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A. G. GODE.

ANTIFRICTION CRANK HANDLE.

APPLICATION FILED JUNE 5, 1903.

NO MODEL.

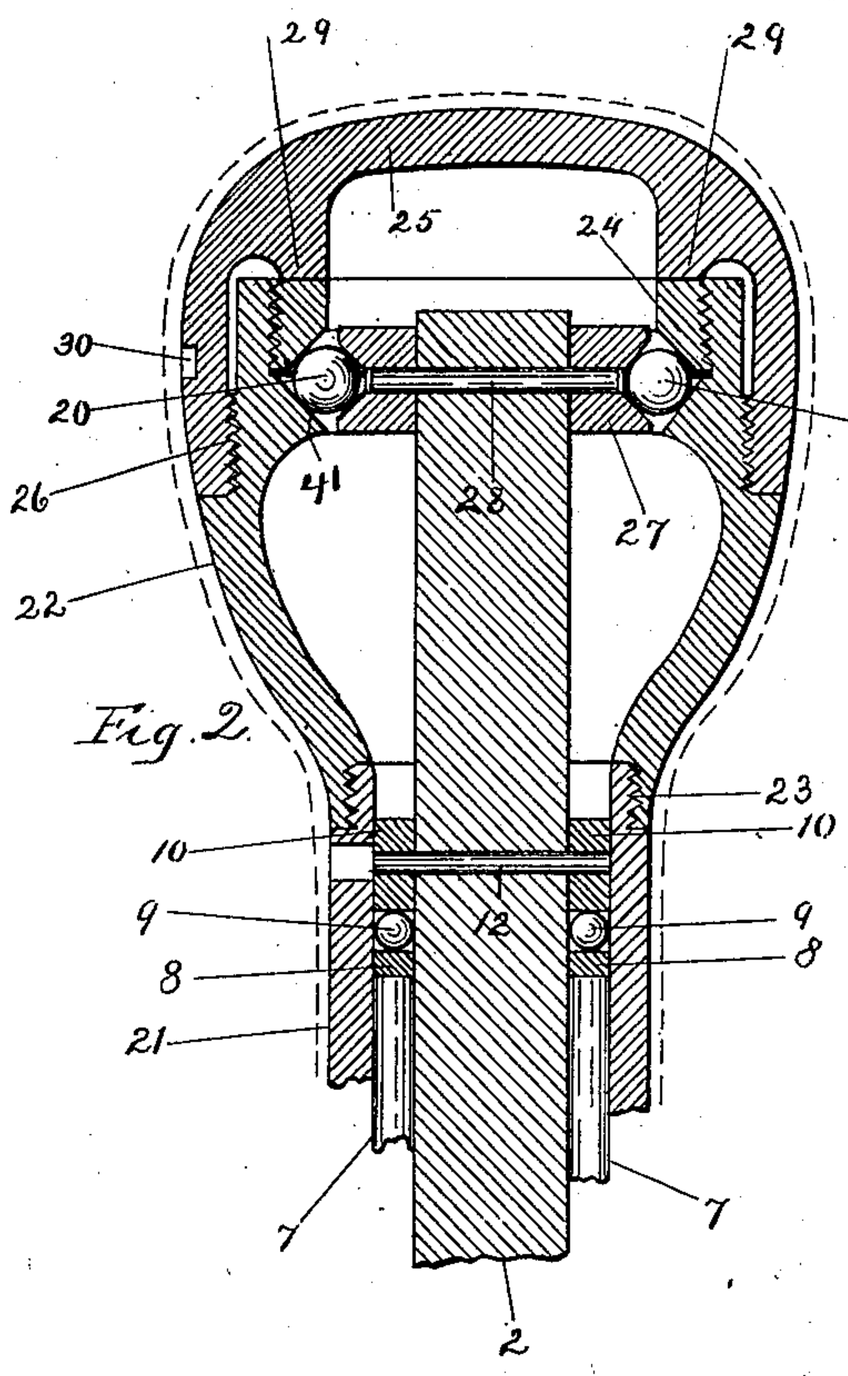

Fig. 2.

