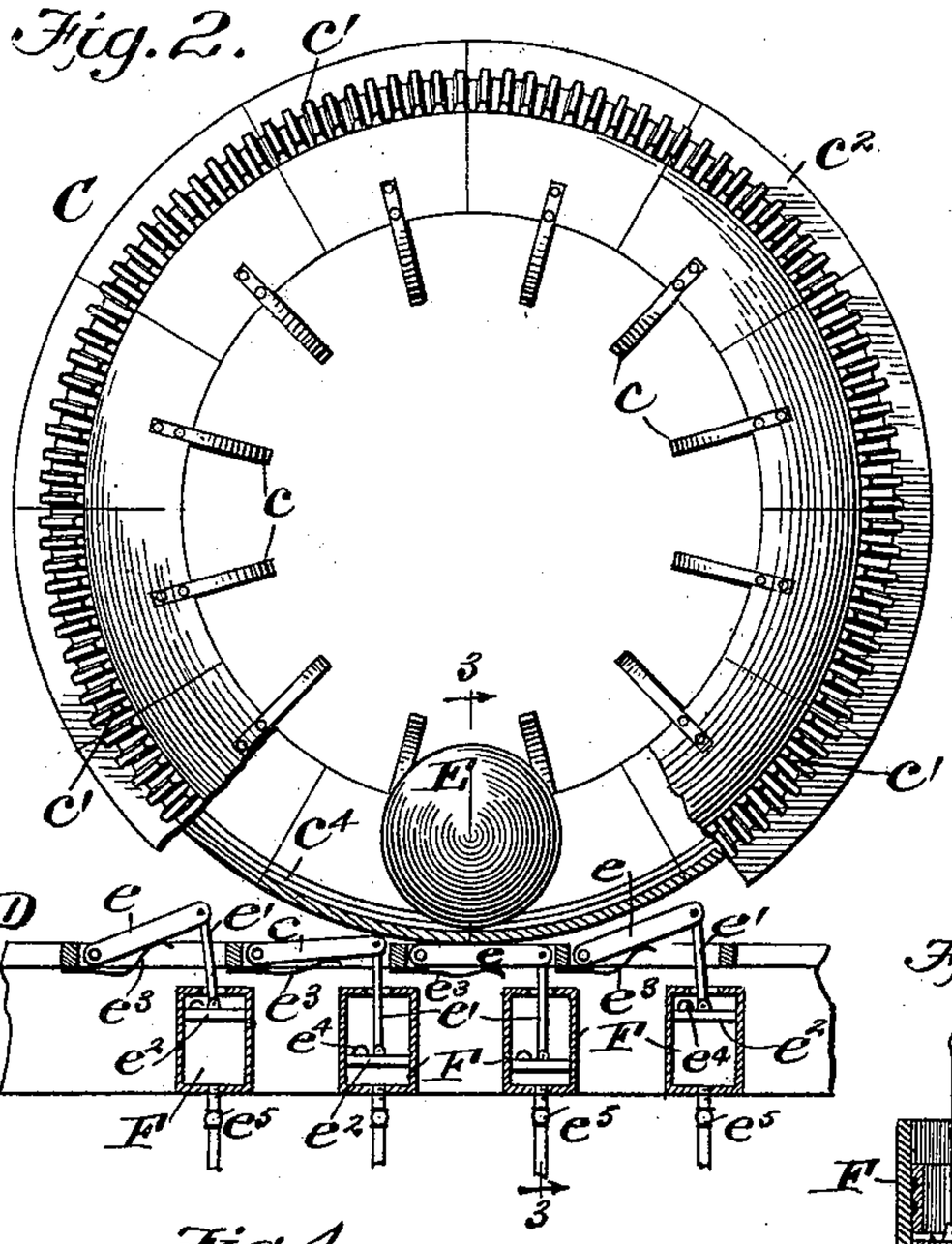


Fig. 4.

