

No. 754,720.

PATENTED MAR. 15, 1904.

C. N. STILSON.
BICYCLE.

APPLICATION FILED OCT. 28, 1902.

NO MODEL.

3 SHEETS--SHEET 1.

Fig. 1

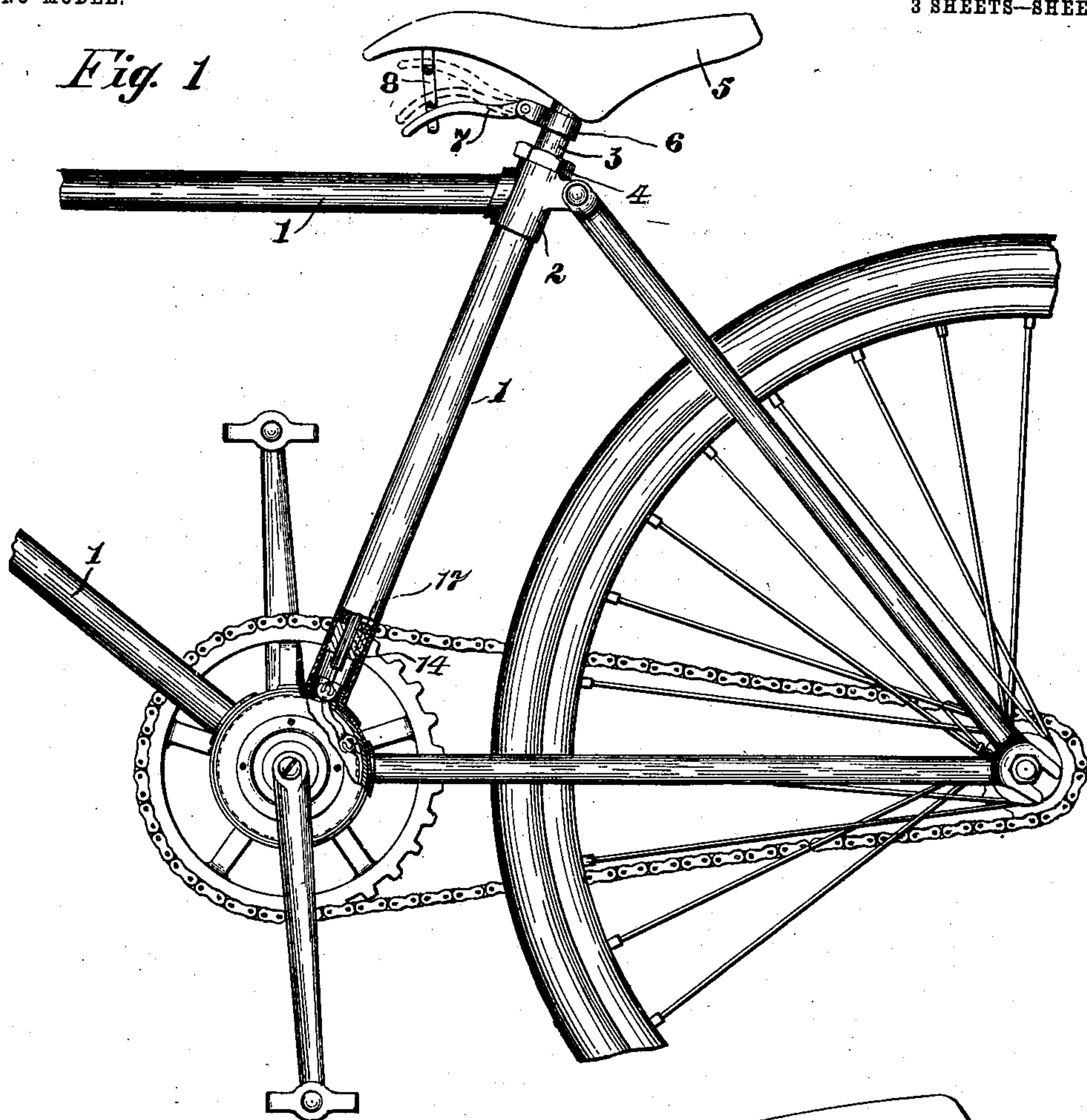
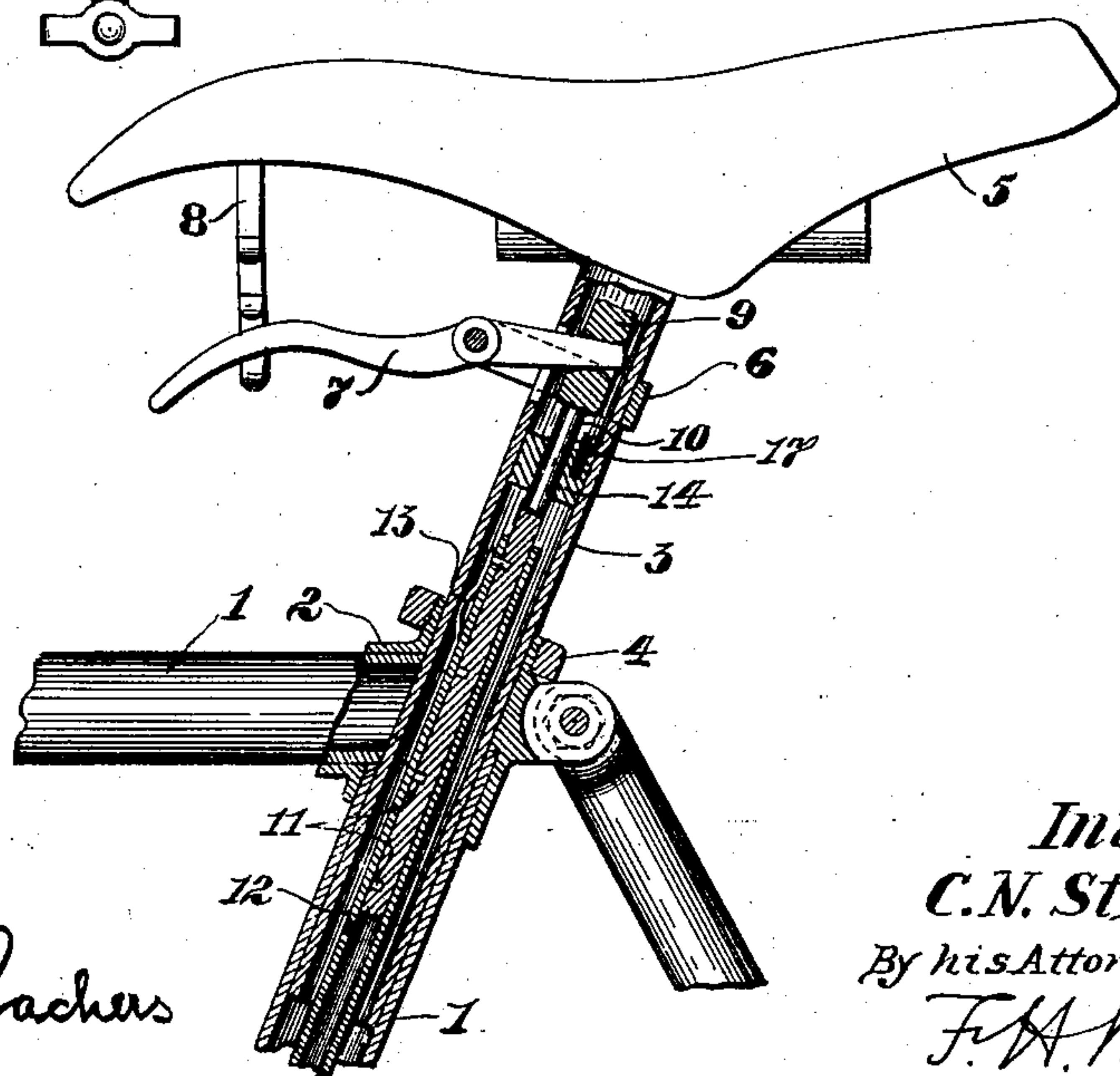


