No. 773,977. PATENTED NOV. 1, 1904.

C. F. PEARSON.

DEVICE FOR TRANSMITTING POWER.

APPLICATION FILED JAN. 29, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2

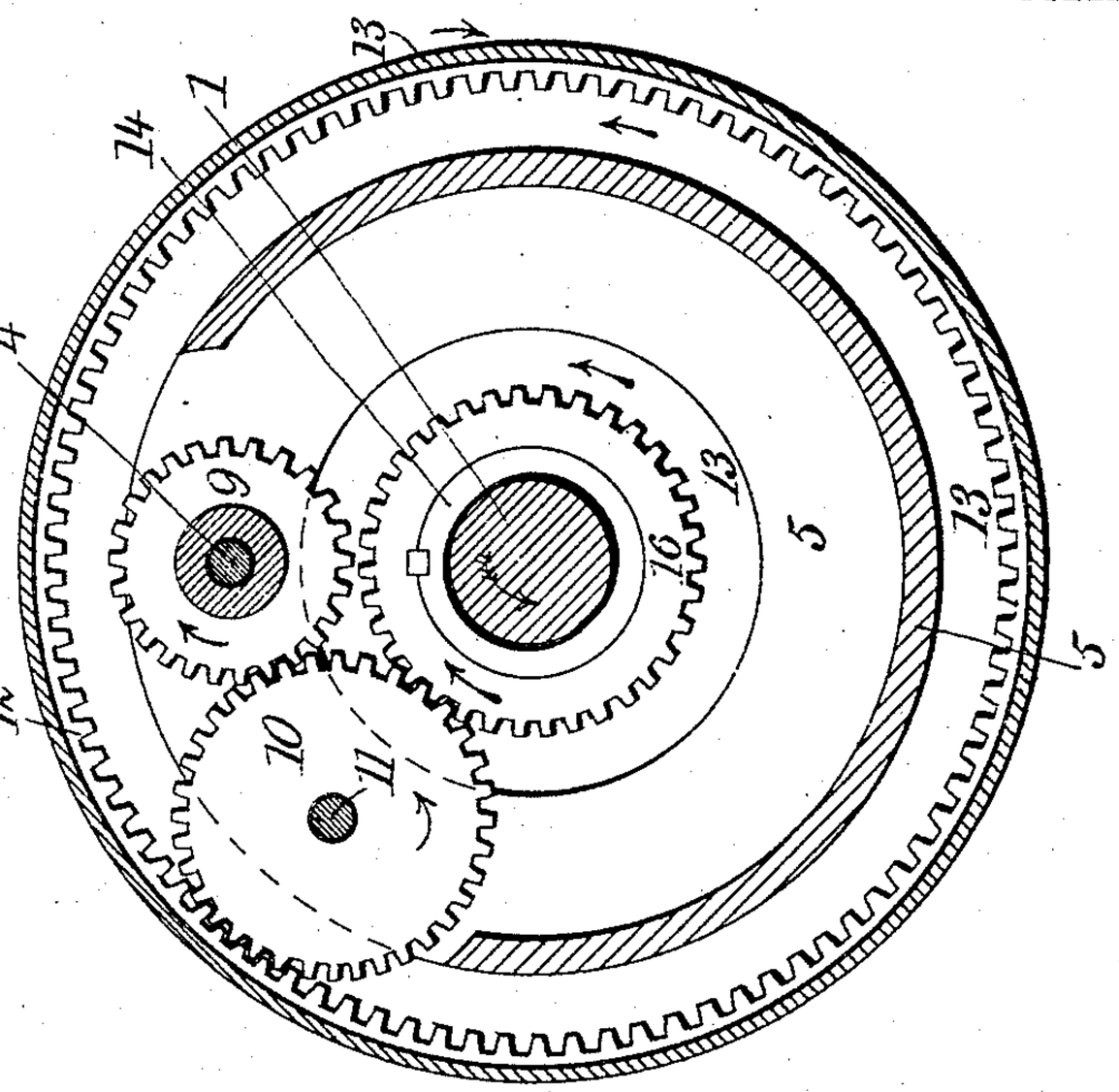