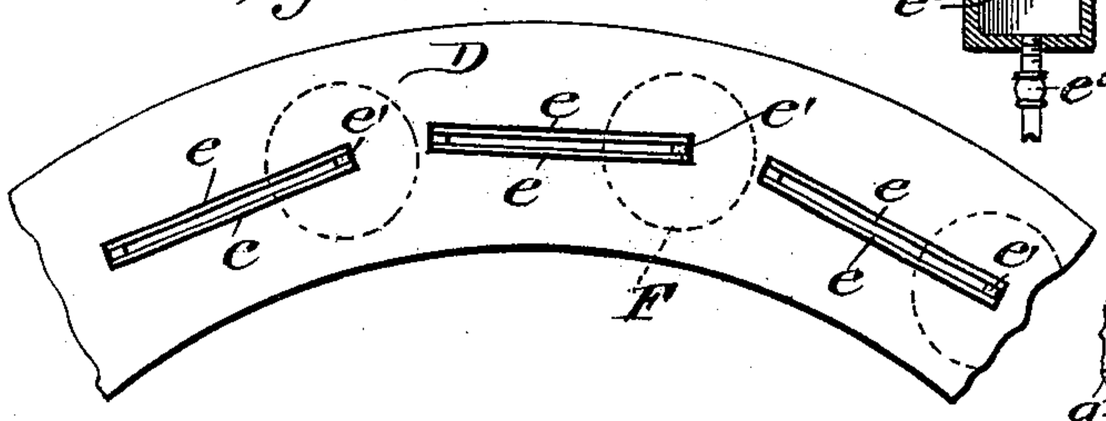


Fig. 3.

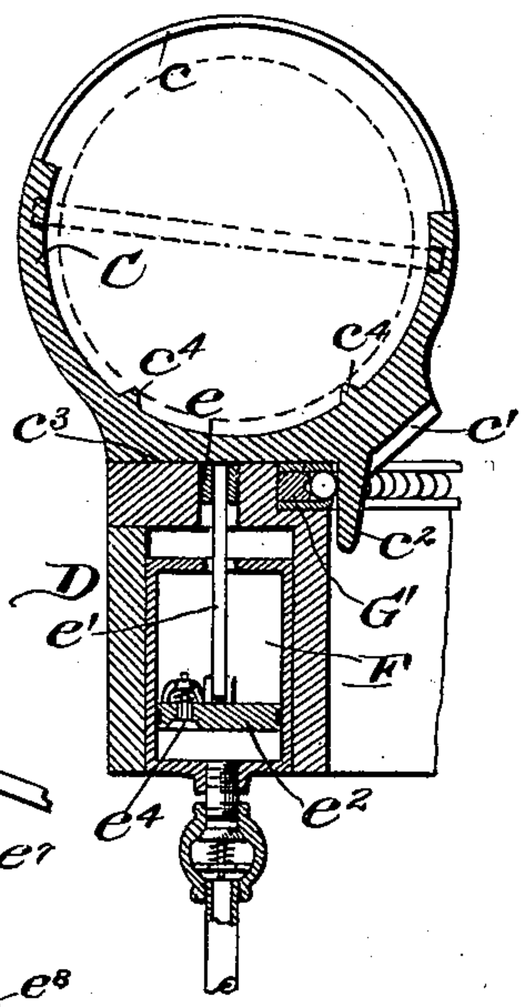


Fig. 7.

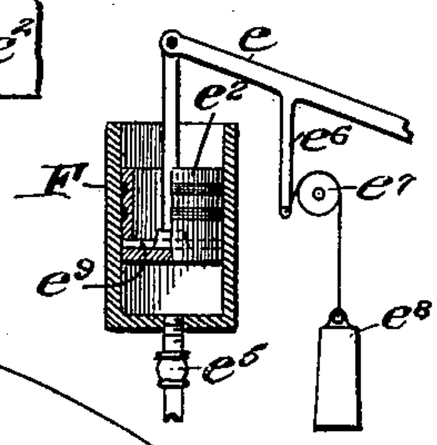


Fig. 6.

