No. 829,507. PATENTED AUG. 28, 1906.

H. B. COLLINS.

POWER TRANSMITTING MECHANISM.

APPLICATION FILED MAY 26, 1904.

4 SHEETS—SHEET 1.

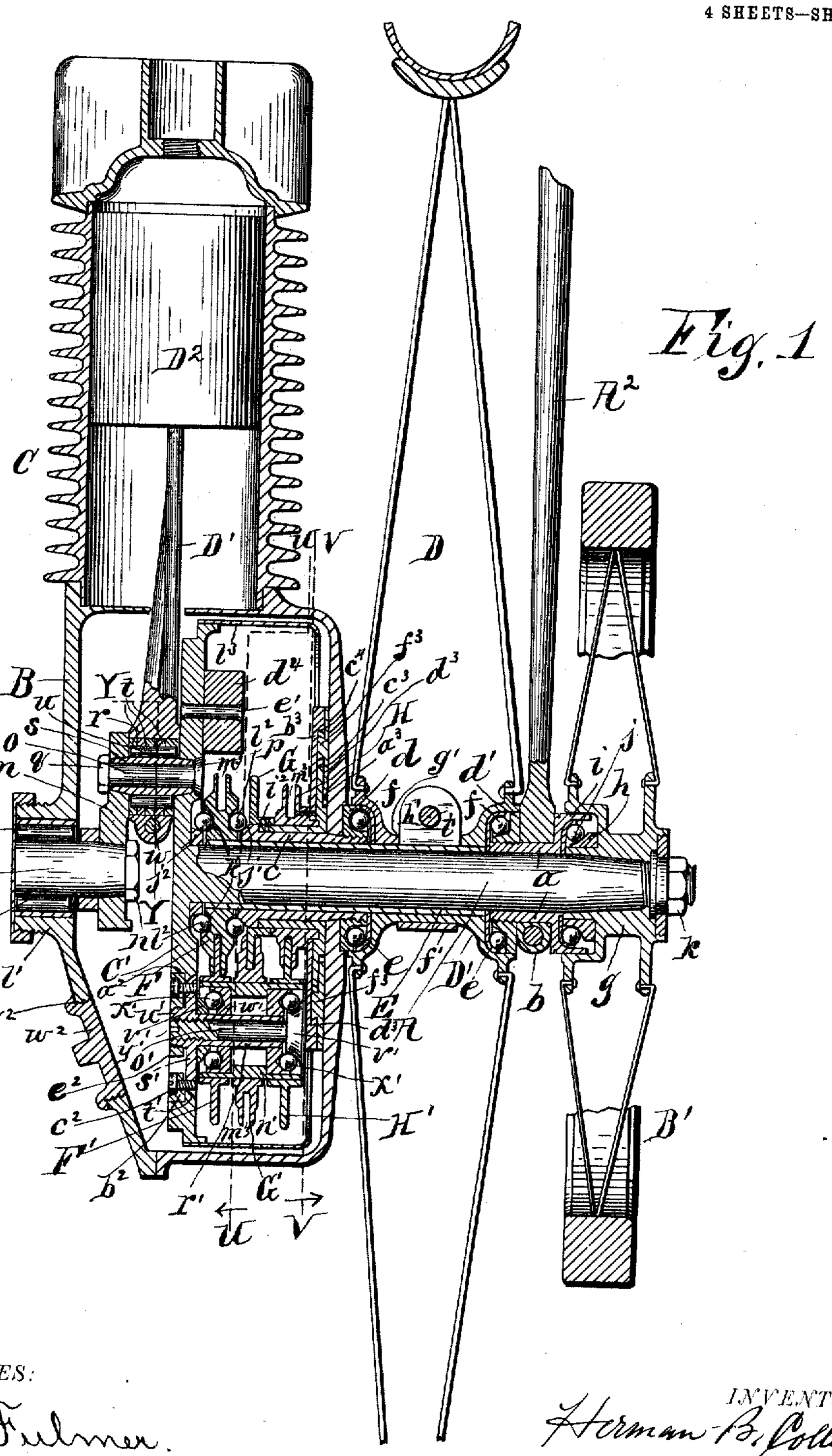

Fig. 1.

WITNESSES:

E. H. Fulmer.

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4 SHEETS—SHEET 2.