Fig. 2



Witnesses:

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Inventor:

C. N. Stilson.

By his Attorney.

F. A. Richards.

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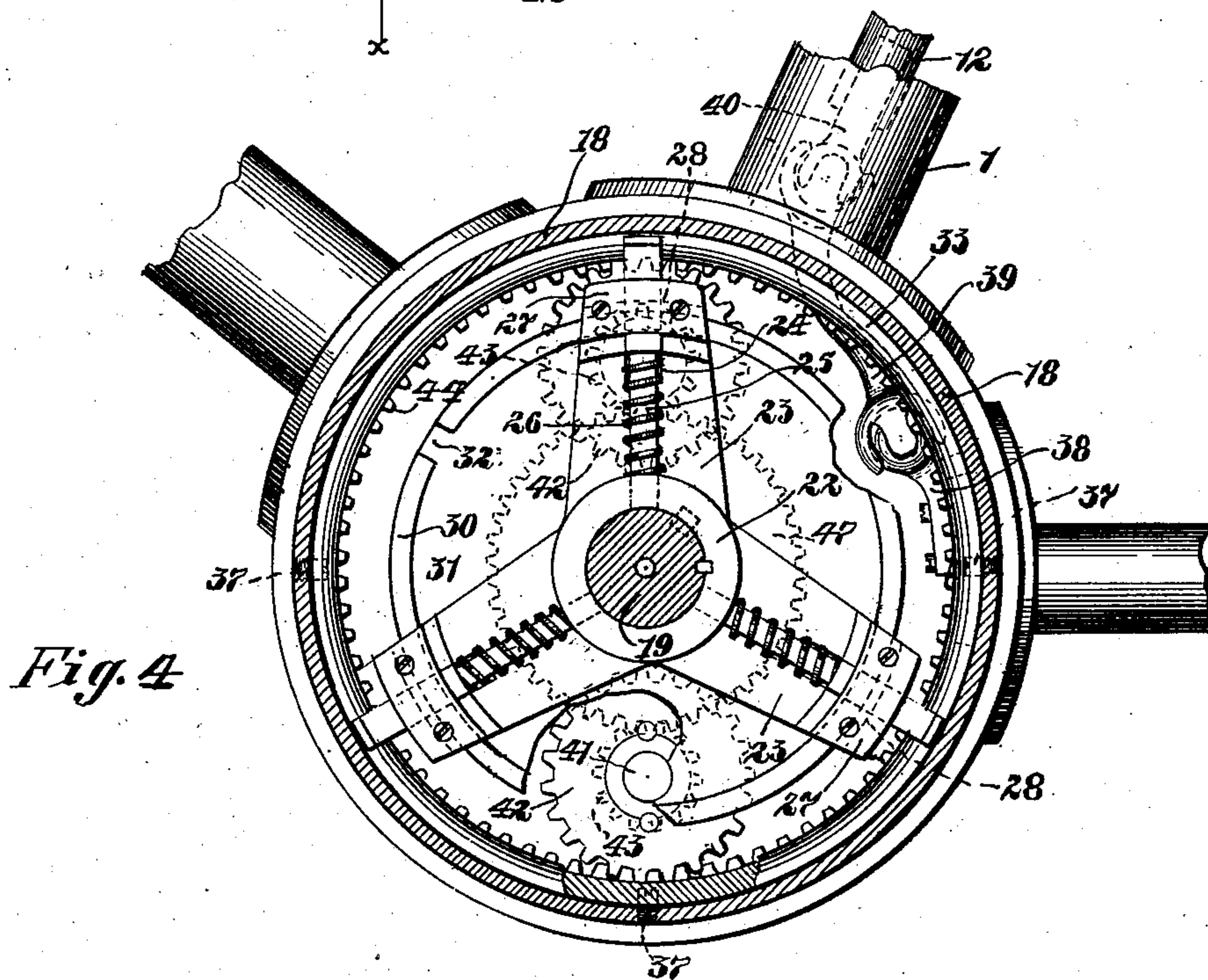
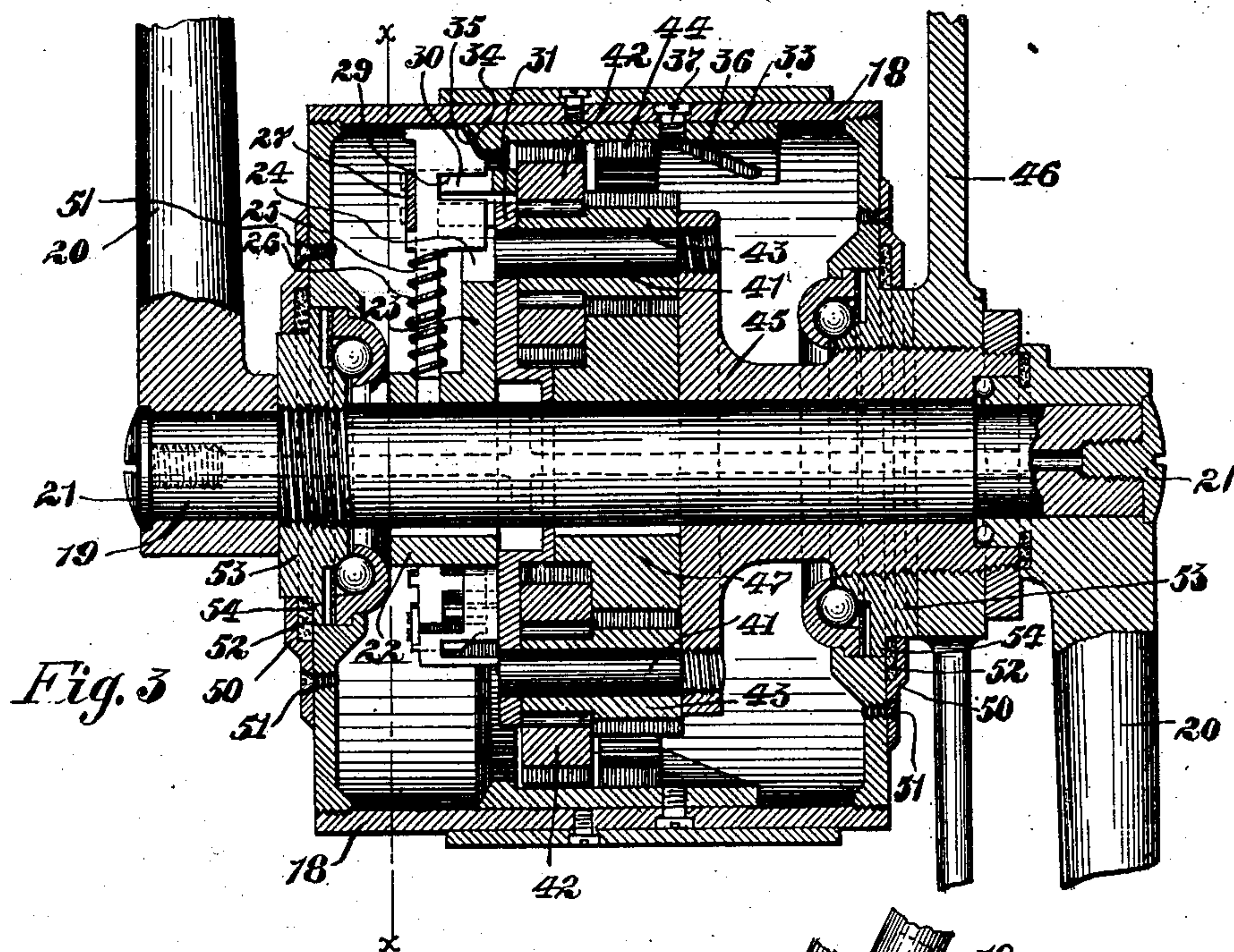
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NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:
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No. 754,720.