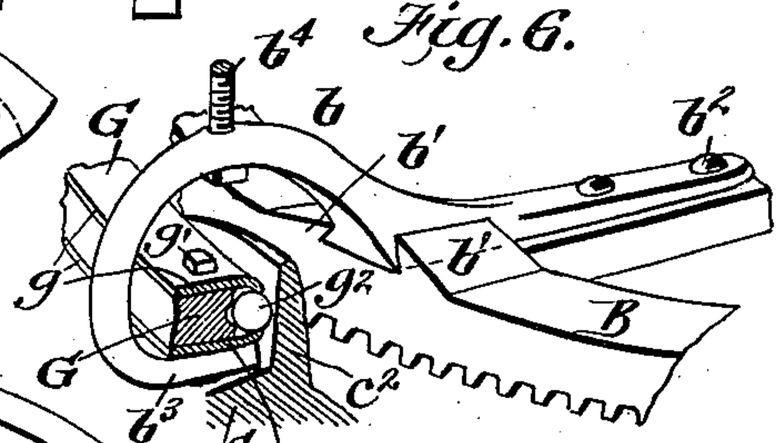
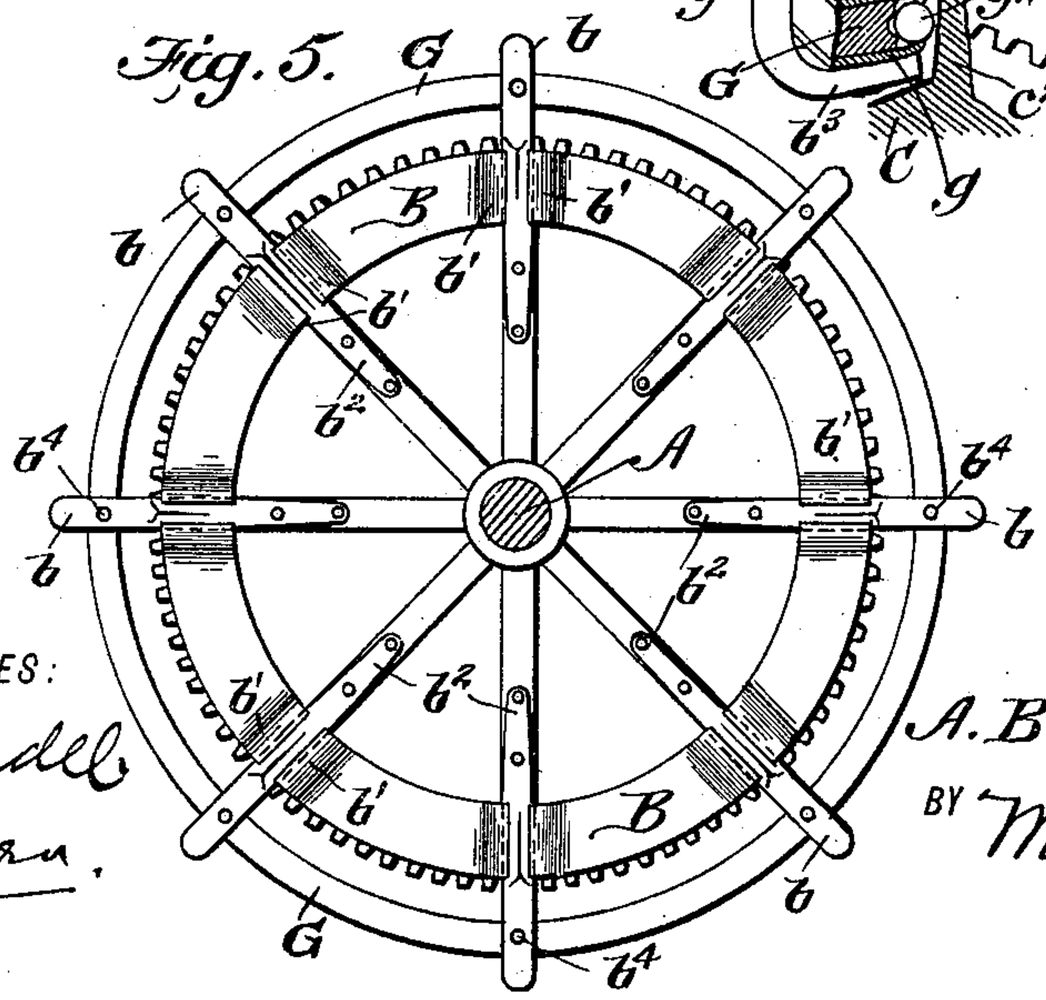


Fig. 5.



WITNESSES:

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AARON B. PERINE, OF TOPEKA, KANSAS.

MEANS FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 594,276, dated November 23, 1897.

Application filed February 18, 1897. Serial No. 623,930. (No model.)

To all whom it may concern:

Be it known that I, AARON B. PERINE, of Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful Improvement in Engines for Transmitting Power, of which the following is a specification.

My invention is in the nature of an improved engine for transmitting power derived from any suitable source of power into useful applications of the same, and more particularly for the utilization of the same for compressing air; and it consists in the peculiar novel construction and arrangement of parts whereby I am enabled to secure a very effective application of the power in an economical way and with but little friction, as will be hereinafter more fully described with reference to the drawings, in which—

Figure 1 is a vertical sectional elevation of the machine. Fig. 2 is a side view, partly in section, of one of the rolling wheels and its track. Fig. 3 is an enlarged section through line 3 3 of Fig. 2. Fig. 4 is a plan view of a part of the track. Fig. 5 is a plan view of the driving gear-wheel and the upper ball-bearing, and Fig. 6 is an enlarged detail in perspective of a part of said gear-wheel and its attached ball-bearing rim. Fig. 7 is a sectional detail of the cylinder-piston and modification of means for raising it.

