J. HUTHER.

REVERSING GEAR.

APPLICATION FILED DEC. 6, 1909.

967,384. **Patented Aug. 16, 1910.**

2 SHEETS—SHEET 1.

FIG. 1.

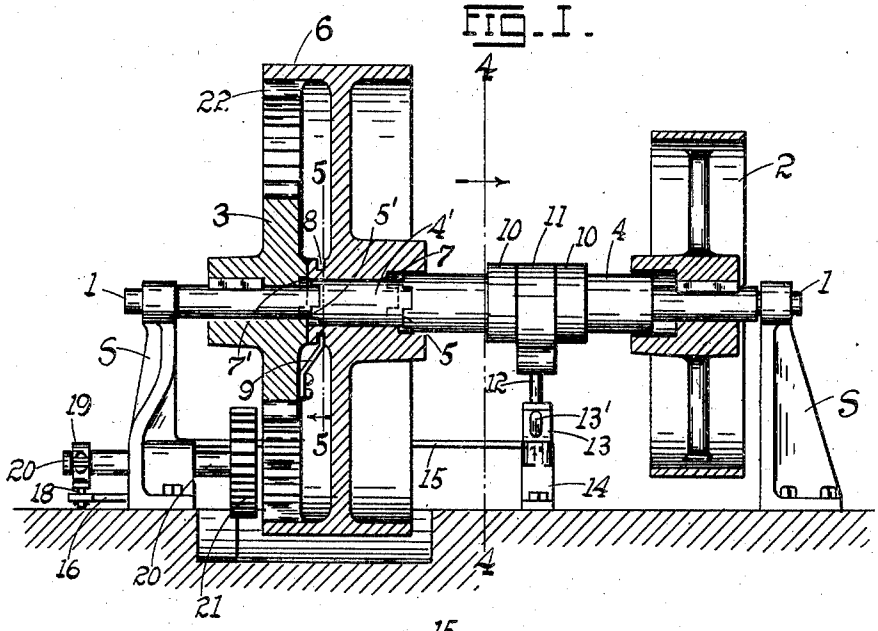
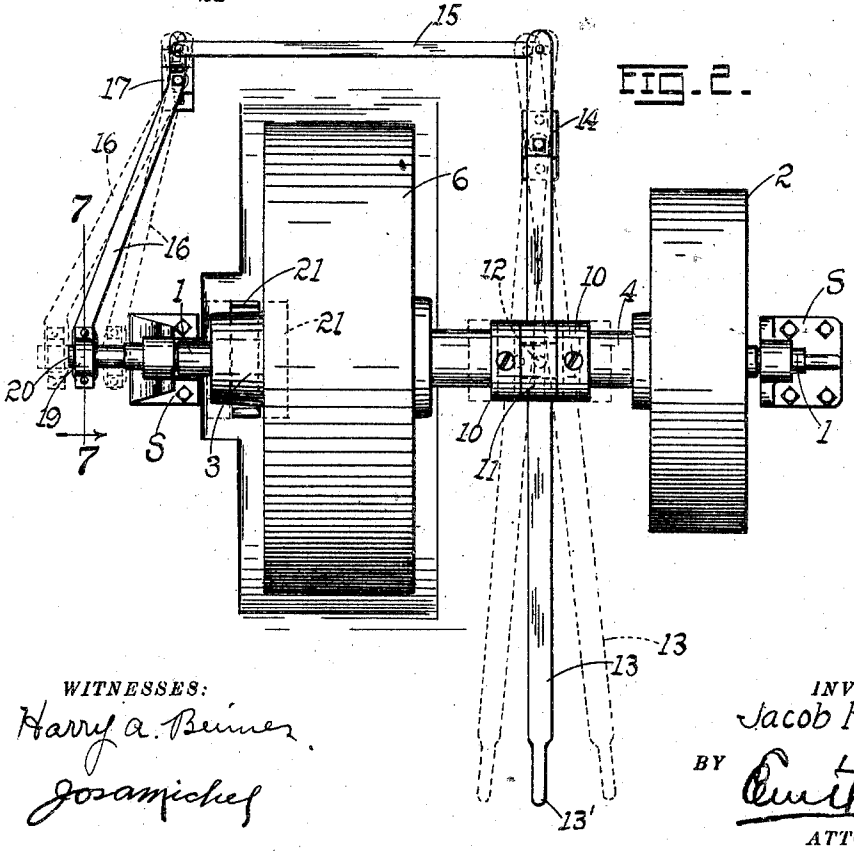


FIG. 2.



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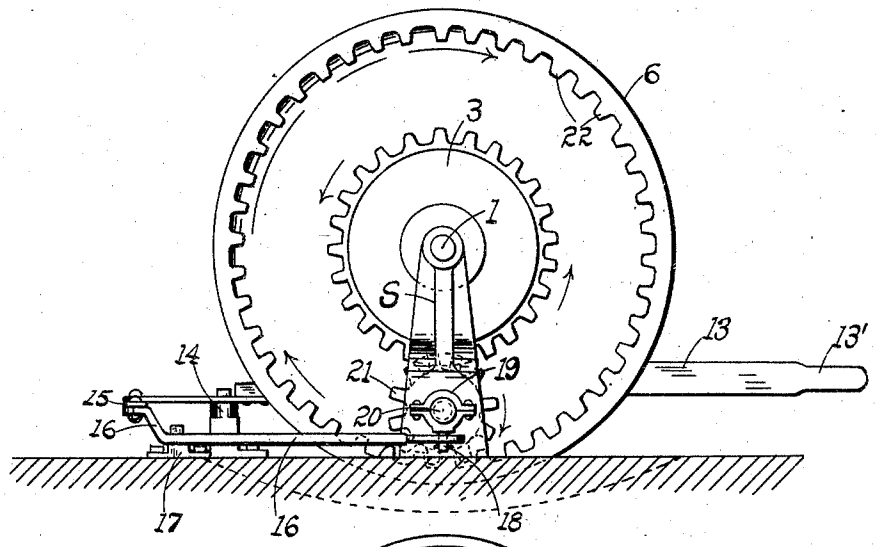
2 SHEETS—SHEET 2.