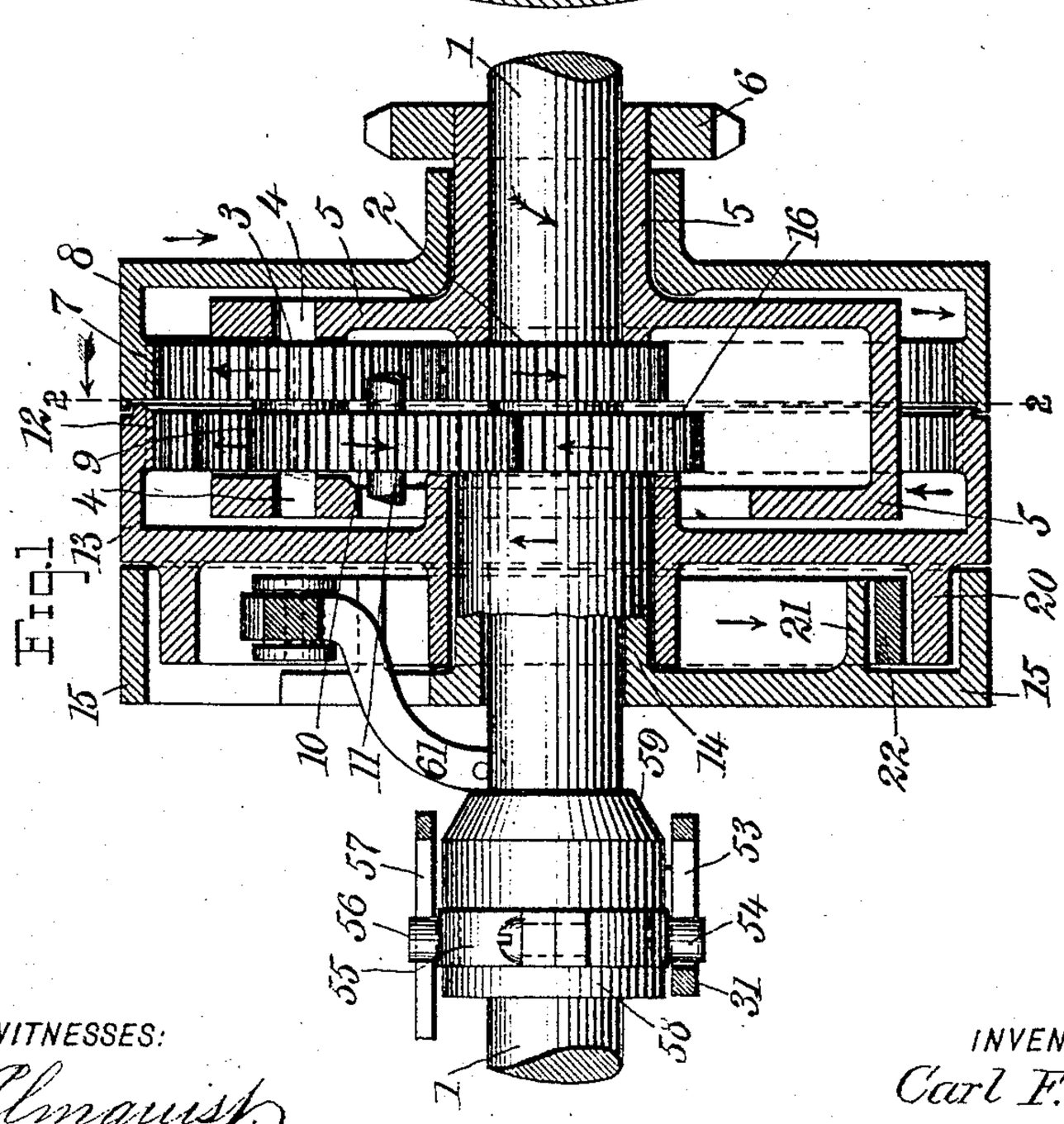


Fig. 1



WITNESSES:

L. Almquist.

A. G. Davis

INVENTOR

Carl F. Pearson

BY Munn & Co

ATTORNEYS

No. 773,977. PATENTED NOV. 1, 1904.

