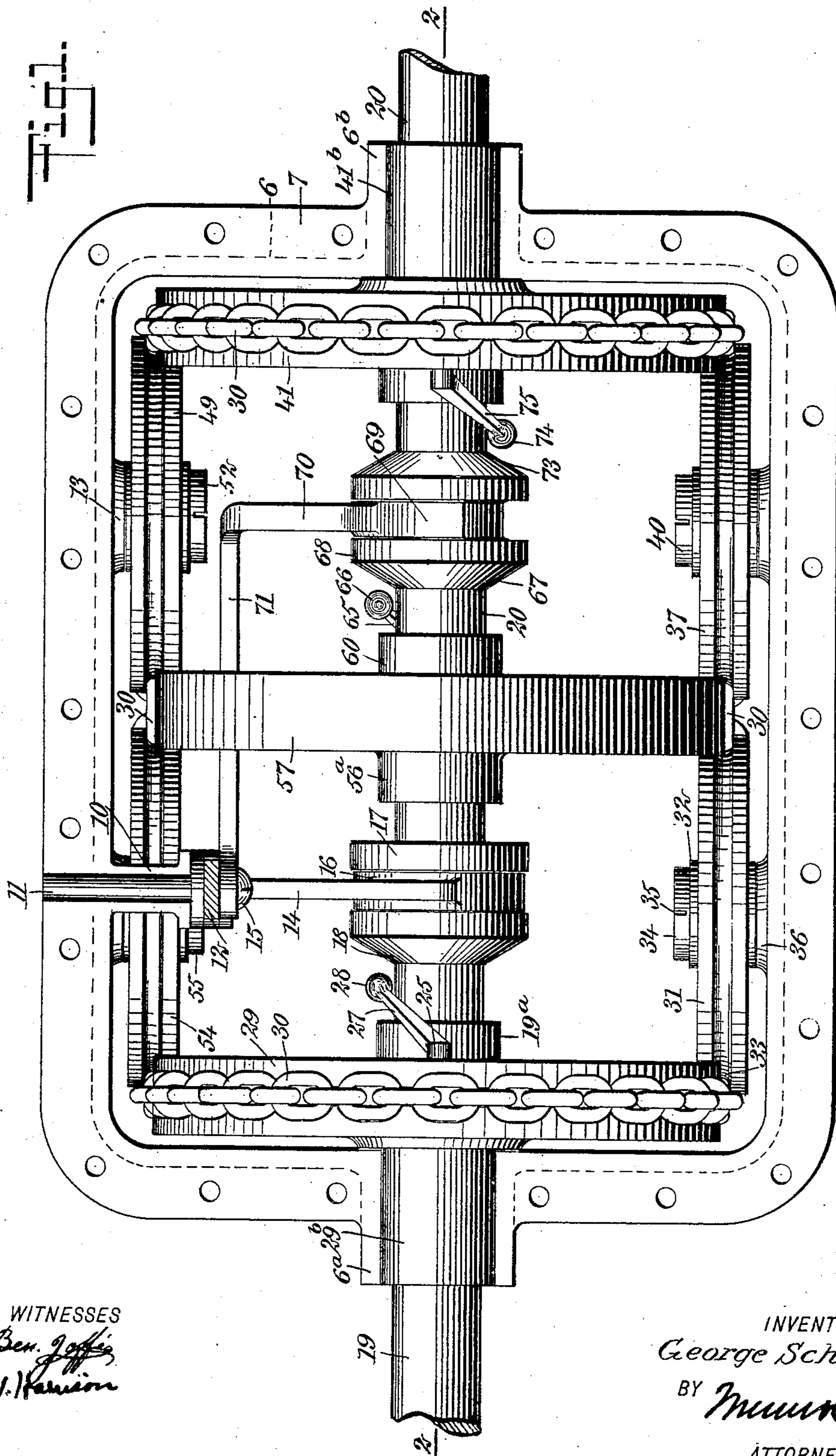


**931,501.**

3 SHEETS—SHEET 1.



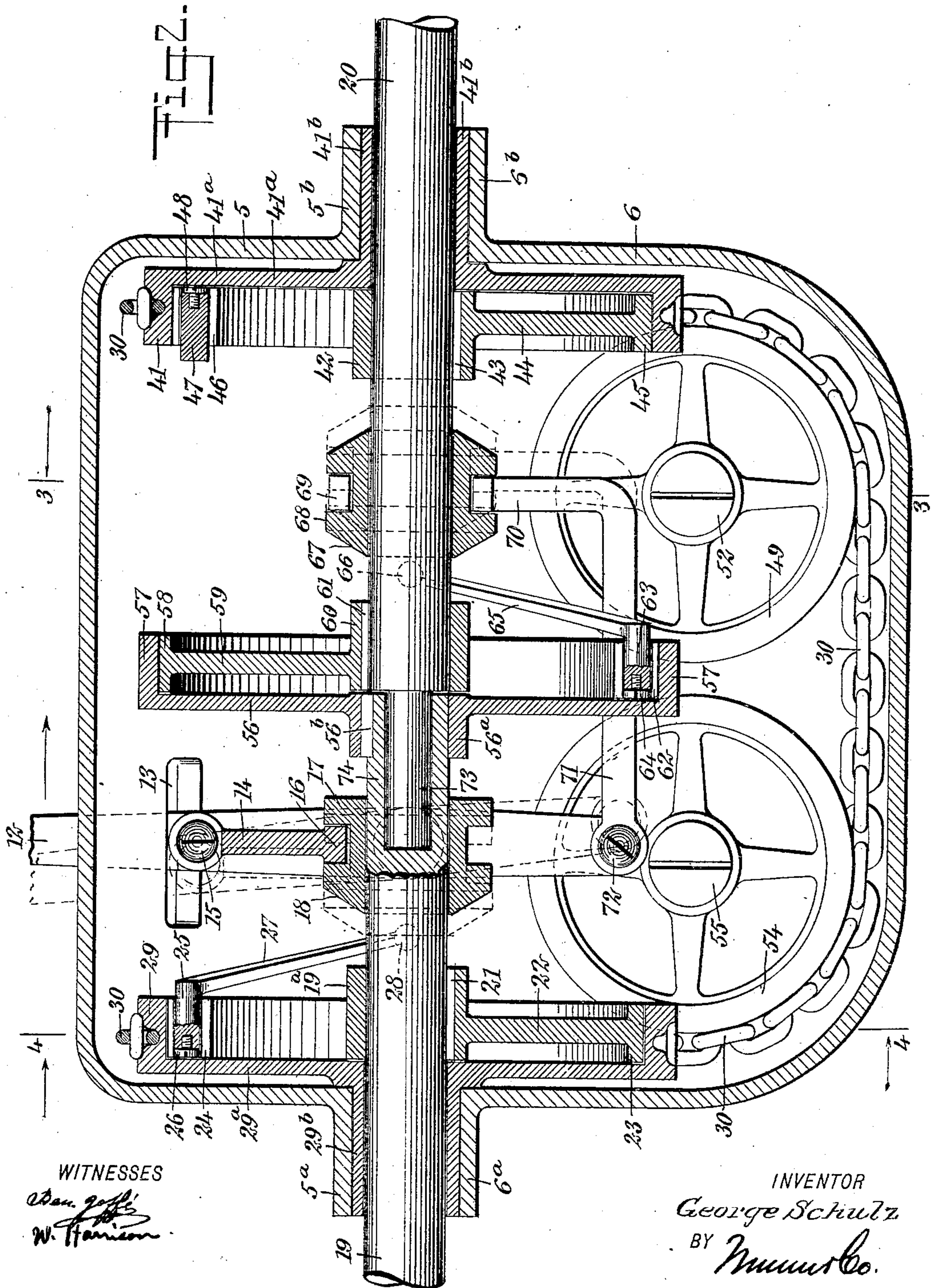
WITNESSES  
Ben. Joffe  
W. Harrison

INVENTOR  
*George Schulz*  
BY *Mumukshu*  
ATTORNEYS

G. SCHULZ.  
REVERSING APPARATUS.  
APPLICATION FILED JUNE 8, 1908.

931,501.

Patented Aug. 17, 1909.  
3 SHEETS—SHEET 2.