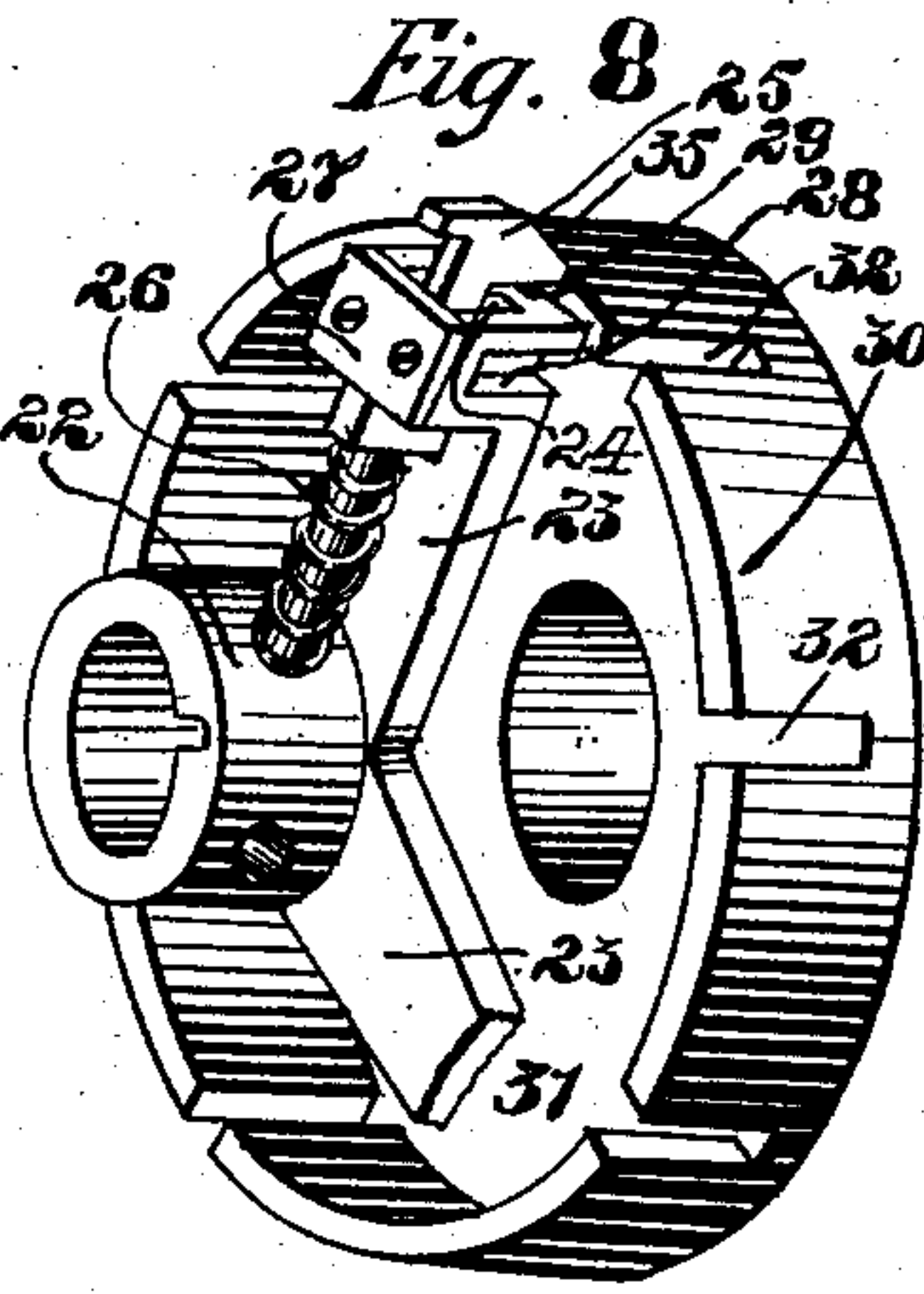
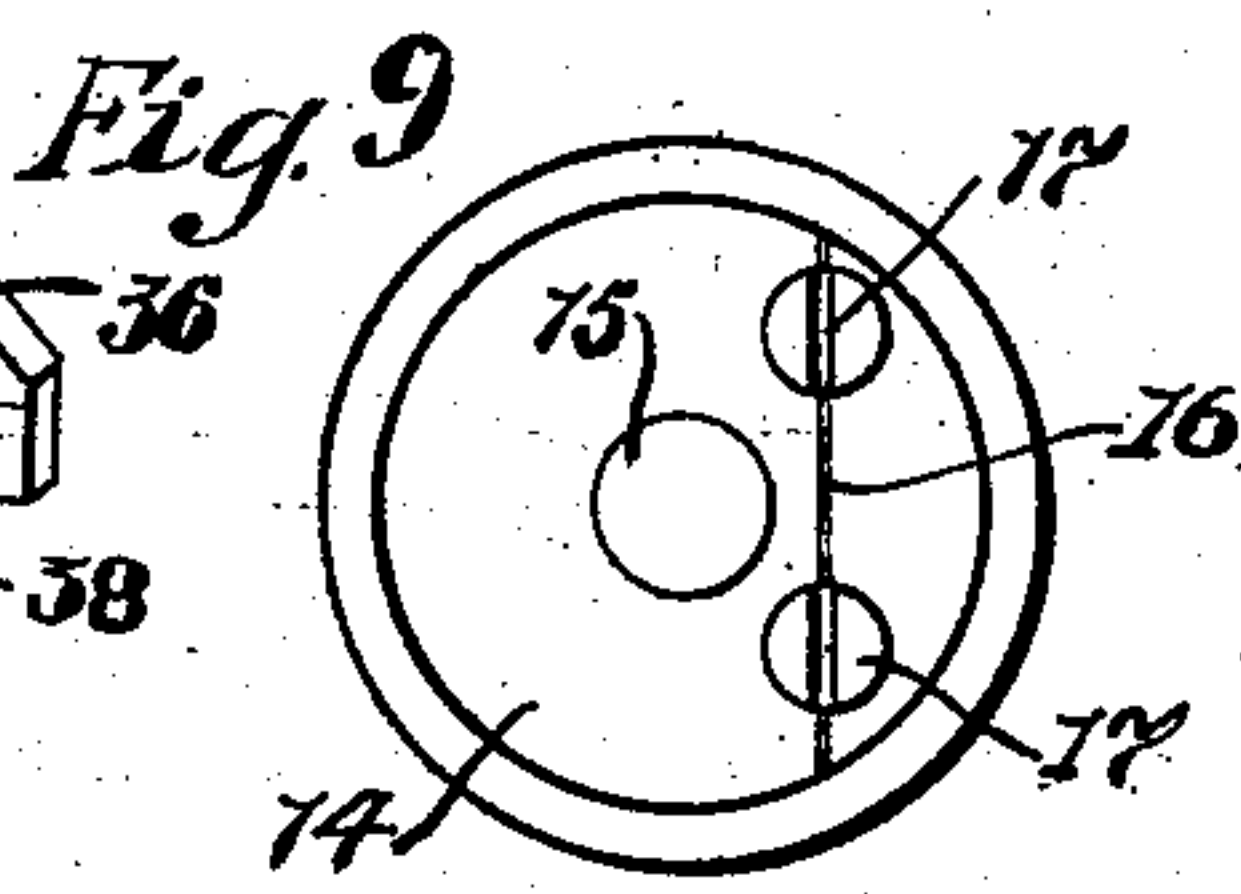
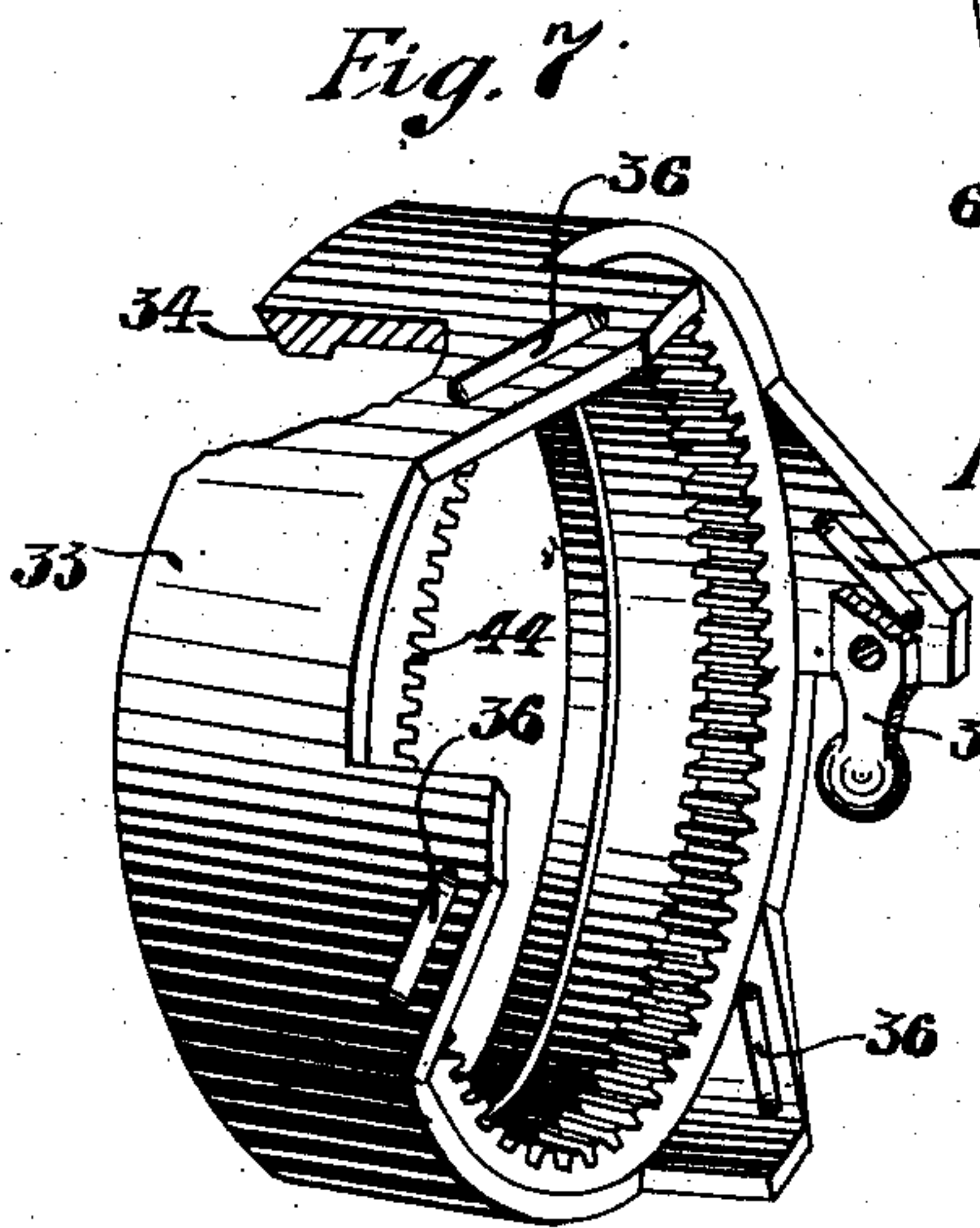