C. F. PEARSON.

DEVICE FOR TRANSMITTING POWER.

APPLICATION FILED JAN. 29, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

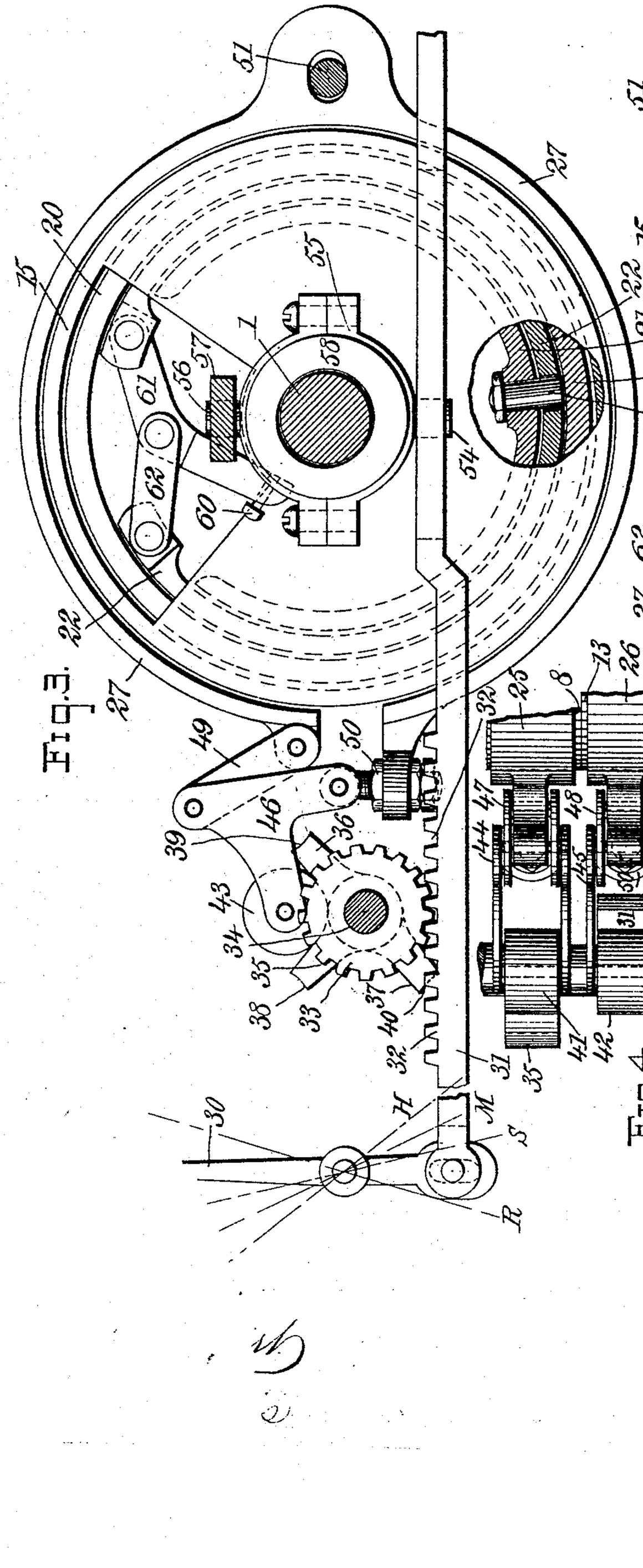


Fig. 3.