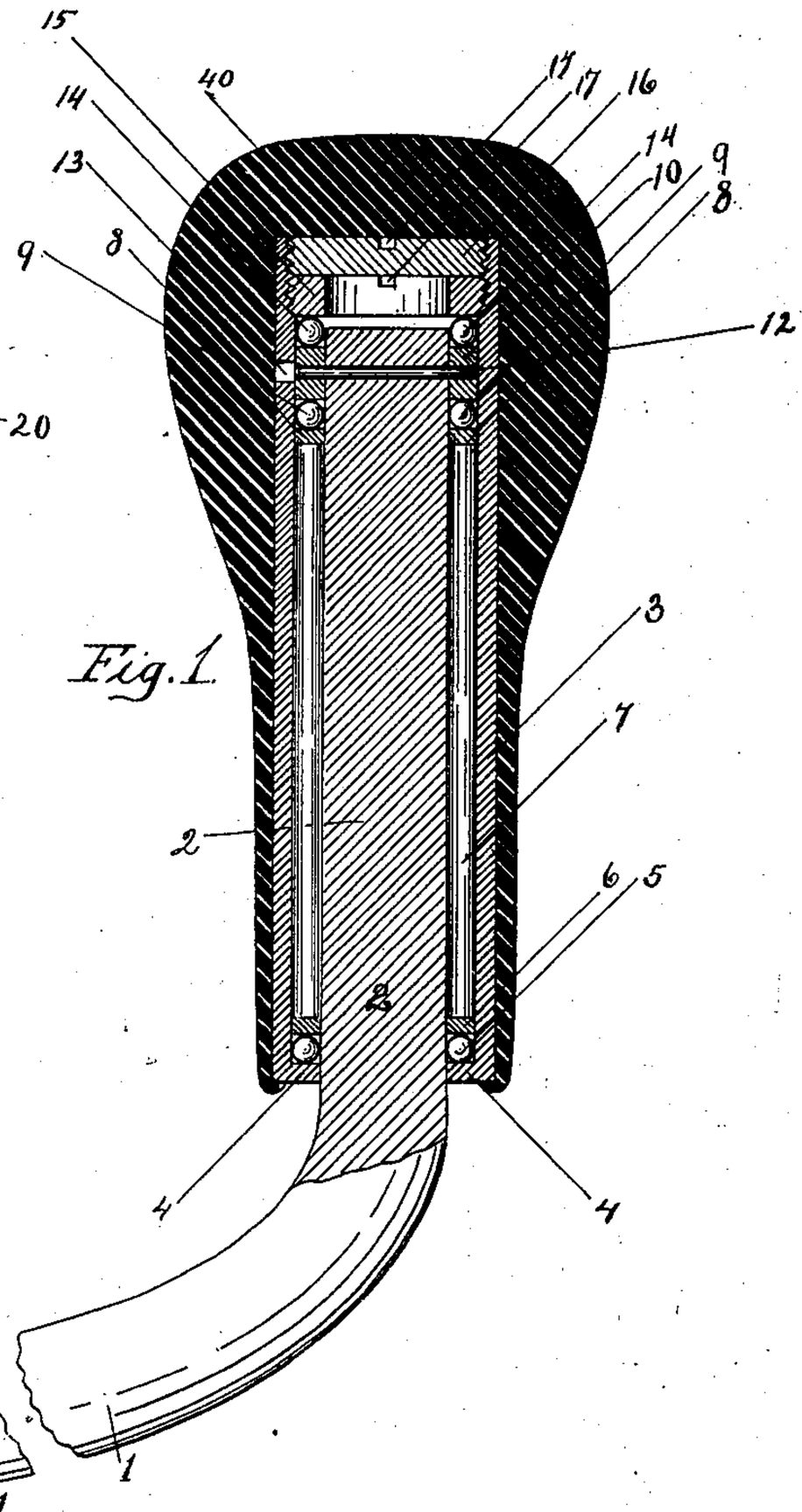

Fig. 1.

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UNITED STATES PATENT OFFICE.

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ANTIFRICTION CRANK-HANDLE.

SPECIFICATION forming part of Letters Patent No. 751,496, dated February 9, 1904.

Application filed June 5, 1903. Serial No. 160,157. (No model.)

To all whom it may concern:

Be it known that I, ALBERT G. GODE, a citizen of the United States, residing at Amsterdam, county of Montgomery, and State of New York, have invented certain new and useful Improvements in Antifriction Crank-Handles, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures.

Figure 1 of the drawings is a view in side elevation of a crank provided with my improved handle, which is shown in central longitudinal section. Fig. 2 is a similar view showing a modified form of construction with the arm of the crank and part of the handle broken away.