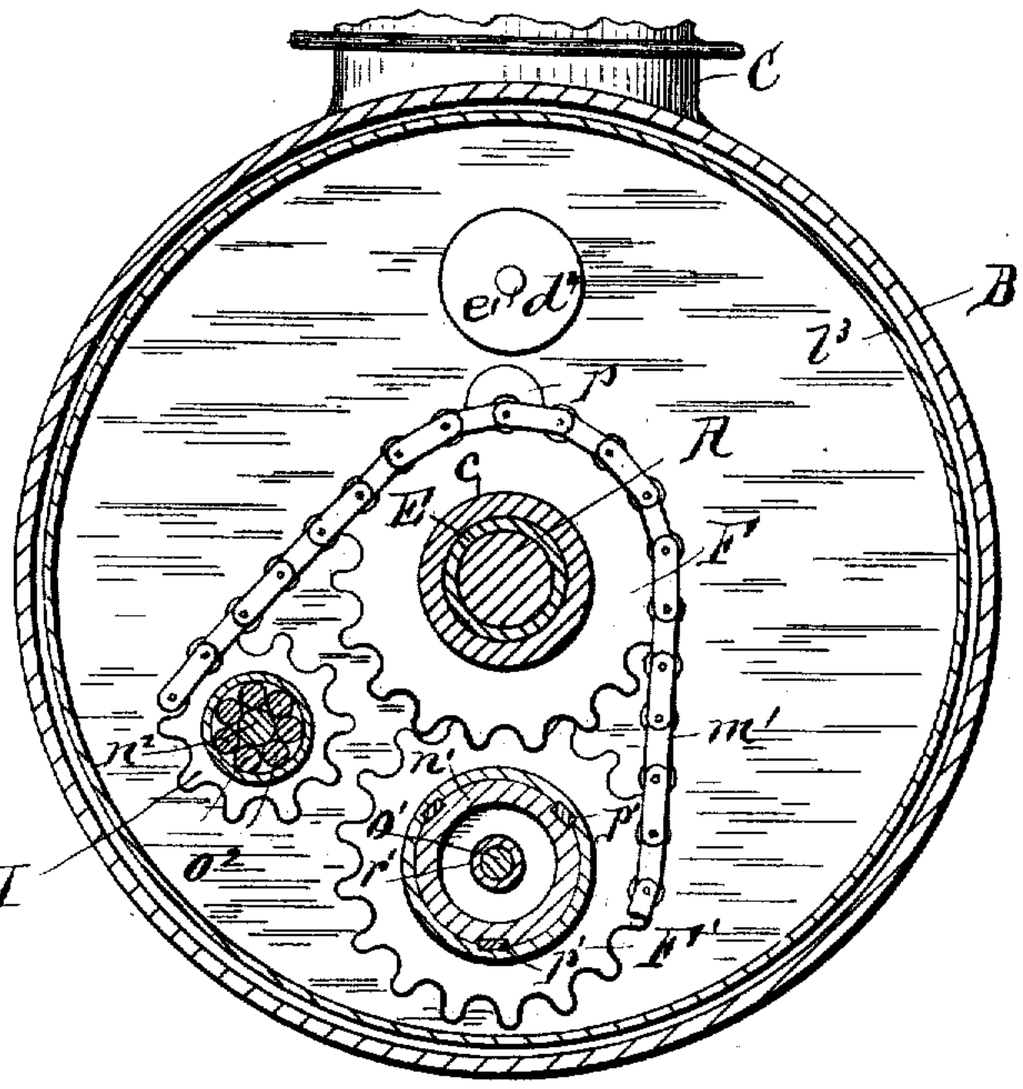

Fig. 2

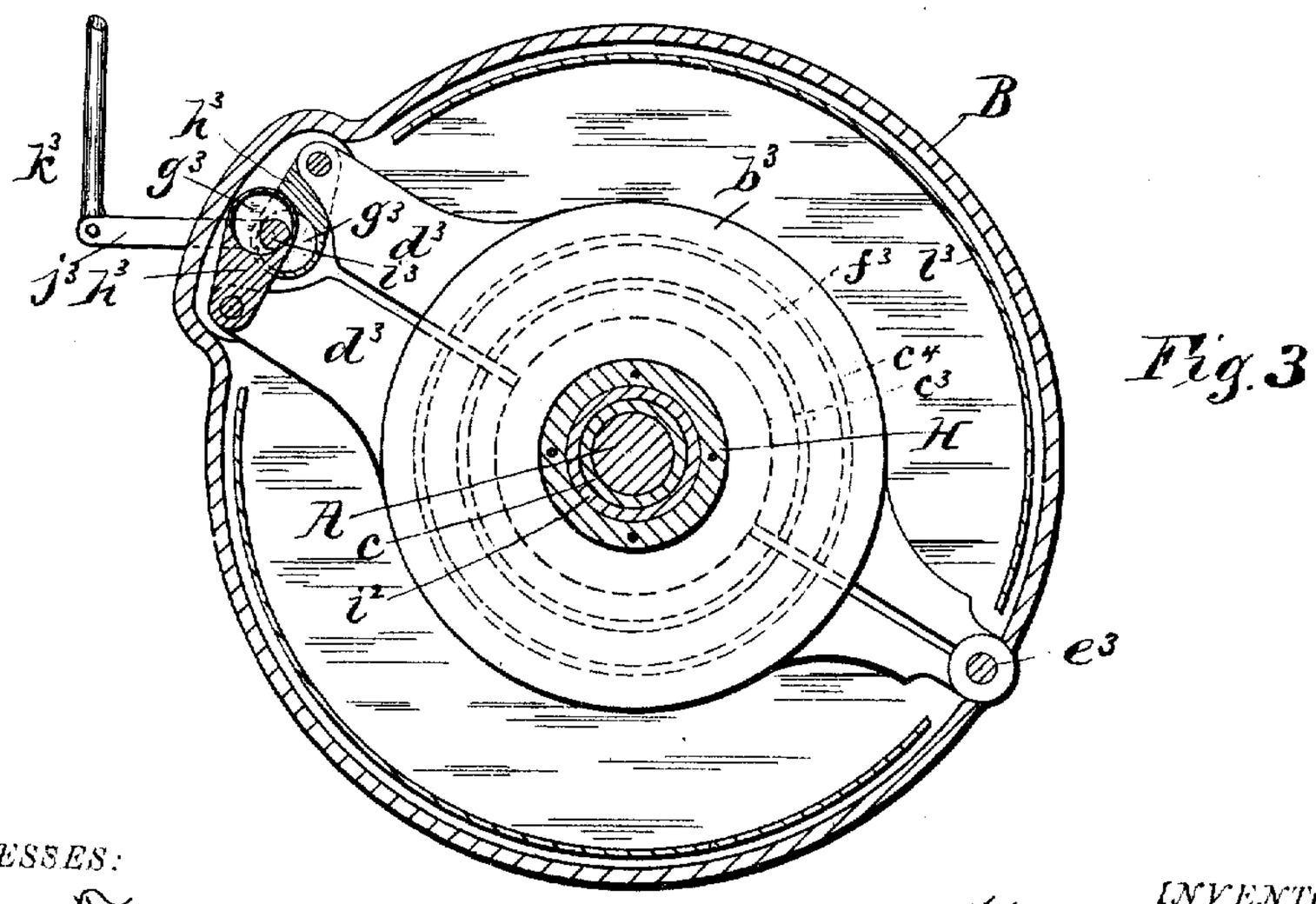

Fig. 3

WITNESSES:

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No. 829,507. PATENTED AUG. 28, 1906.

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POWER TRANSMITTING MECHANISM.

APPLICATION FILED MAY 25, 1904.