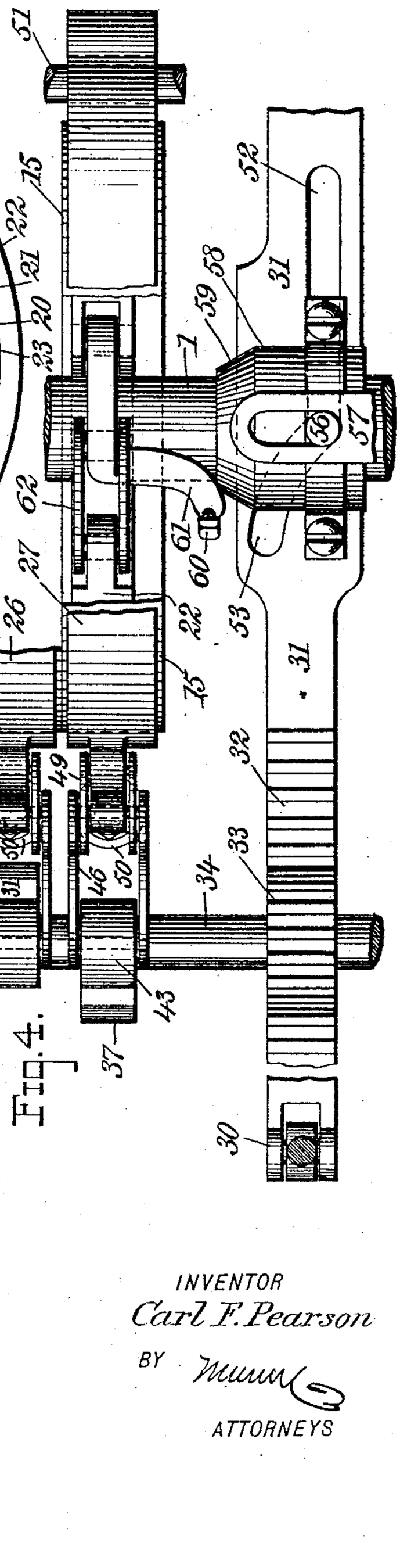


Fig. 4.

INVENTOR
Carl F. Pearson
BY Munn & Co
ATTORNEYS

No. 773,977. Patented November 1, 1904.

UNITED STATES PATENT OFFICE.

CARL F. PEARSON, OF CHICAGO, ILLINOIS.

DEVICE FOR TRANSMITTING POWER.

SPECIFICATION forming part of Letters Patent No. 773,977, dated November 1, 1904.

Application filed January 29, 1904. Serial No. 191,083. (No model.)

To all whom it may concern:

Be it known that I, CARL F. PEARSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Device for Transmitting Power, of which the following is a full, clear, and exact description.

My invention relates to a device for transmitting power, commonly termed "planetary gearing."

The objects of my invention are to provide a power-transmitting device which shall be capable of producing variable speeds and reversing.

Further objects of my invention are to secure these results with a comparatively simple construction and with the assurance of efficient and absolutely certain action.

Further objects will appear in the course of the subjoined description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a cross-sectional view taken on a line parallel with the shaft of the main part of the device without the brake members. Fig. 2 is a sectional view taken on the line 2 2 of Fig. 1. Fig. 3 is an end view of the whole apparatus, showing certain parts in section; and Fig. 4 is a fragmentary plan view showing the braking devices.

In the drawings, which show a preferred form of my invention, the numeral 1 indicates the driving-shaft; 2, a gear secured thereto and meshing with a second gear, 3, mounted on a stud 4, which is supported at both ends and has a bearing in the casing 5, loosely journaled on the shaft 1 and having an extension or sleeve carrying at its end the transmission-gear or other device 6. Meshing with the gear 3 is an internal gear 7, formed upon the drum 8, which is loosely journaled upon the sleeve projecting from the casing 5.

9 represents a gear which is either secured to the gear 3 or may be integral with it and is mounted upon the stud 4 in the same manner as the gear 3. This gear 9 meshes with a gear 10, mounted upon a stud 11, which is also journaled in the casing 5, and it meshes with an internal gear 12 upon a second drum 13, which is free to turn and is loosely journaled upon a sleeve 14 upon a third drum 15. 16 is a gear secured to said sleeve 14 and meshing with the gear 10, as shown in Fig. 2. Upon the drum 13 is a cylindrical projection 20, as shown in Figs. 1 and 3, and upon the drum 15 is a similar projection 21, extending in the opposite direction. Between these two projections is a band 22, secured to the projection 21 by means of a stud or other device 23.