My improved handle is especially adapted for use in connection with the brake of a street-railway car, where the frequent stoppages and "slow-ups" necessary in busy streets require very frequent manipulation of the brake-handle, often attended with the application of much strength exerted upon the brake-handle.

The handle has commonly been made integral and solid with the crank-arm, necessitating the rotation of the handle in the hand of the operator at every application of the brake.

Various expedients have been devised for producing a handle revoluble upon the brake-arm, but have proved unsatisfactory on account of the great strain and wear upon the movable parts.

Handles have generally been made pear-shape in form—that is, with the outer end considerably larger in diameter than the inner end at the junction of the handle and arm.

The outer end of the handle is sufficiently large to admit of the use thereat of the ordinary ball-bearings; but the inner end of the handle is necessarily so small in diameter as to preclude the satisfactory use of such bearings at that end.

To use ball-bearings at the inner end of the handle it would be necessary to make use of balls so small in diameter as to render them impracticable on account of wear and breakage under the great strain to which they would be subjected.

I have ascertained that roller-bearings of very small diameter and extending over considerable part of the length of the handle may be successfully employed to resist the side strains to which the handle is subjected, which are the principle strains applied to a handle-grasp revoluble upon a crank-pin.

The comparatively small force exerted upon the handle-grasp in the direction of the axis of the crank-pin known as "end thrust" can be resisted by ball-bearings in which the balls are made of comparatively small diameter. This is especially true of the bearings located at the inner end of the handle to resist outward end thrust thereon, which is comparatively slight. The larger size of the outer end of the handle-grasp permits of the use of ball-bearings thereat in which the balls are made comparatively large in diameter and are adapted to resist the inward end thrust, which is greater than the outward end thrust.

By the "inward end thrust" I mean that force which is exerted in the direction of the axis of the crank-pin toward the junction of the pin and arm and by the "outward end thrust" the force exerted in line with the axis of the crank-pin toward the outer end of the pin.

Referring to the drawings, 1 is the crank-arm, and 2 the crank-pin. The handle-grasp 3 is preferably a metallic sleeve or tube made with a larger inner diameter than the diameter of the pin and provided at its lower or inner end with an introverted flange 4 and at its outer end interiorly screw-threaded. The grasp is first slipped onto the crank-pin to the position shown in the drawings, after which the inner series of bearing-balls 5 are inserted from the outer end to the position shown and the loose washer 6 inserted to rest upon

the balls 5. A series of small rollers 7 is then inserted with their inner ends resting upon the washer 6, a sufficient number being inserted to loosely fill the space between the pin and the sleeve. Another loose washer 8 is then inserted to rest upon the outer ends of the rollers 7, after which another series of balls 9 are inserted to rest upon the washer 8. A collar 10 is then inserted between the pin and grasp to rest upon the balls 9. The collar is fixed upon the crank-pin by means of the small pin 12, passed through oppositely-disposed receiving-apertures in the collar and a receiving-aperture in the crank-pin, as shown. The pin 12 is inserted by passing the same through the aperture 13 in the grasp. Another series of balls 14 is then inserted between the grasp and crank-pin to rest upon the outer end of collar 10, the crank-pin projecting beyond the collar sufficiently to form a channel to receive the balls. An exteriorly-threaded adjusting-sleeve 15 is then screwed into the outer interiorly-screw-threaded end of the grasp to the proper point to hold the various series of balls, washers, and rollers in loose contact with each other to permit of free movement of the balls, rollers, and washers upon each other and the collar 10, which is fixed upon the crank-pin, after which the locking-nut 16 is inserted in the outer end of the grasp to lock the adjusting-sleeve 15 in its adjusted position. The slots 17 are the usual screw-driver slots for operating the adjusting and locking device.

It will be readily seen that in the construction shown in Fig. 1 the balls serve merely to resist the end thrust and that the rollers serve to resist all the side strains.

The loose washers 6 and 8 are inserted between the ends of the rollers and the neighboring series of balls to afford an end bearing for the rollers, the washers revolving with the rollers upon the balls, which are interposed between the washers and the resisting flange or collar, thereby materially reducing the friction of the movable parts.

It will be observed that the series of balls 5 and 9 and the rollers are made of relatively small diameter, thereby making it possible to secure a small and conveniently-operated grasp for the hand.

In some cases the inward end thrust may be considerable when the hand is placed over the outer end of the grasp.

When desired, the outer series of balls 20 (shown in Fig. 2) may be made comparatively large in diameter on account of the larger size of the outer end of the grasp, the grasp being made in three sections.