WITNESSES  
*Wm. J. Goff*  
*W. Harrison*

INVENTOR  
*George Schulz*  
BY *Mumford Co.*  
ATTORNEYS



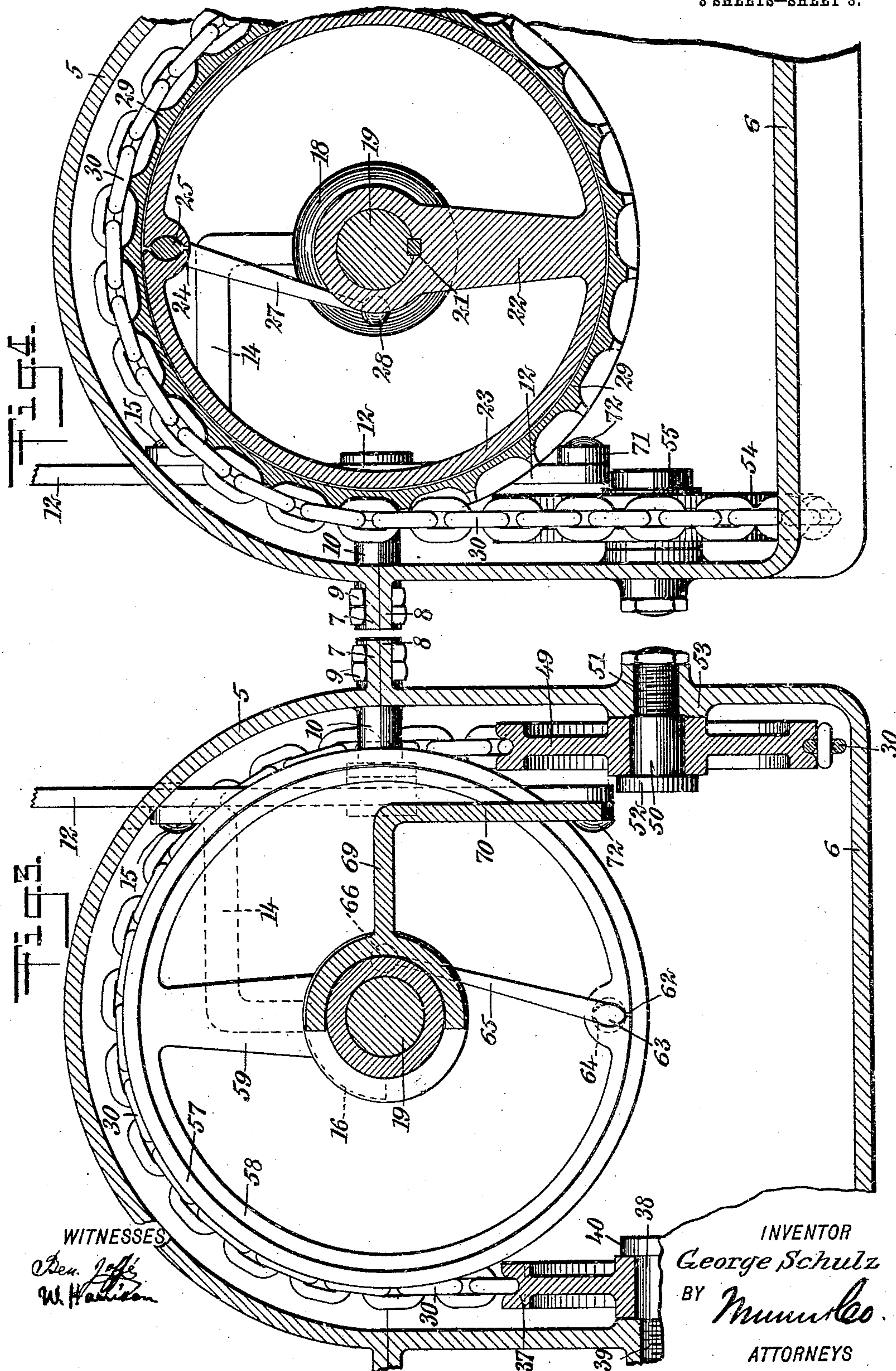
## REVERSING APPARATUS.

APPLICATION FILED JUNE 8, 1908.

931,501.

Patented Aug. 17, 1909.

3 SHEETS—SHEET 3.





# UNITED STATES PATENT OFFICE.

GEORGE SCHULZ, OF NEW YORK, N. Y.

## REVERSING APPARATUS.

No. 931,501.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed June 8, 1908. Serial No. 437,289.

*To all whom it may concern:*

Be it known that I, GEORGE SCHULZ, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Reversing Apparatus, of which the following is a full, clear, and exact description.

My invention relates to means for reversing a rotary motion, my more particular purpose being to produce a frictionless device of this character in which no gear wheels, in the ordinary acceptation of the term, are employed.

My invention further relates to certain general improvements in the construction of devices used for reversing motions transmitted, for instance, by revoluble shafts.