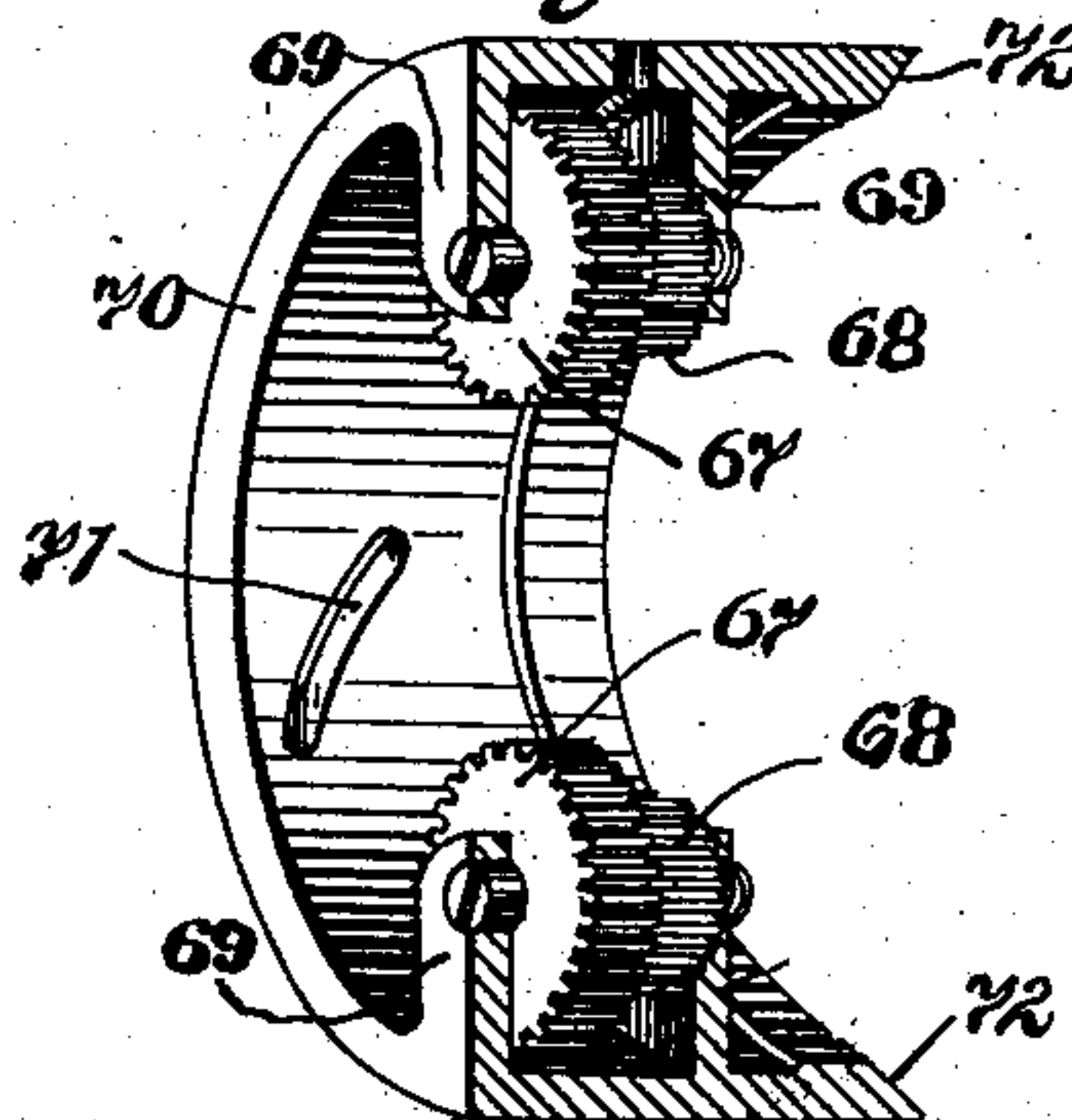
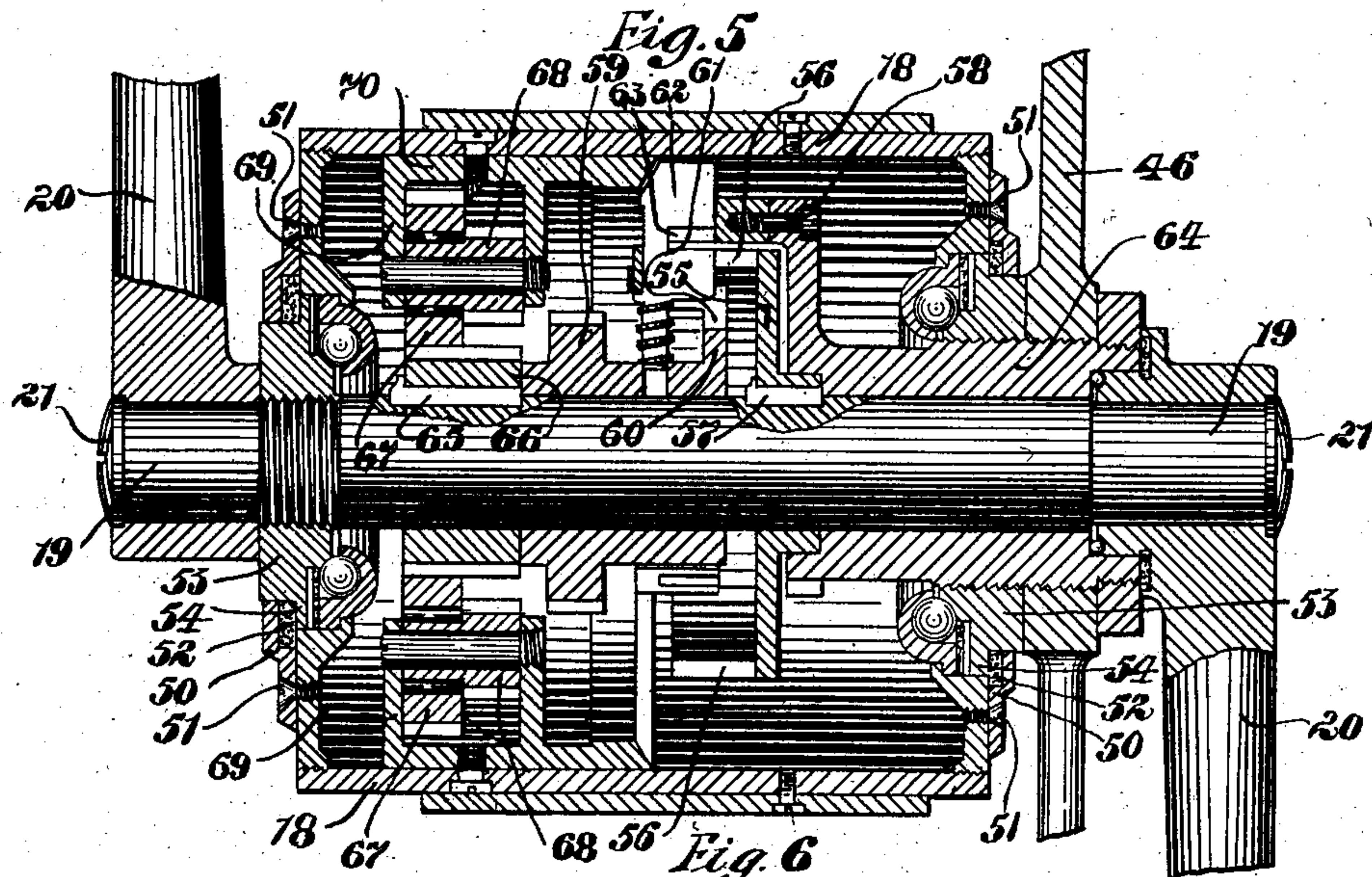
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APPLICATION FILED OCT. 28, 1902.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses.
F. S. Hachenburg.
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Fig. 10