Section 21 is cylindrical in form and screw-threaded at its outer end to receive section 22, which flares outwardly and is screwed onto section 21 at 23.

Section 22 is provided interiorly with the bearing-surface 41, adapted to be engaged by balls 20, and is screw-threaded interiorly at its outer end to receive the exteriorly-screw-threaded bearing-collar 24 and screw-threaded exteriorly to receive the interiorly-threaded cap-section 25, which is screwed onto section 22 at 26.

The crank-pin is provided with a collar 27, having exterior bearing-surfaces adapted to be engaged by the balls 20, as shown. This collar is fixed upon the crank-pin by means of the transverse pin 28, passing through apertures in the crank-pin and collar.

The cap is provided with a locking-flange 29, adapted to bear upon the collar 24 and securely lock the same in its adjusted position.

In assembling the parts just described the section 22 is screwed onto the section 21 after the crank-pin, with its bearing-collar 27, has been inserted to the position shown in Fig. 2. Then the balls 20 are inserted to the position shown and the bearing-collar 24 screwed into the section 22 to the position to properly adjust the bearings for balls 20. Then the cap-section 25 is screwed onto the section 22 until the flange 29 engages the collar 24 to lock it in its adjusted position.

The comparatively large diameter of the bearing-collar 27 makes it possible to employ comparatively large bearing-balls, and when arranged as shown in Fig. 2 these balls not only serve to resist end thrust but also the side strains at the extreme outer end of the grasp. Small apertures 30 may be inserted in the outer sides of a cap to receive a spanner-wrench adapted to screw on the cap. The inner end of this form of grasp may be provided with the roller-bearings the same as shown in Fig. 1.

My improved handle when properly put together and adjusted will last without repairs or readjustment for a very long time, which avoids the necessity of detaching the parts for repairs or readjustment and renders it not only possible, but practicable to cover the entire handle with a coating of vulcanized rubber, which not only gives form to the handle, but covers the joints and insulates the hand of the operator from the handle. In the case of brake-handles used on electrically-propelled vehicles its use is of great importance, as the operator of a non-insulated handle is liable to receive electric shocks. This liability is so great in the case of thunder-storms as to become exceedingly dangerous. It is impracticable to thus insulate non-revoluble handles because of the increased friction between the handle and the hand of the operator, which would render it impracticable of operation. By having the handle-grasp revoluble the greater the friction between the hand and the grasp the better the control of the operator.

I have shown in Fig. 1 an insulating grasp-cover 40 applied to the handle and indicated such a cover by dotted lines in Fig. 2.

The insulating grasp-cover is preferably

made of rubber vulcanized on the revoluble metallic grasp-sleeve; but I do not wish to be limited to any particular kind of insulating material.

What I claim as new, and desire to secure by Letters Patent, is—

1. A crank-handle comprising a crank-pin; a socket-grasp inclosing the pin; ball-bearing mechanism between the grasp and pin to resist end thrusts; and roller-bearing mechanism between the grasp and pin to resist side strains, substantially as described.

2. The combination of a crank-pin; and pin-inclosing handle-grasp; of ball-bearing mechanism between the grasp and pin to resist end thrusts; roller-bearing mechanism between the grasp and pin to resist side strains; a loose washer and a series of bearing-balls interposed between each end of the series of rollers and a resisting-flange, the washer affording a bearing on one side for the ends of the rollers and on the opposite side for the interposed balls, substantially as described.

3. The combination of a vertically-disposed crank-pin; and pin-inclosing handle-grasp; of a ball-bearing mechanism between the grasp and pin to resist downward thrust of the grasp; roller-bearing mechanism between the grasp and pin to resist side strains; a loose washer resting upon the upper ends of the rollers; a loose washer beneath the lower ends of the rollers; a series of balls bearing upon the upper side of the upper washer, and a like series of balls bearing upon the lower side of the lower washer, the sides of the balls opposite the washers bearing, those of one series, upon the grasp and those of the other series upon the crank-pin, substantially as described.

4. The combination of a crank-pin; and pin-inclosing handle-grasp; of ball-bearing mechanism between the outer ends of the grasp and pin composed of relatively large balls to resist both end thrusts and side strains; and roller-bearing mechanism composed of relatively small rollers between the inner portions of the grasp and pin to resist side strains.

In testimony whereof I have hereunto set my hand this 22d day of May, 1903.

ALBERT G. GODE.

Witnesses:

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