In the drawings, Fig. 1, A is a vertical shaft whose lower end is sustained upon a base-plate a^2 and whose upper end is held in a bracket a'. Upon the upper part of the shaft is arranged a large pulley P^5 and a bevel gear-wheel B, both connected by bolts b^4, so as to rotate together. The pulley P^5 is driven by a belt P from a smaller pulley P^3, which latter is on the same shaft with another larger pulley P^2, and which in turn is driven by a belt P, extending to the pulley P of any prime mover—such as an electric motor, a steam or gas engine, or water-power. As shown, the large drive-pulley P^5 and gear-wheel B are arranged to revolve loosely upon the central shaft, while the shaft stands still; but, if desired, the shaft may be rigidly fixed to the said wheels and be made to turn with them on its plate a^2, as on a step-bearing, if desired.

The gear-wheel B is provided with a series of bevel-teeth that mesh with a series of corresponding bevel gear-teeth c', formed on the edge of two or more traveling wheels C C. These wheels occupy a plane inclined at the top inwardly from the vertical and have on their peripheries outside of the teeth c' a tread-surface c^3, arranged to roll upon a circular track D below, which is arranged concentrically about the shaft A. These rolling wheels rotate about their own centers and also revolve or roll around the shaft A on the track D with a gyratory motion. Said wheels have no central bearing and are constructed simply as a hollow circular rim or trough, within each of which rolls a very heavy ball E. The gyratory wheels and balls may be of any size, but the wheels are preferably about twenty feet high. The balls are preferably about four feet in diameter and weigh about eleven tons. To get this weight within a limited size, the ball should be formed of a cast-steel shell filled solidly with molten lead. The gyratory wheels are made as a cast-iron shell in sections riveted together and having upon the inner surface a skeleton-like construction of open bars c, which retain the ball and brace the sides of the cast-metal sections. On the inside of the wheels on the cast-metal casing are formed parallel track-ribs c^4 c^4, running around the inside of the wheels and upon which the ball is sustained and rolls with the least possible friction as the wheels travel on the subjacent track. To guide the wheels in their gyratory motion, they are formed with peripheral flanges c^2, Figs. 1 and 6, which are guided by ball-bearings both above and below. The upper ball-bearing is shown best in Figs. 5 and 6. It is carried by bevel gear-wheel B and is constructed as follows: Onto the upper side of the gear-wheel in radial position are secured a series of hook-shaped supporting-arms b. Their shanks are made of a dove-tail cross-section and are driven into a dove-tail slot b', formed on the upper side of the wheel and then securely bolted thereto. The upper sides of these arms form a connecting-point for the bolts b^4, Figs. 1 and 6, that rigidly connect wheel B to the driving-pulley above, and in the hooked portion of the outer

end of these arms is sustained a compound ring G, that occupies a position just outside of the gear-teeth and also outside of the flange c^2 of the gyratory wheels C. This is the ball-bearing ring, and it is formed of a solid body portion G, Fig. 6, with overlapping strips of metal g g on top and bottom bent toward each other on the inner side to retain the series of balls g^2, which extend all the way around the wheel B. The compound ball-bearing ring, composed of the body part G and the retaining-strips g g, is connected together by bolts g' and is secured to the outer ends of the radial arms b and revolves with the gear-wheel B. As the gyratory wheels C roll around from the power imparted to them by the gear-teeth of wheel B the flange c' of the said gyratory wheel bears on its outer side against the projecting surfaces of the balls g^2 with the least possible friction, said ball-bearing preventing the upper end of the gyratory wheels from moving outwardly and holding its teeth always engaged with those of its driving-wheel B. A similar ball-bearing G', Fig. 3, is arranged on the inner edge of the track D and holds the lower edge of the wheels from moving outwardly and reduces friction at this point.