This completes the description of the gearing of my device in the preferred form shown in the drawings; but it is to be understood that I do not desire to limit myself to the exact construction shown, as it will be obvious that many modifications may be made by a skilled mechanic without departing from the scope of my invention as defined in the claims.

As the device is shown, arrows have been placed upon various parts to indicate the direction of motion of the parts under normal circumstances, and these arrows will not require description. It will be seen that when the device is operating as indicated by these arrows the casing 5, and therefore the transmission-gear 6, will not be in motion. In order to set these parts in motion and transmit power to the desired points, it is necessary to stop the motion of the drums 8, 13, or 15, or to connect them up in certain ways which will be described. This is accomplished by the mechanism which will now be referred to. Upon these three drums are placed brake-bands 25, 26, and 27, as shown in Figs. 3 and 4. These bands are operated by means of a hand-lever 30, connected with a longitudinally-movable bar 31, provided with a rack 32, which meshes with a pinion 33, mounted upon a shaft 34 and designed to rotate said shaft. Upon the shaft 34 are formed or secured a number of cam-surfaces, in this case shown as three in number, (indicated by 35, 36, and 37, respectively.) These cams are shaped as shown and have depressed surfaces 38, 39, and 40, respectively, at their outer

ends. Upon each of these cams rests a roller, (indicated by 41, 42, and 43, respectively.) These rollers are journaled in frames 44, 45, and 46, which are pivoted to links 47, 48, and 49. These links 47, 48, and 49 are pivoted to the brake-bands 25, 26, and 27, respectively, as shown. The frames 44, 45, and 46 are adjustably secured and pivoted to the other ends of the brake-bands, as indicated at 50. It will be seen from this description that the operation of the lever 30 will turn the shaft 34, and the cams will operate in such a manner as to bring the rollers to rest in the surfaces 38 39 40, and thereby tighten the brake-bands as desired in an obvious manner. In the outer end of the sliding bar 31 is a slot 52, provided with a curved offset 53. Into this offset is set a stud 54, secured to a band 55 upon a hub 58. In the upper end of this band is a second stud 56, running in a guideway 57. The hub 58 is provided with a conical surface 59 and is adapted to come into contact with and move an adjustable bolt 60 in the end of a lever 61, which, with a link 62, forms a toggle-joint and is connected at two points to the band 22.