4 SHEETS—SHEET 3.

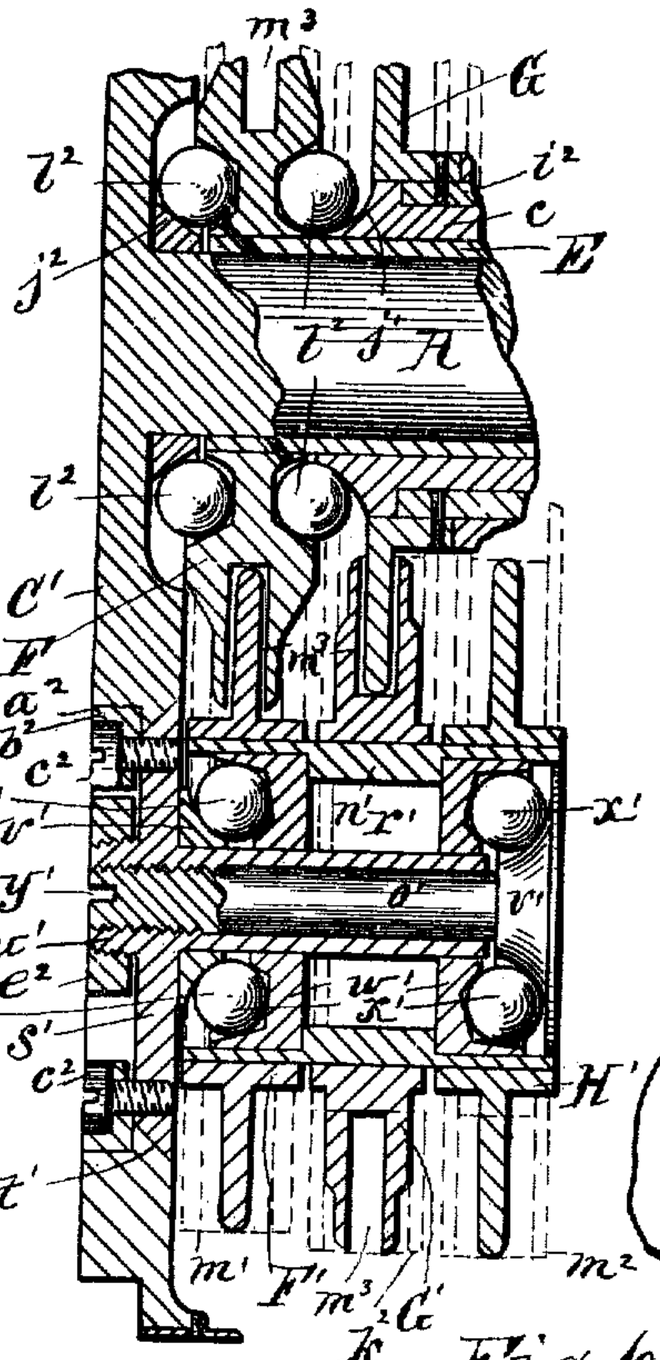

Fig. 6

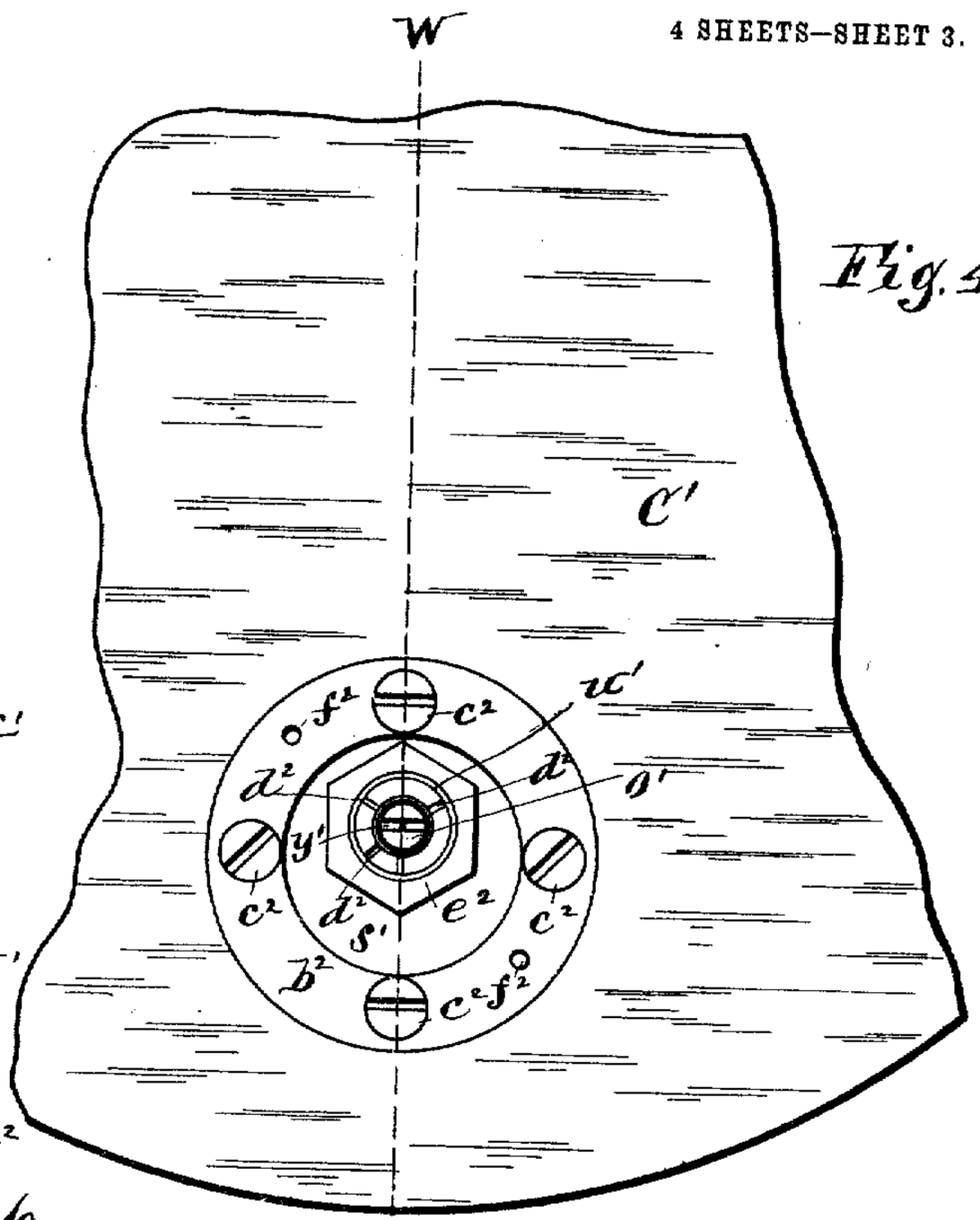

Fig. 4

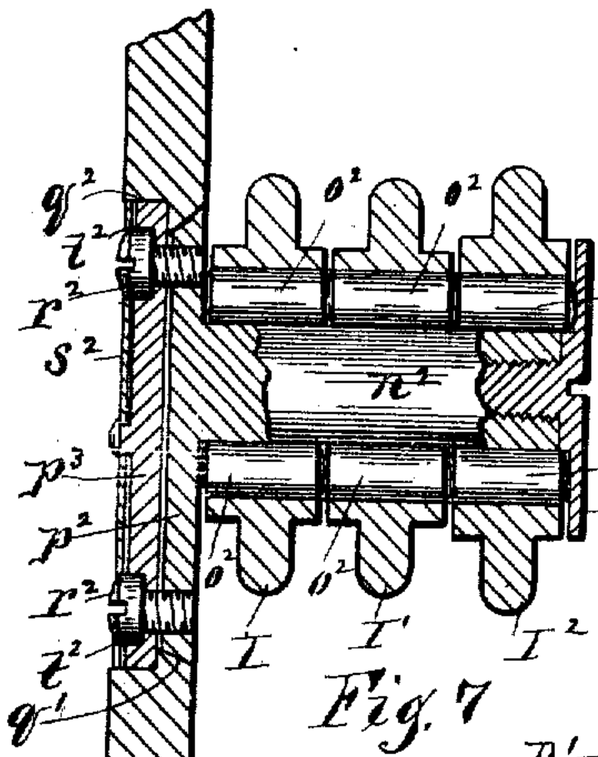

Fig. 7

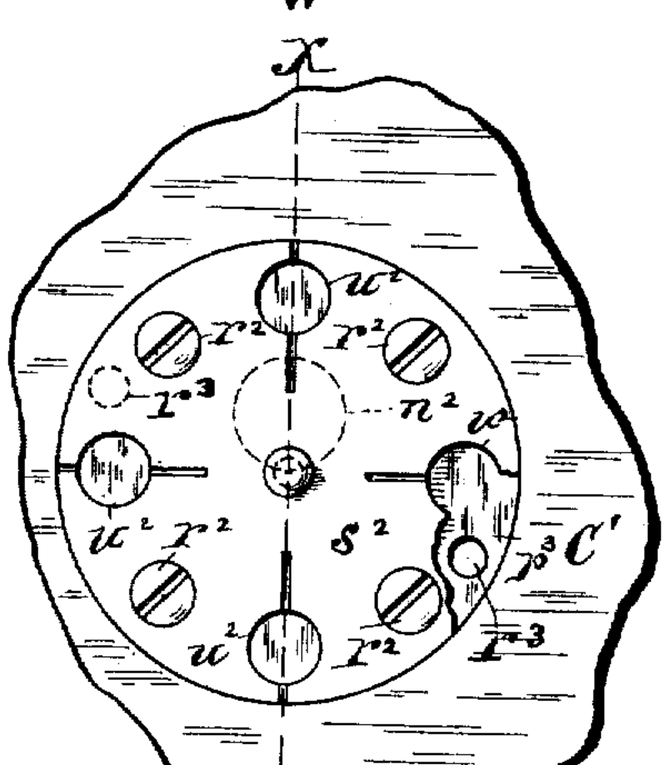

Fig. 5

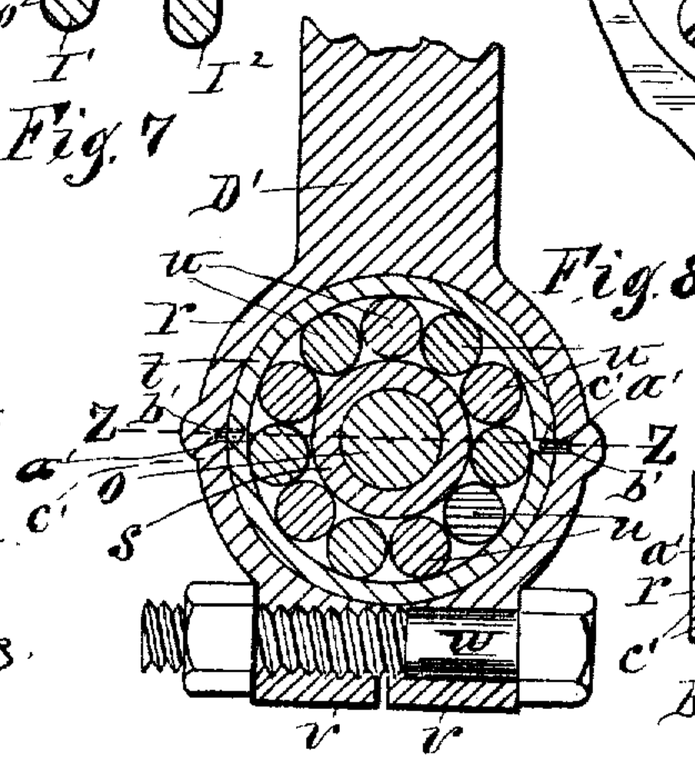

Fig. 8

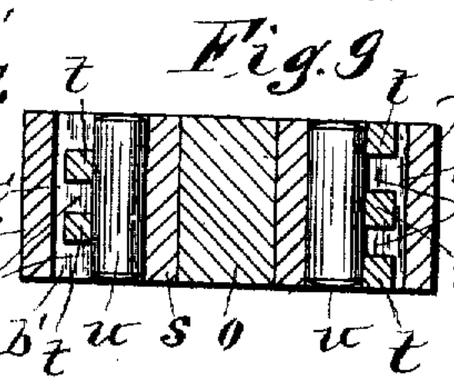

Fig. 9

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PATENTED AUG. 28, 1906.

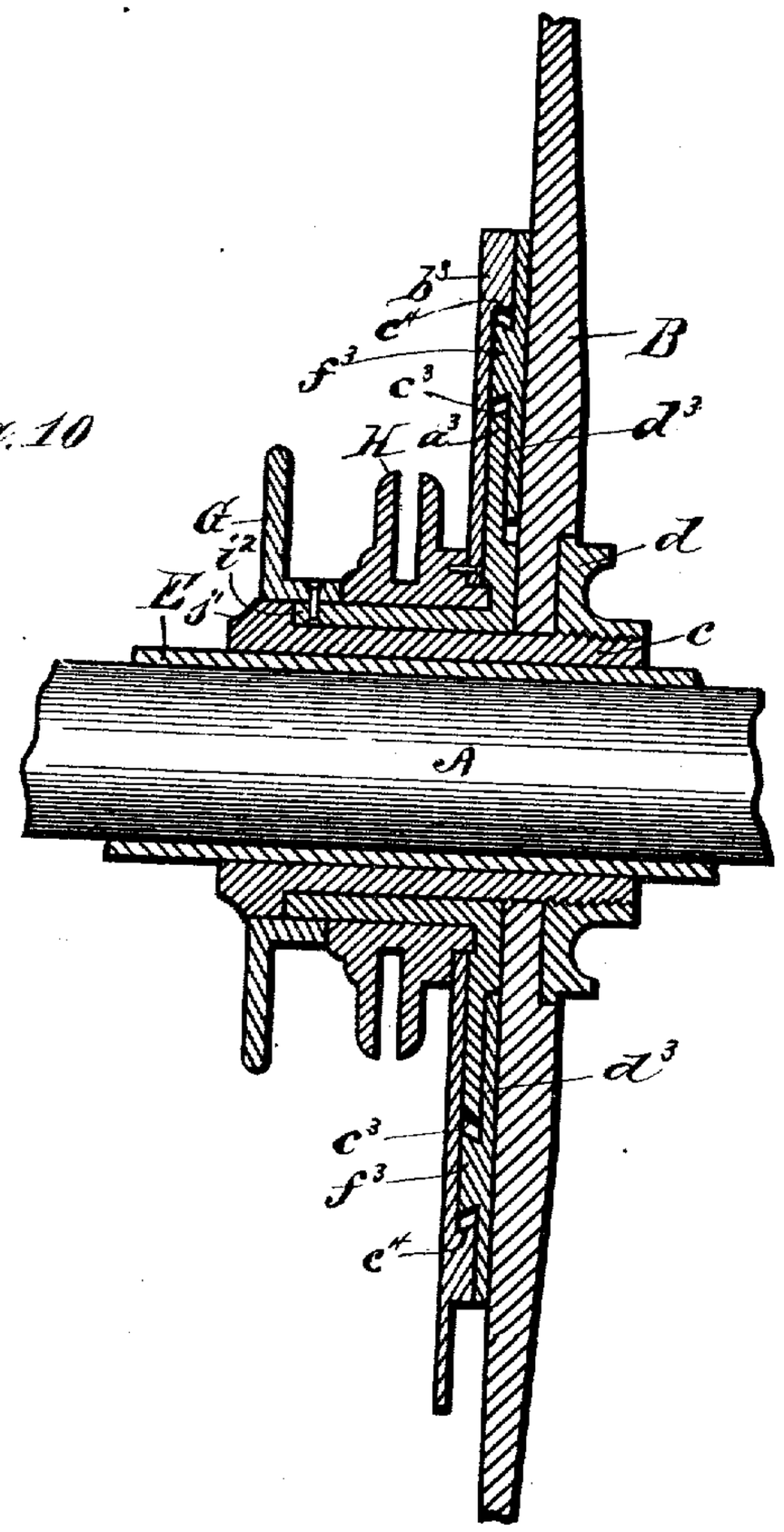
H. B. COLLINS.

POWER TRANSMITTING MECHANISM.

APPLICATION FILED MAY 25, 1904.

4 SHEETS—SHEET 4.

Fig. 10



WITNESSES:

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UNITED STATES PATENT OFFICE.

HERMAN B. COLLINS, OF FULTON, NEW YORK.

POWER-TRANSMITTING MECHANISM.

No. 829,507. Specification of Letters Patent. Patented Aug. 28, 1906.

Application filed May 25, 1904. Serial No. 209,659.

To all whom it may concern:

Be it known that I, HERMAN B. COLLINS, of Fulton, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Power-Transmitting Mechanism, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of mechanisms which are employed in connection with an engine or motor for transmitting the power thereof to the object to be driven.

The invention is applicable for various purposes, but is more particularly designed for propelling motor-vehicles.

The object of the present invention is to produce a power-transmitting mechanism which shall be simple in construction, efficient and reliable in its operation, and which can be easily and conveniently controlled, whereby the speed imparted to the vehicle-wheel shall be effectually