The tread-surfaces c^3 of the gyratory wheels as they roll around on the track D are made to depress the pistons of a series of air-compressing cylinders arranged beneath the track all the way around its circumference. These cylinders are shown at F, and are best illustrated in Figs. 2 and 3. The track is formed with a series of slots through it, as shown in Fig. 4, and in these slots are pivoted depressing-arms e e, which are hinged or pivoted (see Fig. 2) at one end to the track and at the other end to the piston-rods e', which pass down through the open ends of the cylinders and are jointed to the pistons thereon. These pistons have in them downwardly-opening valves e^4, and the discharge-pipe from the lower ends of the cylinders are also provided with downwardly-opening check-valves e^5. When a piston descends, it forces the air below it down through the check-valve e^5, and when the piston rises check-valve e^5 closes and air passes from above the piston through its valve downwardly into the space in the cylinder below. These pistons are forced downwardly by the weight of the gyratory wheels C and the weighted balls within the tread c^3 of the wheels acting upon the depressing-bars e, as shown in Fig. 2, while the pistons are raised after the wheels pass beyond them by springs e^3 beneath the depressing-bars.

As a substitute for the springs for raising the piston after being depressed I may use weights, as shown in Fig. 7, for which purpose a stem e^6 extends downwardly from the depressing-bars e and is attached to a cord passing over a pulley e^7, whose lower end is attached to a weight e^8. When the piston goes down, the weight goes up, and the gravity of the weight in descending raises the piston again. The piston which I use also is cup-shaped, as shown in Fig. 7, with packing-rings around it and a pin e^9 passing through it from side to side and securing the piston-rod.

If desired, the weighted balls E within wheels may have an axle sliding at its ends in grooves in the wheel, as shown in dotted lines in Fig. 3, or the balls may be omitted and the wheels themselves may be made heavier; but I prefer the movable balls or traveling weights, as they lie closer down to the work and give a better leverage and greater steadiness to the wheels by keeping the center of gravity close down to the point of support.

By means of the device thus described I secure the application of power to great advantage with but little friction and am enabled to secure a practically continuous blast of air from a rapid succession of impulses from the several cylinders, which latter may be multiplied indefinitely in number.

An important advantage is that I secure the greatest leverage of the wheels and the greatest power for compression at the end of the stroke of the piston when the air is most compressed in the cylinder and needs the greatest power and positive action.

The object in inclining the wheels C inwardly at the top is to keep the gears in mesh, so that there will practically be no pressure on the ball-bearings at the top until the air-pressure in the receivers becomes great enough to require much more power, which has a tendency to force the wheels out at the top against the ball-bearings.

Only two of the gyratory wheels are shown; but I do not confine myself to two, but may use any number consistent with the diameter of the track. The size and weight of the wheels and balls and the proportion of the gears and track, it will be understood, may be changed at will to suit the various requirements of the work to be done, and I do not confine myself to the exact construction and arrangement of the parts, as these may be varied within certain limits without departing from my invention. Thus, for instance, the compression-cylinder may be used as a pump for liquids. I do not confine myself to the use of compressing-cylinders even, as these may be omitted and the weighted gyratory wheels alone may be made to act on a bed on all crushing, grinding, and pulverizing operations in milling, mining, &c.

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

1. An engine for transmitting power, consisting of a circular track, one or more upright wheels traveling on the same with a gyratory motion, each provided with teeth on its periphery, a driving gear-wheel meshing with the gear of the gyratory wheel, means

for rotating said gear-wheel, and a circular series of ball-bearings arranged to resist the outward trend of the gyratory wheel at the upper and lower points of contact substantially as shown and described.

2. An engine for transmitting power, comprising a circular track, one or more upright gyratory wheels running on said track and inclined inwardly at the upper end, and having peripheral gear-teeth and a driving gear-wheel, and means for actuating it, and a circular series of ball-bearings for guiding the gyratory wheels in their revolutions and resisting their outward trend substantially as shown and described.

3. An engine for transmitting power, comprising a hollow upright traveling wheel having within the same a weight gravitating along the lower inner periphery of the hollow wheel, a peripheral gear on said traveling wheel, a gear-wheel meshing therewith and rotating it with a gyratory motion, and a supporting-track, substantially as and for the purpose described.

4. The combination of one or more upright traveling gyratory wheels each having gear-teeth on its periphery and a peripheral flange, a subjacent circular track with ball-bearings fitting against the side of said flange, and a driving gear-wheel at the top also provided with a ball-bearing for the side of said flange substantially as and for the purpose described.

5. The gear-wheel B carrying outside its ring of teeth a circular ball-bearing ring, in combination with a gyratory wheel having a circumferential row of teeth engaging with the gear-wheel, and a circumferential flange between its gear-teeth and its ball-bearing substantially as and for the purpose described.

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