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UNITED STATES PATENT OFFICE.

CHRISTOPHER N. STILSON, OF NEW YORK, N. Y.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 754,720, dated March 15, 1904.

Application filed October 28, 1902. Serial No. 129,072. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER NILES STILSON, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Bicycles, of which the following is a specification.

The present invention relates to improvements in power-transmitting devices or the like which are especially adapted for use in bicycles.

The invention involves certain new and novel features hereinafter more fully set forth and illustrated; and one of its objects is a simple, durable, and efficient device whereby the driving mechanism may be connected with or disconnected from the driven mechanism and speed of different degrees imparted to the latter, so that the driving-wheel of, for instance, a bicycle may be entirely controlled at the will of the rider.

A second object is to provide controlling means, preferably hand-operated, for bringing the connecting means into operation; and another object is to arrange the device in such a compact form that the whole driving mechanism can be readily inserted in and removed from the frame of the machine without disturbing the device itself.

A new feature of the device is a dust-proof joint, which keeps the working parts entirely clean from sand, &c., so that the life of the bearing-faces will be prolonged very considerably.

The nature of the invention consists in the employment of certain intermediary means between the pedal-shaft and the sprocket-wheel, and the accompanying drawings, which form a part of the present application, illustrate, in—

Figure 1, a side view of the inclosed device adapted for use on a bicycle. Fig. 2 is a cross-section of the hand-operated controlling means. Fig. 3 is a vertical cross-section in the line of the main axis of the assembled mechanism. Fig. 4 is a cross-section in the line X X of Fig. 3 looking toward the right. Fig. 5 is a cross-section similar to Fig. 3, illustrating a modification of the device. Fig. 6

is a side view, partly broken away, of the shifting device used in connection with the modification illustrated in Fig. 5. Fig. 7 is a perspective side view of the shifting device used in the construction shown in Fig. 3. Fig. 8 is a perspective side view illustrating the clutch mechanism of the device shown in Fig. 3, and Figs. 9 and 10 illustrate a device for guiding the controlling-rod shown in Fig. 2.

Similar numerals of reference indicate corresponding parts in the several views.

1 in Figs. 1 and 2 is the tubular frame of the bicycle, having its struts connected to the horizontal bar of the frame by means of a joint 2. The strut contains a telescopic tube 3 for suitably supporting the saddle 5 and is held in position at different heights in the joint 2 by a preferably split screw and its nut 4. The upper part of the telescopic tube 3 is provided with a collar 6, carrying a pivot for a lever 7, one end of which may be locked at times on suitable shoulders of a hook 8, secured to the lower side of the saddle 5, and the other end of the lever 7 enters a block 9 of the rod 10, contained within the tube 3 and movable therein. Figs. 9 and 10 illustrate a guide-block 14 for this rod 10, which consists of a cylindrical piece, having a circular boring 15 and being split at 16, so that by inserting two screws 17 in suitable screw-holes in the split the block 14 may be expanded and held tightly within the telescopic tube.

The rod 10 is provided with a series of notches 11 and is surrounded by a tubular rod 12, having at or near its upper end a spring-clutch 13, the head of which is adapted to enter any of the notches 11 of the rod 10 and thereby form a rigid connection between rod 10 and tubular rod 12 for the purpose of extending the length of the same. This arrangement may be made use of when the saddle has to be adjusted at different heights from the frame of the bicycle.

One of the principal features of the present invention consists in the fact that the whole speed changing and controlling device is located in a tubular inclosure 18, which may be readily inserted into and removed from the hub portion of the bicycle without disassembling

bling or taking apart any of the parts of the device proper.

The pedal-shaft 19 (representing in the present case the driving member) carries on each end a crank 20 in the usual manner secured to the shaft by screws 21. Keyed to the shaft 19, and therefore constantly rotating with the same, is a driver 22, Figs. 3 and 8, consisting of a plurality of radial arms 23, each provided with a radial slot 24 for holding a movable member 25, controlled by a coiled spring 26, and tending to force the movable member 25 out toward the cylindrical casing 18 of the device. Each member 25 is held in position by a plate 27, screwed onto the driver 22, and the inner end of 25 enters into suitable radial holes of the hub portion of the driver 22.