regulated and shall permit unrestrained traveling of the vehicle under momentum when the engine or motor is at rest and shall allow the motive power to be cut off and applied at will while the vehicle is under motion without subjecting the mechanism to jar or strain.

To that end the invention consists in the novel construction and combination of parts of the transmission mechanism, as hereinafter fully described, and set forth in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of my invention applied to a bicycle, a portion of the front or driven wheel and frame being partly shown. Figs. 2 and 3 are vertical transverse sections on lines U U and V V, respectively, in Fig. 1. Figs. 4 and 5 are enlarged outer face views of portions of the main driving-disk, illustrating the eccentric devices for adjusting the arbors of the auxiliary transmission sprocket-wheel and auxiliary driving sprocket-wheels and the idler sprocket-wheels, respectively. Figs. 6 and 7 are sectional views on lines W W and X X, respectively, in Figs. 4 and 5. Fig. 8 is an enlarged longitudinal section on line Y Y in Fig. 1. Fig. 9 is a transverse section on line Z Z in Fig. 8. Fig. 10 is an enlarged detail sectional view showing more clearly the means for locking the main driving-wheels against rotation one at a time.

Referring to the said drawings, A^2 represents a portion of one of the usual so-called "front-fork sides" of a bicycle-frame, which frame member is provided at its lower end with a bushing *a*, rigidly secured thereto by means of a suitable clamp *b*, formed on said frame member.