The operation is as follows: In the position shown by Fig. 3 the hand-lever 30 is vertical and the parts are in such position that none of the brake-bands is tightened and the hub 58 is in its outermost position. Therefore the parts will operate as indicated by the arrows in Fig. 1. Upon shifting the hand-lever 30 to the position shown by the dotted line S the shaft 34 will be rotated forty-five degrees and the roller 41 will be brought up upon the cam 35 and will rest in the depressed surface 38 at the top of said cam. This will cause the band 25 to be tightened and the rotation of the drum 8 to be arrested. When this occurs, the gear 3, meshing with the internal gear 7 upon the drum 8, will be caused to rotate around within the drum 8, carrying with it the casing 5 and causing the rotation of the transmission member 6 at a slow speed in the direction indicated by the arrow on the shaft 1. It is to be understood that the driving-shaft 1 always rotates in the direction indicated by the arrow applied to it. Upon shifting the lever 30 to the position indicated by the dotted line M the shaft 34 will be turned ninety degrees and the roller 43 brought into contact with the cam 37 and into the surface 40, which will now be at the top of the shaft. The effect of this will be to tighten the band 27 upon the drum 15 and stop the rotation of the drum 15, and therefore of the sleeve 14 and gear 16. The effect of this, it is obvious, will be to cause the gear 10 to rotate around the gear 16 and carry with it the casing 5, in which it is journaled, and likewise the transmission member 6 in the direction indicated by the arrow on the shaft 1. Owing to the sizes of the gears illustrated, this rotation will be at a higher speed than that before described. Of course before the tightening of the band 27 the roller 41 will be removed from the surface 38, thereby loosening the band 25 upon the drum 8. Upon shifting the lever 30 through another arc of ninety degrees into the position indicated by the dotted line H the three rollers 41, 42, and 43 will be permitted to remain in their lowest position, as indicated in Fig. 3, and all the brake-bands will be loose; but the bar 31 will be forced to its outermost position, and the slot 53 therein will operate upon the pin 54 and force the hub 58 inward, whereby its conical surface 59 will contact with the screw 60 and force outward the lever 61, consequently striking the toggle-joint formed by the lever 61 and the link 62, and thereby force the band 22 into intimate contact with the projection 20 and the drum 13. This will secure the two surfaces 20 and 21, and therefore the two drums 13 and 15, together, but will not necessarily stop the rotation of either. The effect of this will be to cause the internal gear 12 and the external gear 16 to rotate together, and therefore stop the rotation of the gear 10 on its axis. The gear 9, meshing with the gear 10, will also be stopped, and likewise the gear 3, which is not free to rotate independently of the gear 9. The effect of this stoppage of the members will be to cause the gear 3 to travel around the gear 2, which is forced to rotate by the shaft 1, taking with it the casing 5 and transmission member 6, as well as all the drums. This motion will be at a high speed relative to the other speeds produced, as above described, on account of the absence of any reducing-gearing which is present in the operations described above. Of course upon reversing the lever the reverse operation will take place, and the transmission member 6 may come to a stop when the lever 30 is in the position shown in Fig. 3, and upon carrying the lever 30 beyond that position to that indicated by the dotted line R the third cam 36 will be brought into position to act upon the roller 42, and when the surface 39 on that cam is brought far enough around to hold the roller in its elevated position the brake-band 26 upon the drum 13 will be tightened, and the effect of this will be to stop the drum 13 and of course the internal gear 12, whereupon the gear 10 meshing therewith will be caused to rotate within the drum 13, carrying with it the casing 5 and the transmission member 6 in a direction opposite to the arrow shown on the shaft 1 and to the motion of the transmission member 6 in each of the three cases described above.

It will be seen from this description that with a device constructed as shown and described or in an analogous manner three speeds and reverse may be obtained and that the operation of a single lever in the ordinary manner will secure these changes of speed and the direction. It will also be seen that the shape of the surfaces 38, 39, and 40 is such as to hold the rollers 41, 42, and 43 securely in

position, and thus enable the lever to be set in any desired position and left for any length of time.

The invention represented herein is exceedingly efficient and capable of a wide range of use upon various kinds of machinery.

The relative sizes of the various gears have not been stated, as it is obvious that they will be varied according to the speeds desired, but for ordinary uses sizes proportional to those illustrated could be employed with advantage.

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

1. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting motion from said shaft to said member at four different speeds and in two directions, said means consisting of two sets of intermeshing gears, one of said sets comprising a gear fast on the driving-shaft, two gears, one of each set, being rigidly secured together, and a plurality of drums, two of said drums having internal gears each meshing with a gear of one of said sets, and the gears of each set being in the same plane.

2. In a planetary-gearing system, the combination of a driving-shaft, a transmission member, a casing carrying the transmission member and loosely journaled on said shaft, three drums, means connected to said driving-shaft for driving said drums in two directions, means for arresting either drum, and means for coupling two of said drums together to prevent their rotation independent of each other, said last two means comprising brakes, an expansible band, a shaft, cams and a pinion on said shaft, connections from said cams to said brakes, a rack meshing with said pinion, and connections from said rack to said expansible band.

3. In a planetary-gearing system, the combination of a driving-shaft, a transmission member, three drums, means connected to said driving-shaft for driving said drums in two directions, means for transmitting power from said drums to said transmission member, and means for arresting any of the drums independently of the others, thereby changing the speed or direction of rotation of said transmission member, said last-named means comprising three brakes, a shaft, a series of cams on said shaft and a toggle-joint connected from each cam to a brake, each cam having a depressed surface to hold the brakes in operative position.

4. In a planetary-gearing system, the combination of a driving-shaft, a transmission member, three drums, means connected to said driving-shaft for driving said drums in two directions, means for transmitting power from said drums to said transmission member, means for arresting any of the drums independently of the others, and means for connecting two of said drums together to prevent their moving independently of each other, said last-named means comprising an expansible band mounted on one of said drums, a cam for operating said band, and a rack and pinion and cam for operating said first-named cam.