Each of the radial arms 23 is furthermore provided with a circumferential recess 28 and each movable member 25 with a corresponding recess 29. If the movable members 25 are pressed toward the pedal-shaft 19, the two recesses 28 and 29 will coincide and will rotate along the rim 30 of a driven drum 31. If spring 26 is allowed to expand and to press the movable member 25 outwardly, the head of this member 25 will enter the recesses 32 of the rim 30, and the drum 31 will be taken along and rotated by the driver 22.

Fig. 8 illustrates the relation of the two members 22 and 31, but the same are shown separated from each other, while in fact the rim 30 is always located within the recess 28.

The pushing in and out of the movable members 25 is accomplished by the shifting-drum 33, Fig. 7. The same consists of a cylindrical portion having a beveled face 34, which cooperates with a similar beveled face 35 on the head of each member 25. The drum 33 is provided with a number of inclined slots 36, into which fit the ends of screws 37, passing through and secured in the tubular casing 18. The drum 33 is furthermore provided with one member 38 of a ball-and-socket joint, the other member of which is formed by one end of a link 39. The other end of this link 39 is part of a second ball-and-socket joint between it and the lower end 40 of the tubular rod 12, Fig. 4.

It will be seen that by operating the lever 7, Fig. 2, the tubular rod 12 will be moved up and down, and the drum 33 will not only be rotated, but on account of the slots 36 gliding along the screw 37 will also be shifted sidewise. The face 34 will come in contact with the faces 35 of the movable members 25, and the latter will be depressed, the recess 29 of the same will coincide with the recess 28 of the driver-arms 23, and their driver will be allowed to rotate along the rim 30 of the drum 31 without rotating the same.

If the lever 7 should be depressed, rod 12 drawn up, and drum 33 rotated and shifted in the opposite direction, the movable members 25 will be released, the head of the same

will close the recesses 28 of the driver 23, will enter the recesses 32 of the drum 31, and will rotate the same.

The drum 31 carries the shafts 41 of a pair of planetary gears, each consisting of two gears 42 and 43 of different diameter. Gear 42 is adapted to at times engage with an integral gear 44 of the drum 33. The other ends of the shafts 41 are fastened to a sleeve 45, onto which is screwed the sprocket-wheel 46, forming a rigid system with said sleeve.

The pedal-shaft 19 carries keyed thereto a central gear 47, which is always in mesh with the smaller ones 43 of the planetary gears.

If the driver 23 drives the drum 31, the whole system—i. e., pedals 20, pedal-shaft 19, driver 23, drum 31, shafts 41, gears 42 and 43, gear 47, sleeve 45, and sprocket-wheel 46—will all rotate at the same uniform speed.

If the drum 33 is shifted, movable members 25 pushed down, recesses 28 and 29 cleared, then drivers 23 will rotate along rim 30, Fig. 8; but as gear 47 is keyed to the pedal-shaft 19 it will rotate with the shaft and will also rotate the planetary gears 43. The bigger gear 42 being integral with 43 and in mesh with internal gear 44 of the drum 33 will rotate the sleeve 45, and thereby the sprocket-wheel 46, at a reduced speed.

Suitable ball-bearings facilitate the rotation of the shaft 19 and the sleeve 45. In order to entirely exclude dust and sand from the casing 18, a dust-proof joint is provided at the ends of the casing 18, consisting of a cover-plate 50, secured to the sides of casing 18 by screws 51 and holding a felt, leather, or fabric washer 52, arranged in such a manner that the bearing-hub 53 is in contact with the washer 52, not only with its circumference but also with the face of an extension-rim 54, forming thereby an inclosure of highest efficiency.

In the modification illustrated in Fig. 5 the internal gear in the shifting-drum is omitted, and instead of the driver 22, Fig. 8, being keyed to the pedal-shaft 19 a member similar in shape to the drum 31, Fig. 8, is keyed to said shaft and operates as a driver. This member consists of a drum 55, having recesses 56 similar to the recesses 32 in drum 31 of Fig. 8. A key 57 secures the drum 55 to the pedal-shaft 19. The driven member in this modification consists of a sleeve made in two parts secured together by screws 58 and surrounding the driving-drum 55. Adjoining it are the driven arms 60, having radial slots 61, similar to slots 24 in Fig. 8, which contain spring-controlled movable members 62, also having recesses 63, similar to recesses 29, Fig. 8. The driven arms 60 are secured by the aforementioned screws 58 to the part 64 of the sleeve which carries the sprocket-wheel 46. The pedal-shaft 19 has secured thereto by means of a key 65 a gear 66. This gear 66 is in mesh with two planetary gears

67, forming part of a pair, the other and smaller gears 68 of which may at times come in mesh with the gear 59, forming part of the sleeve, to which is secured the sprocket-wheel 46. The planetary gears 67 68 are secured to brackets 69 of the shifting-drum 70. This shifting-drum has inclined slots 71, similar to the slots 36, Fig. 7, a beveled face 72, similar to 34, Fig. 7, and one member of a ball-and-socket joint (not shown in the drawings) similar to 38 of Fig. 7. The operation of this modification is as follows: If beveled face 72 is out of contact with the corresponding beveled face on the movable members 62, the head of the same will be located in the recesses 56 of the driving-drum 55, will therefore rotate with the same, and the whole system, including the sprocket-wheel 46, will rotate at the same speed. If drum 70 is shifted so as to depress the movable members 62, the recess 63 will coincide with the rim of the drum 55, and said drum will freely rotate through said recess 63. At the same time planetary gear 68 having come in mesh with central gear 59 and being integral with planetary gear 67 the said central gear 59 will be driven at a different speed from the speed of the pedal-shaft 19, and consequently the sprocket-wheel 46 will have a different speed than the pedals 20. This modification Fig. 5 may also be used as a coasting device by locking the lever 7 in such a position that the movable member 62 is not taken along by the driving-drum 55, but that gear 68 is not yet in mesh with gear 59. The sprocket-wheel and the sleeve 64, carrying the, same may then rotate, whereas the pedal and pedal-shaft may be kept stationary.

Having now described the invention, that which is considered as new and useful, and desired to be secured by Letters Patent, is—

1. The combination in a bicycle with a shaft, of a driver thereon having a plurality of radial arms, a radially-movable member on each arm, a drum adapted to be engaged by said movable member, and a sleeve secured to said drum for carrying a sprocket-wheel.