B represents an annular casing in which the transmission devices are housed, as hereinafter described. On said casing is mounted a cylinder C of a reciprocating-piston engine, which may be of any suitable and well-known type and may be supported at its upper end on the bicycle-frame in any convenient manner. Said casing is provided in one end with an opening in which is rigidly secured a bushing *c*, which protrudes therefrom. This bushing and the aforesaid bushing *a* are axially in line with each other and are provided with exteriorly-screw-threaded portions to which are applied bearing-cones *d d'*, respectively abutting against said casing and frame member.

D represents the front wheel of the bicycle, which in the present instance constitutes the driven wheel and has its hub D' provided with the usual bearing-cups *e e*, and between said cups and cones are interposed the usual sets of antifriction-balls *f f*.

A denotes the main rotary shaft which passes freely through said bushings *a c* and hub D', and on the end adjacent to the frame member is rigidly mounted a fly-wheel B', which has its hub *g* applied to the shaft with a tapering fit. Said end of the shaft is journaled by means of a bearing-cone *h*, fastened to the hub of the fly-wheel, and a bearing-cup *i*, fastened to the outer end of the bushing *a*, between which cup and cone are interposed antifriction-balls *j j*. The said fly-wheel is secured to the shaft by means of a nut *k*, applied to the screw-threaded end of the shaft. This shaft is composed of two sections having their adjacent ends disposed within the casing, the section A' thereof having its outer end journaled on suitable rollers *l l*, interposed between the shaft and a hub *l'*, formed on the casing. To the inner end of said shaft-section A' is rigidly secured a crank *m* by means of a nut *n*, applied to the section. On the adjacent end of the main section of the shaft A is rigidly mounted a rotary disk C', preferably formed integral therewith. This disk constitutes the primary driving member of the transmitting mechanism, as will be shortly described. Said disk C' is pivotally connected to the aforesaid crank *m* by means of a pin *o* passing through said parts and having a head *p*

on one end countersunk in the disk and provided on the other end with a screw-thread to which is applied a nut q, bearing on the outer face of the crank.

D′ denotes a pitman or rod which is actuated by the reciprocating piston D² of the engine-cylinder C. The lower end of this pitman is provided with an annular box r, by which it is journaled on the aforesaid pin o. The said pin is rigidly embraced by a sleeve or bushing s, and the box r of the pitman is provided with split bearing-rings t t, and between these rings and sleeve are interposed antifriction-rollers u u. This box r is slitted through its lower portion on a line parallel to the axis of the pin o and is provided on opposite sides of the slit with ears v v, having perforations for the reception of a clamping-bolt w. Said box is also provided in its interior at opposite sides with longitudinal grooves a' a', in which are arranged retaining-plates b' b', provided with inwardly-projecting tongues c' c', engaging the slits of the rings and serving to hold the same in position. These rings and the rollers u u are formed from hard steel. To the disk C′ is fastened a counterbalance-weight d^4 by means of a pin e'.

E denotes a revoluble sleeve passing freely through the bushing c of the casing and loosely embracing a portion of the main shaft A, and which is rigidly fastened at one end to the interior of the hub D′ of the driven wheel D by means of a clamping-band f'. The said hub D′ is provided with an opening in one side, as indicated at g', whereby the clamping-band f' is allowed to embrace a portion of both the hub and sleeve. This opening permits the hub to be contracted slightly when the clamping-band is tightened, and thereby causes the hub to firmly grip the sleeve. This clamping-band is formed with perforated ears h' for the reception of a screw or bolt i' for tightening the same. On the end of the sleeve E within the casing is rigidly secured a sprocket-wheel F, preferably by means of pins. This sprocket-wheel constitutes the main transmission-wheel, by the rotation of which the said sleeve is caused to impart motion to the driven wheel D. On the adjacent end of the aforesaid bushing c and on the shaft A are provided the well-known bearing-cones j' j^2, respectively, and in the opposite sides of the sprocket-wheel are provided bearing-cups k' k', between which cones and cups are interposed the usual sets of antifriction-balls l^2 l^2. These bearings and the aforesaid ball-bearings can be readily and simultaneously adjusted by the operation of the nut k on the opposite end of the main shaft A, as clearly shown in Fig. 1 of the drawings.

F′ represents a sprocket-wheel, which I term an "auxiliary" transmission-wheel and which is connected to the main transmission-wheel F by means of the usual chain m' and has a less number of teeth than the main transmission-wheel. Said auxiliary sprocket-wheel F′ is mounted on a barrel n', journaled on an arbor o', projecting from the face of the rotary driving-disk C′, which arbor is caused to travel in a path around the main transmission-wheel F by the rotation of said disk. The said sprocket-wheel F′ is firmly locked to the barrel n' by means of keys p', as shown in Fig. 2 of the drawings. The aforesaid arbor o' is embraced by a sleeve r', which is formed integral with an annular plate s', which is eccentric thereto and is seated on a circumferential beveled shoulder t' of an opening provided in the disk C′. Said plate s' is formed with a tapering hub u' on its outer face, which hub is screw-threaded both internally and externally, and the outer end portion of the arbor o' is screw-threaded and engages the internal thread of the hub to allow the arbor to be turned therein to adjust the bearings of the barrel n'. These bearings comprise the usual cones v' v' and cups w' w', secured to the arbor and barrel, respectively, and antifriction-balls x' x', interposed between said cones and cups. The outer end of the said arbor is provided with a transverse groove y' for the application of a screw-driver for turning the same.

The driving-disk C′ is provided in its outer face with a circumferential shoulder around the opening referred to, as indicated at a^2, which shoulder is concentric to the aforesaid shoulder t' in the inner face of the disk. On said shoulder a^2 is seated an adjusting-ring b^2, fastened to the aforesaid plate s' by means of screws c^2 c^2, which serve to draw the said ring and plate firmly onto their seats. The hub u' of said plate s' is provided with radial slits d^2 d^2 to allow the same to be compressed to firmly grip the arbor o' by the tightening of a set-nut e^2, applied to the hub, as clearly shown in Fig. 4 of the drawings. The said ring b^2 is provided in its outer face with oppositely-disposed sockets f^2 f^2 for the application of the so-called "spanner-wrench" for turning the eccentric ring and plate, whereby the ring is caused to shift the arbor o' in relation to the axis of the sprocket-wheel F, and thereby regulate the tension of the chain m'. The casing B is provided in one end with a hand-hole j^2 to afford access to the arbor-adjusting devices and other parts requiring adjustment. This hand-hole is provided with a removable plug w^2.

G represents a sprocket-wheel, which I term the main "low-speed" driving-wheel and which is provided with a cylindrical hub i^2, by which it is journaled on the aforesaid rigid bushing c, surrounding the revoluble sleeve E.

G′ represents an auxiliary or coöperating low-speed sprocket-wheel which is mounted on the aforesaid barrel n', journaled on

the arbor o', and which is connected to the main driving sprocket-wheel G by the usual chain k^2. (Shown in dotted lines.) The gearing of these low-speed driving-wheels G G′ is preferably of the same ratio as that of the transmission-wheels F F′, but of a reverse order—*i. e.*, the main transmission-wheel F and auxiliary driving-wheel G′ in the present instance are each provided with eighteen teeth and the auxiliary transmission-wheel F′ and main driving-wheel G are provided with seventeen teeth each, thereby producing substantially nine to one relation between the driving-disk C′ and ground-wheel or driven wheel D.

H represents a sprocket-wheel termed the main "high-speed" driving-wheel which is journaled on the aforesaid cylindrical hub i^2 of the main low-speed driving-wheel G and rotated independently thereof. H′ represents an auxiliary high-speed driving-wheel which is also mounted on the aforesaid barrel n', journaled on the arbor o', which wheel is connected to the main high-speed wheel by chain m^2. (Shown in dotted lines.) The number of teeth of these sprocket-wheels H H′ differs from that of the driving-wheels G G′, being provided with sixteen and eighteen teeth, respectively, thereby producing substantially a six to one relation between said driving-disk C′ and driven wheel D. The said auxiliary driving-wheels G′ H′ are locked to the said barrel n' by the aforesaid keys p', and thereby caused to rotate with the auxiliary transmission-wheel F′.