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 plan view of my device with the top half of the casing removed, this view showing the driving shaft, the driven shaft, and the various loose pulleys for obtaining at will either a direct drive or an indirect reversed drive; Fig. 2 is a vertical section substantially on the line 2—2 of Fig. 1, but showing the top half of the casing in position, this view showing more particularly how the driving and driven shafts are fitted relatively to each other and how the various movable members for effecting the direct and indirect drives are arranged; Fig. 3 is a vertical section upon the line 3—3 of Fig. 2, looking in the direction of the arrow, and showing one of the pulleys provided with a spring ring and mechanism for expanding this spring ring so as to cause it to act as a clutch member and grip a pulley rim carrying the drive chain; and Fig. 4 is a vertical cross section upon the line 4—4 of Fig. 2, looking in the direction of the arrow and showing another one of the pulleys and its connection with the drive chain.

At 5, 6 is a two-part casing, the part 5 representing the top and the part 6 the bottom of the casing. The top 5 is provided with journal-necks 5<sup>a</sup>, 5<sup>b</sup>, each of semi-cylindrical form, and the bottom 6 is similarly provided with journal-necks 6<sup>a</sup>, 6<sup>b</sup>, also of semi-cylindrical form and mating the necks 5<sup>a</sup>, 5<sup>b</sup>. The two parts 5, 6 of the

casing are provided respectively with flanges 7, 8 (see Figs. 3 and 4), held together by bolts 9. Extending inwardly from the casing is a cylindrical bearing 10 (see Figs. 1, 3 and 4), one-half of the same being integral with the piece 5 and the other half thereof being integral with the piece 6.

Supported within this bearing is a pin 11 (see Fig. 1), and journaled upon the inner end of this pin is a hand-lever 12, which extends through a slot 13 (see Fig. 2), in the part 5 of the casing. A fork 14 is journaled upon the lever 12 by aid of a bolt 15, and is provided with an arcuate portion 16 which fits into a cone 17. This cone is provided with an annular face 18 and encircles a driving shaft 19, being slidable in relation thereto. A driven shaft is shown at 20, and its center is in alinement with that of the driving shaft 19. A hub 19<sup>a</sup> is, by aid of a key 21, secured rigidly upon the driving shaft 19. Integral with this hub and extending radially outward therefrom is a spoke 22 supporting a spring ring 23 integral with the spoke. The spring-ring is provided with a slot 24, and fitting into this slot is an expanding key 25, which is substantially elliptical in cross section (see Fig. 4), so that when turned slightly upon its own axis it causes the spring ring 23 to expand. A round-headed screw 26 is secured directly to the key 25 and is sunken slightly into the spring-ring 23. As the head of the screw 26 is of a diameter equal to that of the greatest diameter of the key 25, the key can not move axially out of its position, the head of the screw serving as a limiting stop. A lever 27 is integral with the key 25 and is provided with a ball-head 28 adapted to be engaged by the face 18 of the cone 17. A rim 29 is fitted with a sprocket-chain 30 and is mounted upon a disk 29<sup>a</sup> having a hub 29<sup>b</sup>. This hub encircles the driving-shaft 19 and is loose relatively to the same. A pulley 31 (see Fig. 1) is provided with a hub 32 and with a groove 33, the latter giving the hub a suitable surface for engaging the chain 30. A pin 34 is threaded and secured to the casing and serves as an axle upon which the pulley 31 turns. A lug 36 affords a good fastening for the pin 34. Another pulley 37 (see Figs. 1 and 3), analogous to the pulley 31, is journaled upon a pin 38, having a threaded portion 39 secured firmly to the casing and also having a head 40 for holding the pulley 37 in position. A rim 41



(see Fig. 2), is integral with a disk 41<sup>a</sup> and with a sleeve 41<sup>b</sup>, the latter being loose relatively to the driven shaft 20.

A hub 42 is secured rigidly upon the driven shaft 20 by aid of a key 43, and is provided with a single spoke 44 radiating outwardly and terminating in a spring-ring 45, which is provided with a slot 46 and is fitted with an expanding-key 47 held in position by a bolt 48. A pulley 49 (see Fig. 3) is journaled upon a pin 50, having a threaded portion 51 secured to the casing and also having a head 52, this pin being mounted upon a lug 53 of the casing. Another pulley 54 (see Figs. 1 and 4), is mounted upon a pin 55 and is in the same plane as the pulley 49, and both of the pulleys last mentioned engage the chain 30. Mounted upon a disk 56 and integral with it (see Fig. 2), is a rim 57 occupying substantially the center of the casing. Integral with the disk 56 is a hub 56<sup>a</sup>, and this is secured to the driving shaft 19 by aid of a key 56<sup>b</sup>. An expanding ring 58 is mounted upon a single spoke 59, the latter being integral with the hub 60, which is secured to the driven shaft 20 by aid of a key 61.