2. The combination in a bicycle with a pedal-shaft, of a pinion or gear keyed thereon, a drum loosely mounted on said shaft having a sleeve secured thereto, a plurality of planetary gears on said drum one set of the same adapted to mesh with said pinion, an internal gear in mesh with another set of the planetary gears, and means for shifting said internal gear into and out of engagement with said planetary gear.

3. The combination with a shaft, of a driving member thereon, one or more radial arms on said driving member, a radially-movable member on each arm, a driven member, and means on said driven member adapted to be engaged by said movable member on the radial arms.

4. The combination in a bicycle with a shaft, of pedals secured to said shaft, a driving mem-

ber on said shaft, radial arms on said driving member, a movable member on each arm, means adapted to be engaged by said movable member, a sleeve secured to said means and rotatable on said shaft, and a sprocket-wheel carried by said sleeve.

5. The combination in a bicycle with a shaft, of pedals secured thereto, a driving member thereon, radial arms on said driving member, a spring-controlled movable member on each arm, means adapted to be engaged by said movable member having a sleeve, and a sprocket-wheel carried by said sleeve.

6. The combination in a bicycle with a shaft, of a driver thereon, an arm on said driver, a radially-movable member on said arm, and means adapted to be engaged by said movable member.

7. The combination in a bicycle with a shaft, of a driver thereon having one or more radial arms, a movable member on each arm, and a driven member adapted to be engaged by said movable member.

8. The combination in a bicycle with a pedal-shaft, of a driver secured thereto, a drum mounted thereon, a sleeve secured to said drum, planetary gears on said drum one of the same adapted to mesh with said driver and an internal gear adapted to mesh with another of the said planetary gears.

9. The combination with a shaft, of a driving member secured thereto, a driven member loosely mounted thereon and having notches, movable members on said driving member adapted to enter said notches, means for radially moving said movable members, and hand-controlled means for shifting said moving means.

10. The combination with the pedal-shaft of a bicycle, of a power-transmitter loosely mounted with reference to the pedal-shaft, a driver rigid with said shaft, a clutch for connecting the driver with and disconnecting it from said power-transmitter, transmitting-gears interposed between said shaft and said power-transmitter, and means for operating the clutch and also changing the relative condition of said gears to thereby disconnect said shaft from the power-transmitter and render the gears operative to transmit motion and conversely to connect said shaft with said power-transmitter and render said gears inoperative.

11. The combination with the pedal-shaft of a bicycle, of a power-transmitter loosely mounted with reference to the pedal-shaft, a driver rigid with said shaft, a clutch for connecting the driver with and disconnecting it from said transmitter, a driving-pinion rigid with said shaft, transmitting-gears, one of which meshes with said pinion, and means for operating the clutch and also changing the relative condition of said transmitting-gears to thereby disconnect said shaft from the power-transmitter and render the gears operative to

transmit motion and conversely to connect said shaft with said power-transmitter and render said gears inoperative.

12 The combination with the pedal-shaft
5 of a bicycle, of a power-transmitter loosely
mounted with reference to the pedal-shaft, a
driver rigid with said shaft, a clutch for con-
necting the driver with and disconnecting it
from said power-transmitter, a driving-pinion
10 rigid with said shaft, transmitting-gears, one
of which meshes with said pinion, a gear with
which another of said transmitting-gears is
adapted to engage and from which it may be
disengaged, and means for operating the clutch
15 and effecting the engagement of the said other
transmitting-gear with and its disengagement
from said gear with which it is adapted to en-
gage.

13. The combination with the pedal-shaft
20 of a bicycle, and a power-transmitter loosely
mounted with reference to the pedal-shaft, of
a driver rigid with said shaft, a clutch for con-
necting the driver with and disconnecting it
from said power-transmitter, a driving-pinion
25 rigid with said shaft, transmitting-gears, one
of which meshes with said pinion, a gear with
which another of said transmitting-gears is
adapted to engage and from which it may be
disengaged, and a cam-operating member for
30 shifting the clutch and effecting the engage-
ment of the said other transmitting-gear with
and its disengagement from said gear with
which it is adapted to engage.

14. The combination with the pedal-shaft
35 of a bicycle, and a power-transmitter loosely
mounted with reference to the shaft, of a driver
rigid with said shaft, a clutch for connecting
the driver with and disconnecting it from said
power-transmitter, a driving-pinion rigid with
40 said shaft, transmitting-gears, one of which
meshes with said pinion, a gear with which
another of said transmitting-gears is adapted
to engage and from which it may be disen-
gaged, a rotatable and longitudinally-slidable
45 member for operating the clutch and effect-
ing the engagement of the said other trans-
mitting-gear with and its disengagement from
said gear with which it is adapted to engage,
and means for effecting the longitudinal move-
50 ment of said slidable member during its rota-
tion.

15. The combination with the pedal-shaft
of a bicycle, and a power-transmitter loosely
mounted with reference to the pedal-shaft, of
a driver rigid with said shaft, a clutch for con- 55
necting the driver with and disconnecting it
from said power-transmitter, a driving-pinion
rigid with said shaft, transmitting-gears, one
of which meshes with said pinion, a gear with
which another of said transmitting-gears 60
is adapted to engage and from which it may
be disengaged, a cam-operating member for
shifting the clutch and effecting the engage-
ment of the said other transmitting-gear with
and its disengagement from said gear with 65
which it is adapted to engage, an actuator-rod
for said member and which extends upward
within reach of the rider, and a connection
between said rod and said member.

16. The combination with the pedal-shaft 70
of a bicycle, and a power-transmitter loosely
mounted with reference to the shaft, of a driver
rigid with said shaft, a clutch for connecting
the driver with and disconnecting it from said
power-transmitter, a driving-pinion rigid with 75
said shaft, transmitting-gears, one of which
is in mesh with said pinion, a gear with which
another of said transmitting-gears is adapted
to engage and from which it may be disen-
gaged, a cam-operating sleeve for shifting the 80
clutch and effecting the engagement of the
said other transmitting-gear with and its dis-
engagement from said gear with which it is
adapted to engage, a telescopic actuator-rod
for said member and which extends upward 85
within reach of the rider, and a connection
between said rod and said member.

17. The combination with the crank-hanger
of a bicycle, of a shell detachably secured in
said hanger, a pedal-shaft mounted in said 90
shell, a speed-changing gear also mounted in
said shell, and an actuator-rod extending up-
ward through the frame of the bicycle to a
point accessible to the rider.

In witness whereof I have hereunto set my 95
hand, in the presence of two subscribing wit-
nesses, this 15th day of September, 1902.

C. N. STILSON.

In presence of—

RALPH JULIAN SACHERS,
H. W. HALL.