I I′ I^2 represent idler sprocket-wheels upon which the respective chains travel and which are provided with sufficient numbers of teeth to equalize the number of teeth in the sets of sprocket-wheels and permit the employment of chains of equal lengths. These idler sprocket-wheels are journaled to rotate independently upon a supplemental arbor n^2, projecting from the face of the driving-disk C′, and they are preferably provided with antifriction-bearings consisting of the well-known rollers o^2 o^2, interposed between the hubs of the said wheels and the arbor. Said arbor n^2 is formed integral with an eccentric-plate p^2, seated in the inner face of the disk upon a circumferential shoulder q' of an opening provided in the disk, which plate is securely held in its position by a clamping-plate p^3, concentric thereto and seated on a circumferential shoulder q^2 in the outer face of the disk, through which plates pass screws r^2 r^2. This clamping-plate is provided with sockets r^3 r^3 in its outer face for the reception of a suitable wrench for turning the plate. To the center of the outer face of the plate p^3 is pivoted a concentric spring-plate s^2, which is provided with a set of apertures t^2 t^2, arranged to register with the respective screws r^2 r^2 and which are of a diameter to allow the rounded heads of the screws to protrude slightly therethrough. The pressure of said plate s^2 on the said screws prevents the latter from becoming loose, and the said apertures permit the application of a screw-driver to the screws for turning the same when required. The said spring-plate is also provided with an additional set of apertures u^2 u^2 intermediate the aforesaid apertures and of greater diameter than the heads of the screws and serving to allow the latter to be removed. By turning the plates p^2 p^3, which are eccentric to the arbor n^2, the said arbor is shifted in relation to the axis of the transmission-wheel F and driving-wheel G H, thereby forming an additional adjustment for simultaneously regulating the tensions of the chains. It will be noted that by the employment of this latter adjusting device the means for adjusting the aforesaid arbor o' may be dispensed with, if desired. The outer end of the arbor n^2 is provided with a removable annular plate v^2, serving to retain the idler sprocket-wheels and the rollers o^2 o^2 thereon. To the respective main driving sprocket-wheels G H are rigidly fastened contiguous disks a^3 b^3, provided with concentric annular friction-surfaces c^3 c^4, respectively, which are arranged to be engaged by a pair of clamping-plates d^3 d^3, extending across one end of the casing B and pivoted at one end thereto, as indicated at e^3 in Fig. 3 of the drawings. On the respective plates d^3 d^3 are formed or rigidly secured a pair of friction-ring sections f^3 f^3, arranged between and adapted to grip the friction-surfaces c^3 c^4 of the disks a^3 b^3 to lock the said sprocket-wheels G H one at a time against rotation, as more clearly shown in Fig. 10 of the drawings, and for the purpose hereinafter fully described. These ring-sections f^3 f^3 are moved into and out of contact with said friction-surfaces by the movement of the free ends of the plates d^3 d^3 toward and from each other. This movement of the plates d^3 d^3 is effected by means of eccentrics g^3 g^3, which are connected to the plates by means of links h^3 h^3, pivotally connected to the free ends of the plates, as clearly shown in Fig. 3 of the drawings. Said eccentrics are fastened to a shaft i^3, suitably journaled on the casing B, and to said shaft is attached an outwardly-extending arm j^3, to the outer end of which is connected a rod k^3, which may be operated in any suitable manner for actuating the eccentrics. By the employment of the described means for operating said clamping-plates compactness is added to the construction. However, I do not limit myself in this respect; neither do I limit myself to the use of said clamping-plates for locking the sprocket-wheels G H against rotation, inasmuch as various devices may be employed for the purpose.

To the periphery of the rotary driving-disk C′ is rigidly fastened a cylindrical guard

l^3, surrounding the chain-and-sprocket mechanism, on which guard the chains are caused to lie by the centrifugal force of the disk in case of their breakage, and thereby prevent them from becoming entangled in the other parts.

To permit the employment of large sprocket-wheels and at the same time maintain a compactness, I form the wheels F′, G, and H′ with narrower teeth than the respective coöperating wheels F, G′, and H and provide the teeth of the latter wheels with slots, as indicated at m^3, through which slots the teeth of the former travel, as clearly shown in Figs. 1 and 6 of the drawings.

My described transmitting mechanism may be employed for various purposes and any motive power may be used for imparting rotary motion to the primary driving member of the mechanism, which member in the present instance consists of the described disk C′, and inasmuch as I have shown and described said mechanism as applied to a motor-cycle I shall now proceed to explain the operation of the same in such application, it being understood that any suitable or well-known means may be employed for controlling the engine. Assuming the engine and bicycle to be at rest, the main transmission sprocket-wheel F is held likewise by reason of its rigid connection with the driven wheel or ground-wheel D, and the friction ring-sections f^3 f^3 being out of engagement with the disks a^3 b^3 of the main driving sprocket-wheels G H the latter wheels are free to rotate independently, thereby permitting free and independent rotation of the driving-disk C′ and main shaft A with respect to the sleeve E, which connects the main transmission-wheel F to the hub of the driven wheel D. These parts being in the condition described, the bicycle is permitted to be trundled or pedaled in the well-known manner with entire freedom. If the engine is started while the bicycle is at rest, the pitman D′ imparts forward rotation to the driving-disk and main shaft, and by reason of the sprocket-wheel F being held at rest by the ground-wheel D, as stated, this forward rotation of the disk carrying the arbor o' in a path around the main sprocket-wheels causes the chain m' to be laid on and cast off from the sprocket-wheel F, whereby the auxiliary wheel F′ is rotated rearward and transmits like rotation to the main driving sprocket-wheels G H independently and at different speeds through the sprocket-wheels G′ H′, respectively, and their connecting-chains k^2 m^2, these latter wheels being connected to the auxiliary transmission sprocket-wheel F′ in the manner hereinbefore described. These different speeds of the wheels G H are attained by the difference in gearing with the respective connected wheels G′ H^2, as stated. A person having mounted the bicycle operates the rod k^3 by any suitable means to actuate the eccentrics g^3 g^3, which move the clamping-plates d^3 d^3 inward to cause their friction ring-sections f^3 f^3 to grip the annular friction-surface c^3 of the disk a^3, fastened to the main low-speed driving-wheel G with sufficient firmness to retard the rearward rotation of the latter wheel, whereby the auxiliary low-speed driving-wheel G′, carried on the said arbor, is caused to be retarded through the laying on and casting off of its chains k^2 relative to the retarded wheel G. This retarded movement of the wheel G′ causes the auxiliary transmission-wheel F′ to be retarded, whereby its chain m' imparts like movement to the main transmission-wheel, which latter in turn transmits a forward rotation through the sleeve E to the driven or ground wheel D. It will be understood that the other driving-wheel H is at this time free to rotate. By increasing the grip of said ring-sections g^3 f^3 on the said disk a^3 the rotation of the main transmission-wheel F is acclerated, and consequently increased speed is imparted to the driven wheel, and by firmly gripping the disk to lock the sprocket-wheel G against rotation the full action of the low-speed wheels G G′ is effected in the main transmission-wheel F, whereby the described gearing of these wheels and gearing of the transmission-wheels coöperating therewith causes the driven wheel D to be rotated once during nine revolutions of the driving-disk C′. If desired, the person in charge may operate the aforesaid rod k^3 to move the clamping-plates d^3 d^3 outward to cause the friction ring-sections f^3 f^3 to grip the friction-surface c^4 of the disk b^3, fastened to the main high-speed driving-wheel H, to lock the same against rotation in the manner described. This movement of the clamping-plates releases the disk a^3 of the wheel G and allows the latter to rotate freely. By locking said sprocket-wheel H the traveling of the arbor o' around said wheel causes the chain m^2 to be laid on and cast off from the wheel in the manner set forth, which action imparts decreased rotation to the connected wheel H′, whereby decreased speed is transmitted by the wheel F through the sleeve E to the ground or driven wheel D in the ratio of six to one. It will be understood that when the clamping-plates d^3 d^3 are actuated to render operative the transmission-gearing they are under all conditions sufficiently yielding to eliminate the sudden impact of explosion of the engine and insuring a smooth forward impulse to the rider and obviating the breaking of chains and other parts. By stopping the engine and operating the said clamping-plates to release both disks a^3 b^3 to allow the sprocket-wheels G H to rotate freely and independently the driving-disk C′ and main shaft A are caused to lose their rotary mo-