The expanding ring 58 (see Figs. 2 and 3), is provided with a slot 62, into which an expanding key 63 fits, this key being of substantially elliptical form and provided with a bolt 64 whereby its withdrawal is prevented. A lever 65 is integral with the expanding key 63 and is provided with a ball head 66. A cone 68 is provided with an annular sloping face 67. Engaging this cone is a fork 69 mounted upon an arm 70, the latter having a horizontal portion 71 secured by a bolt 72 to the lower end of the hand lever 12. The cone 68 is also provided with an annular sloping face 73 adjacent to which is a ball head 74 carried by a lever 75, the latter being integral with the expanding key 47.

When the upper end of the hand lever 12 is moved to the left, according to Fig. 2, as indicated by dotted lines in said figure, the cone 17 is moved to the left and the face 18 engages the ball head 28 so as to turn the lever 27 slightly outward and cause the expanding key 25 to increase the diameter of the spring ring 23 thereby causing this ring to grip the rim 29, the parts thus acting as a clutch and causing the driven shaft 19 to turn the rim 29, thus actuating the chain 30. This same movement of the lever 12 to the left causes the cone 68, under control of the fork 69, to move to the right, according to Fig. 2. At the same time the movement of the cone 68 to the right causes the face 73 to engage the ball head 74, thus turning the expanding key 47 and tightening the spring ring 45 relatively to the rim 41. The net result is that the same movement of the lever 12 which causes the rim 29 to become fixed

in relation to the spring ring 23, also causes the spring ring 45 to expand and become rigid relatively to the rim 41. This movement causes the driven shaft 20 to turn in a direction reverse to the direction of travel of the driving shaft 19. If, now, the hand lever 12 be allowed to resume its normal position, as indicated by full lines in Fig. 2, the ball heads 28, 66 and 74 are all disengaged from the cones associated with them, the result being that the driving shaft 19 and the driven shaft 20 are totally disconnected from each other, so that the rotation of the driving shaft has no effect whatever upon the driven shaft. Suppose, further, that the hand lever 12 be shifted to the right, according to Fig. 1. This movement causes the cone 17 to slide to the right and the cone 68 to slide to the left, according to Fig. 2. The result is that the ball head 66, being pressed to the left according to Fig. 2, causes the spring ring 58 to grip the inner surface of the rim 57. This rim 57 and the spring ring 58 now act as clutch members, being locked together and enabling the driving shaft to transmit a direct rotary movement to the driven shaft.

From the above description the action of the device will be readily understood. The operator, in order to cause the driving shaft 19 to confer upon the driven shaft 20 a direct drive in the same direction of rotation as that of the driving shaft, merely shifts the hand lever 12 to the right according to Fig. 2. If he wishes to reverse the rotation of the driven shaft 20 he shifts the hand lever 12 to the left according to this figure. If he shifts the lever neither to the right nor to the left, no power is transmitted to the driven shaft.

As will be readily understood from the above description this reverse mechanism contains no cog wheels or gear members, as the term is ordinarily used. The friction afforded by the movement of the various parts is less than in some other forms of gearing.

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

The combination of driving and driven shafts, a revoluble member mounted upon said driving shaft and adapted to turn independently thereof, a revoluble member mounted upon said driven shaft and adapted to turn independently of the same, separate members for locking said driving and driven shafts rigidly relative to the respective revoluble members mounted upon said shafts, said separate members being provided with separate arms movable independently, means controllable at will and including conical surfaces for engaging said separate arms in order to actuate the same in unison, a flexible connection extending from said revoluble

member upon said driving shaft to said revo-  
luble member upon said driven shaft, and  
guiding pulleys disposed intermediate said  
driving shaft and said driven shaft, said  
5 guiding pulleys engaging said flexible con-  
nection.

In testimony whereof I have signed my

name to this specification in the presence of  
two subscribing witnesses.

GEORGE SCHULZ.

Witnesses:

ALEXANDER LEVENE,  
BERTRAM L. MARKS.