5. In a planetary-gearing system, the combination of a driving-shaft, a plurality of drums, a transmission member, a hand-lever, means for transmitting motion from said shaft to said drums and connections to said drums from said hand-lever comprising a series of cams and toggles for first causing the power to be transmitted at a slow speed from said shaft to said transmission member, then increasing the speed, and finally further increasing the speed by moving said lever in one direction, and stopping and reversing the motion of said member by a reverse motion of said lever.

6. In a planetary-gearing system, the combination of a driving-shaft, a plurality of drums each having an internal gear, a transmission member, a lever, means for transmitting motion from said shaft to said drums, said means consisting of two gears meshing with each other, one of them being mounted on the shaft, three intermeshing gears, one of the latter being rigidly connected with one of the two first-mentioned gears, and connections to said drums from said lever for first causing the power to be transmitted at a slow speed from said shaft to said transmission member, then increasing the speed, and finally further increasing the speed by moving said lever in one direction and stopping and reversing the motion of said member by a reverse motion of said lever.

7. In a planetary-gearing system, the combination of a driving-shaft, a transmission member, a plurality of drums having internal gears, a lever, and means for transmitting motion from said shaft to said drums; said means consisting of two sets of gears, the gears of each set being located in the same plane and one of said sets consisting of two gears, one being mounted upon the shaft, and the other set of three gears connected with one of the gears of said first set, a gear of each of said sets having engagement with one of said internal gears, and connections from the lever to the drums for causing the power to be transmitted at varying speeds in the same direction from the shaft to the transmission member when the lever is moved in one direction.

8. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting motion from said shaft to said member at four different speeds, said means comprising two sets of intermeshing gears, one of said sets including a gear fast on the driving-shaft, two gears, one belonging to each of said sets, being rigidly secured together, and a plurality of drums, two of said drums having internal gears each meshing with the gear of one of said sets.

9. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting power from said shafts to said member at three different speeds in one direction and also in the reverse direction, said means comprising two sets of planetary gears, a plurality of drums, means for operatively connecting said drums with said gears, brakes for said drums, a rotatable shaft, a plurality of cams on the last-named shaft, means engaging one brake when the last-named shaft is turned through a certain angle, and means connected with another of said cams for tightening another brake when the shaft is turned through a larger angle.

10. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting power from said shaft to said member at three different speeds in one direction and at one speed in the reverse direction, said means comprising two sets of planetary gears, a plurality of rotatable drums, means for operatively connecting said drums to said gears, brakes for said drums, a rotatable shaft, a cam on said shaft, a lever arranged to be engaged and operated by said cam, and a link connecting said lever and said brake.

11. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting power from said shafts to said member at three different speeds in one direction and also in the reverse direction, said means comprising two sets of planetary gears, a plurality of drums, means for operatively connecting said drums with said gears, brakes for said drums, a rotatable shaft, a plurality of cams on the last-named shaft, means engaging one brake when the last-named shaft is turned through a certain angle, and means connected with another of said cams for tightening another brake when the shaft is turned through a larger angle; each of said last-mentioned means comprising a cam on the last-mentioned shaft, a lever arranged to be engaged and operated by the cam, and a link connecting the lever with one of said brakes.

12. A planetary-gearing system, comprising a driving-shaft, a transmission member, means for transmitting power from said shafts to said member at three different speeds in one direction and also in the reverse direction, said means comprising two sets of planetary gears, a plurality of drums, means for operatively connecting said drums with said gears, brakes for said drums, a rotatable shaft, a plurality of cams on the last-named shaft, means engaging one brake when the last-named shaft is turned through a certain angle, means connected with another of said cams for tightening another brake when the shaft is turned through a larger angle, and means for reversing the motion of said transmission member when the shaft is turned in the opposite direction.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL F. PEARSON.

Witnesses:
GUS E. JOHNSON,
MAURICE TALIN.