tion, whereby all of the sprocket-wheels are permitted to rotate freely with the driven wheel D, and thus allow the bicycle to travel under its momentum with little or no friction of said parts. While the engine is at rest and the bicycle is moving, the person mounted on the bicycle can readily start the engine at will and apply the power thereof by the operation of the clamping-plates in the manner hereinafter described. It is obvious that the forward movement imparted to the ground-wheel may be at any speed slower and the backward movement faster or slower than the primary driving member, which backward movement can be obtained by making the relative difference in size of a set of driving sprocket-wheels.

Having described my invention, what I claim is—

1. In a power-transmitting mechanism, the combination of a main shaft, the driven member free from the shaft, a primary driving member connected to the shaft, a main transmission-wheel rigidly connected to the driven member, an auxiliary transmission-wheel carried on the primary driving member and imparting movement to the main transmission-wheel, and suitably-controlled speed-regulating devices connected to the transmission-wheels as set forth.

2. In a power-transmitting mechanism the combination of a main shaft, the driven member free from the shaft, a revoluble sleeve loosely embracing said shaft and imparting motion to the driven member, a main rotary driving member connected to the shaft, a main transmission sprocket-wheel rigidly mounted on the sleeve, an arbor projecting from the main driving member and traveling in a path around the main transmission sprocket-wheel, an auxiliary transmission sprocket-wheel journaled on the arbor, a chain connecting said sprocket-wheels, and suitably-supported speed-regulating sprocket-wheels and chains connected to the auxiliary transmission sprocket-wheel, and means for controlling the action of said speed-regulating sprocket-wheels and chains, as set forth.

3. In a power-transmitting mechanism, the combination with the driven member, of a suitably-operated primary driving member, a main transmission-wheel connected to the driven member, an auxiliary transmission-wheel carried on the primary driving member and imparting movement to the main transmission-wheel, main and auxiliary driving-wheels connected to the primary driving member and transmission-wheels and geared to effect multiple speeds in the main transmission-wheel, and means for controlling the action of said driving-wheels as set forth.

4. In a power-transmitting mechanism, the combination with the driven member, of a suitably-operated primary driving member, a main transmission sprocket-wheel connected to the driven member, an auxiliary transmission sprocket-wheel carried on the primary driving member, a chain connecting the latter sprocket-wheel to the main transmission sprocket-wheel, main and auxiliary driving sprocket-wheels, connected to the auxiliary transmission sprocket-wheels and geared to regulate the speed imparted by the main transmission sprocket-wheel to the driven member, chains connecting the driving sprocket-wheels and means controlling the action of said driving-wheels as set forth.

5. In a power-transmitting mechanism, the combination with the driven member, of a suitably-operated primary driving member, a main transmission sprocket-wheel connected to the driven member, an auxiliary transmission sprocket-wheel carried on the primary driving member, a chain connecting said wheels, loosely-mounted main driving sprocket-wheels, auxiliary driving sprocket-wheels rotating with the auxiliary transmission sprocket-wheel, chains connecting said auxiliary driving sprocket-wheels with the respective main driving sprocket-wheels, and means for locking the latter wheels, one at a time, against rotation for the purpose set forth.

6. In a power-transmitting mechanism, the combination of a main shaft, a revoluble sleeve loosely embracing said shaft, the driven member rigidly connected to said sleeve, a rotary driving-disk rigidly secured to the shaft, a main transmission sprocket-wheel rigidly mounted on the sleeve, an auxiliary transmission sprocket-wheel journaled on the disk and connected to the main transmission sprocket-wheel, a main low-speed driving sprocket-wheel and a main high-speed driving sprocket-wheel journaled independently, auxiliary low-speed and high-speed driving sprocket-wheels connected to the respective main driving-wheels and to the auxiliary transmission sprocket-wheel, and suitably-controlled friction devices operative for locking the main driving sprocket-wheels, one at a time, against rotation for the purpose set forth.

7. In a power-transmitting mechanism, the combination of a main shaft, a revoluble sleeve loosely embracing said shaft, a driving-disk rigidly connected to said shaft, the driven member rigidly connected to said sleeve, means operating said disk, a main transmission sprocket-wheel rigidly mounted on the sleeve, an arbor projecting from the disk and traveling in a path around said sprocket-wheel, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said transmission sprocket-wheels, a main low-speed driving sprocket-wheel and a main high-speed sprocket-wheel journaled independently and axially in line with the main transmission sprocket-wheel,

auxiliary low-speed and high-speed driving sprocket-wheels journaled on the aforesaid arbor and fastened to the auxiliary transmission sprocket-wheel, separate chains connecting the said low-speed and high-speed driving-wheels, and means operative for controlling the action of said driving-wheels as set forth.

8. In a power-transmitting mechanism, the combination with a suitably-supported casing and main rotary shaft extending through the casing and journaled therein, of a revoluble sleeve loosely embracing said shaft, the driven member rigidly connected to said sleeve, a rotary driving-disk secured to the shaft within the casing, means for rotating said disk, a main transmission sprocket-wheel rigidly mounted on the sleeve adjacent to the disk, an arbor projecting from the face of the disk and traveling in a path around the main transmission sprocket-wheel, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said transmission sprocket-wheels, supplemental sprocket-wheels and chains journaled within the casing and actuated by the said disk and operative for imparting different speeds to the transmission-wheels, and suitably-operated means supported on the casing for controlling the action of said supplemental sprocket-wheels and chains for the purpose set forth.

9. In a power-transmitting mechanism, the combination with a suitably-supported casing, and a main rotary shaft journaled in said casing, of a revoluble sleeve loosely embracing said shaft, the driven member rigidly connected to said sleeve, a rotary disk rigidly fastened to the shaft within the casing, a suitably-operated crank journaled in the casing and imparting motion to said disk, a main transmission sprocket-wheel rigidly mounted on said sleeve, an arbor projecting from the face of the disk and traveling in a path around said sprocket-wheel, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said sprocket-wheels, a main low-speed driving sprocket-wheel and a main high-speed driving sprocket-wheel journaled independently in the casing and axially in line with the main transmission sprocket-wheel, auxiliary low-speed and high-speed driving sprocket-wheels journaled on the aforesaid arbor and fastened to the said auxiliary transmission sprocket-wheel, separate chains connecting the low-speed and high-speed wheels respectively, concentric disks rigidly fastened to the main driving sprocket-wheels respectively, and plates supported movably on the casing and provided with frictional means for engaging said latter disks to lock the sprocket-wheel thereof, one at a time, against rotation for the purpose set forth.

10. In a power-transmitting mechanism, the combination of a main rotary shaft, a revoluble sleeve loosely embracing said shaft, the driven member rigidly connected to said sleeve, a primary driving member rigidly connected to said shaft, a main transmission sprocket-wheel imparting motion to said sleeve, an auxiliary transmission sprocket-wheel carried on the primary driving member and connected to the main transmission sprocket-wheel, multiple-speed driving sprocket-wheels and chains connected to the transmission sprocket-wheels, concentric disks rigidly fastened to the main driving sprocket-wheels respectively, suitably-pivoted clamping-plates provided with friction-surfaces arranged to grip the said disks, one at a time, to lock the latter sprocket-wheels against rotation, and means for actuating said clamping-plates as set forth.

11. In a power-transmitting mechanism, the combination of a main rotary shaft, a revoluble sleeve loosely embracing said shaft, the driven member rigidly connected to said sleeve, a primary driving member rigidly connected to said shaft, transmission-wheels connected to the sleeve and driving member respectively, main driving-wheels, auxiliary driving-wheels connected to the main driving-wheels and transmission-wheels, concentric disks fastened to the main driving-wheels respectively and provided with annular friction-surfaces, a pair of suitably-pivoted clamping-plates each provided with a frictional ring-section arranged to grip the friction-surfaces of the disks, one at a time, to retard the rotation of the main driving-wheels and lock the same against rotation to impart variable speed to the transmission-wheels, and suitably-operated eccentrics for actuating said clamping-plates as set forth.

12. In a power-transmitting mechanism, the combination with a driven member, a primary driving member, transmission-wheels connected to the driven member and driving member respectively, multiple-speed main and auxiliary driving-wheels connected to the transmission-wheels, the main driving-wheels having affixed to them respectively concentric disks provided with annular friction-surfaces, a pair of clamping-plates suitably pivoted at one end, levers pivotally connected to the opposite ends of said plates, eccentrics connected to said levers, a manually-operated lever for actuating said eccentrics to move the clamping-plates toward and from each other, and a pair of friction ring-sections secured respectively to the plates and arranged to engage the aforesaid friction-surfaces of the disks to lock the main driving-wheels, one at a time, against rotation for the purpose set forth.

13. In a vehicle, the combination with a frame member, a suitably-supported casing, and the driven wheel, of a power-transmitting mechanism comprising a revoluble sleeve

journaled at one end in the casing and rigidly connected at its opposite end to the driven wheel, the main shaft passing loosely through said sleeve and journaled at one end on the said frame member and at its other end on the sleeve within the casing, a primary driving member rigidly connected to the latter end of the shaft, a main transmission-wheel rigidly mounted on the sleeve adjacent to said driving member, an auxiliary transmission-wheel carried on the primary driving member and imparting motion to the main transmission-wheel, and multiple-speed driving-wheels connected to the auxiliary transmission-wheel, and means for controlling the action of said driving-wheel as set forth.

14. In a vehicle, the combination with a frame member, a suitably-supported casing provided with a rigid bushing in one end, and the driven wheel having its hub journaled on said frame member and bushing, of a power-transmitting mechanism comprising a revoluble sleeve passing freely through said bushing and rigidly connected at one end to the hub of the driven wheel and having its opposite end journaled on the bushing, the main rotary shaft passing loosely through the sleeve and journaled at one end on the frame member and at the other end on the sleeve within the casing, a rotary driving-disk secured to the shaft within the casing, a main transmission sprocket-wheel rigidly mounted on said sleeve adjacent to the driving-disk, an arbor projecting from the face of the disk and traveling in a path around the main transmission sprocket-wheel, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said transmission sprocket-wheels, main driving sprocket-wheels journaled independently of the aforesaid bushing, auxiliary driving sprocket-wheels journaled on said arbor and fastened to the auxiliary transmission sprocket-wheel, chains connecting the auxiliary driving-wheels with the respective main driving-wheels, and means for locking the latter wheels, one at a time, against rotation for the purpose set forth.

15. The combination with a frame member, a suitably-supported casing, and driven wheel journaled on said frame member and casing, of a main rotary shaft free from the hub of said wheel, a revoluble sleeve loosely embracing said shaft and passing through the hub, a clamp locking said hub to the sleeve, a primary driving member secured to the shaft, transmission-wheels connected to said driving member and sleeve respectively, driving-wheels connected to one of the transmission-wheels, and friction means supported on the case and operative for engaging one of the driving-wheels for the purpose set forth.

16. In a power-transmission mechanism, the combination with a driven member, of a main shaft journaled free from said driven member, a primary driving member rigidly secured to the shaft, a revoluble sleeve loosely embracing said shaft and imparting motion to the driven member, an arbor carried on the main driving member, a main transmission sprocket-wheel rigidly mounted on said sleeve, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said transmission sprocket-wheels, independently-rotating main driving sprocket-wheels axially in line with the main transmission sprocket-wheel, auxiliary driving sprocket-wheels journaled on said arbor and fastened to the auxiliary transmission sprocket-wheel, chains connecting the auxiliary driving sprocket-wheels with the respective main driving sprocket-wheels, means for locking the main driving sprocket-wheels against rotation, one at a time and adjusting means connected to said arbor and operative for shifting the same in relation to the axis of the main wheels to simultaneously regulate the tensions of said chains as set forth.

17. In the herein-described power-transmitting mechanism, the combination with a driven member, of a main rotary shaft free from the driven member, a primary driving member consisting of a rotary disk rigidly fastened to said shaft, a revoluble sleeve loosely embracing the shaft and imparting motion to the driven member, a main transmission sprocket-wheel rigidly mounted on the sleeve, an arbor projecting from the disk, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said transmission sprocket-wheels, suitably-supported main low-speed and high-speed driving sprocket-wheels adapted to rotate independently, auxiliary low-speed and high-speed driving sprocket-wheels journaled on the aforesaid arbor and rotating with the auxiliary transmission sprocket-wheel, chains connecting the auxiliary driving-wheels with the respective main driving-wheels, manually-operated means for locking the main low-speed and main high-speed driving-wheels against rotation, one at a time, and eccentric adjusting means operative for shlfting said arbor in relation to the axis of the main sprocket-wheels to simultaneously regulate the tensions of the chains as set forth.

18. In the herein-described power-transmitting mechanism, the combination with a driven member, of a rotary main shaft free from said driven member, a rotary driving-disk fastened to said shaft, a revoluble sleeve loosely embracing said shaft and imparting motion to the driven member, a main transmission sprocket-wheel mounted rigidly on the sleeve, an arbor projecting from the disk, an auxiliary transmission sprocket-wheel journaled on said arbor, a chain connecting said sprocket-wheels, main low-speed and high-speed sprocket-wheels journaled to ro-

tate independently and disposed axially in line with the main transmission sprocket wheel, auxiliary low-speed and high-speed driving sprocket-wheels journaled on said arbor and rotating with the auxiliary transmission sprocket-wheel, chains connecting the auxiliary driving-wheels with the respective main driving-wheels, means for locking the main driving sprocket-wheels against rotation, one at a time, for the purpose described, a supplemental arbor projecting from the said disk, and idler sprocket-wheels journaled on the latter arbor and supporting the respective chains as set forth.

19. In the herein-described power-transmitting mechanism, the combination with the main shaft, a revoluble sleeve embracing said shaft, the driven member rigidly connected to said sleeve, a rotary driving-disk rigidly secured to the shaft, a main transmission sprocket-wheel secured to the sleeve, an auxiliary transmission sprocket-wheel journaled on the disk, a chain connecting said sprocket-wheels, a main low-speed driving sprocket-wheel and a main high-speed driving sprocket-wheel journaled independently, auxiliary low-speed and high-speed driving sprocket-wheels connected to the respective main driving-wheels and to the auxiliary transmission sprocket-wheel, suitably-controlled devices operative for locking the main driving sprocket-wheels, one at a time, against rotation, and a guard carried on the aforesaid disk and surrounding the sprocket-wheels and chains for the purpose set forth.

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Witnesses:
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