FIG. 3.



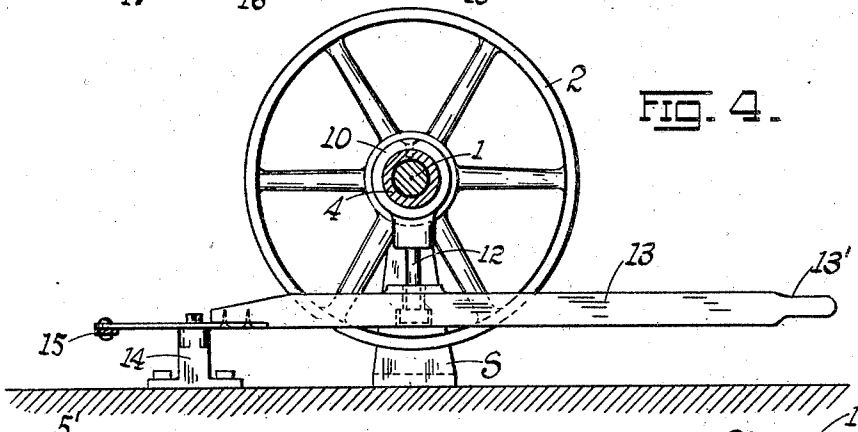


FIG. 4.

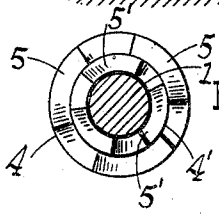


FIG. 6.

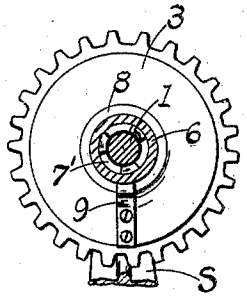


FIG. 5.

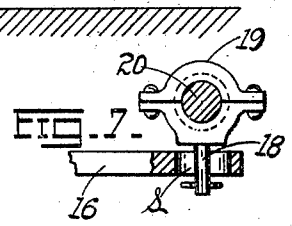


FIG. 7.

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REVERSING-GEAR.

967,384. Specification of Letters Patent. **Patented Aug. 16, 1910.**

Application filed December 6, 1909. Serial No. 531,682.

To all whom it may concern:

Be it known that I, JACOB HUTHER, citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Reversing-Gear, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in reversing-gear; and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a combined vertical middle longitudinal section and elevation of my invention; Fig. 2 is a top plan thereof, with parts in central position; Fig. 3 is an end elevation looking from the side carrying the gear mechanism; Fig. 4 is a vertical cross-section on line 4—4 of Fig. 1; Fig. 5 is a cross-section on line 5—5 of Fig. 1, with the coupling sleeve carried by the shaft and other parts removed; Fig. 6 is an end view of the sliding coupling sleeve mounted on the drive-shaft, the latter being shown in cross-section; and Fig. 7 is a sectional detail on the line 7—7 of Fig. 2.

The object of my invention is to construct a reversing-gear for changing the direction of rotation of a belt-pulley (or equivalent rotating-body) at the pleasure of the operator, which shall be simple in construction, compact, readily manipulated, or thrown into or out of engagement, one under perfect control, and one possessing further and other advantages better apparent from a detailed description of the invention, which is as follows:—

Referring to the drawings, S, S, represent suitable standards carrying a drive-shaft 1, one end of the latter having keyed thereto a drive belt-pulley 2, the opposite end having keyed thereto an exteriorly-geared wheel 3. Mounted loosely on the shaft 1 between the pulley 2 and gear wheel 3 is a sleeve 4 terminating at the end adjacent the gear 3 in a reduced extension 4′, a male-clutch member 5 being disposed on the annular shoulder thus formed at the base of the extension 4′, and a second male-clutch member 5′ being formed at the free end of the extension. Loosely mounted on the extension 4′, with its hub partially overlapping the clutch 5 on the sleeve 4 proper, is a loose pulley 6. At the base of the cavity of the hub portion of the pulley 6 enveloping the sleeve 4 proper is disposed a female-clutch formation 7 which coöperates with the male clutch 5 on the sleeve 4; and on the inner face of the gear 3 around the shaft 1 is disposed a female clutch formation 7′ (Fig. 5) which coöperates with the male clutch 5′ of the sleeve extension 4′. To prevent the pulley 6 (or equivalent member) from working away from the gear 3, to which it should always be adjacent, I provide the hub portion of the pulley on the side facing the gear wheel 3 with a peripheral groove 8 which is engaged by the bent terminal of an arm or bracket 9 secured to the face of the gear wheel. In that way, the pulley 6 may be free to turn on the sleeve 4, 4′ and yet always remain in close proximity to the gear 3, a position which it is necessary it should maintain that it may at the proper time engage with the reversing pinion presently to be described.

Carried by the sleeve 4 between the pulleys 2 and 6 are collars 10, 10, between which is loosely mounted a band or ring 11 from which depends a pin or stud 12 which is suitably and pivotally coupled to the long arm of a shifting lever 13, the free end of the lever-arm terminating in a handle 13′. The lever is fulcrumed to a post 14, the end of the short arm thereof being pivotally connected by a link 15 to the short arm of a bent-lever 16 pivoted over a plate 17, the free end of the long arm of said bent-lever being provided with an elongated slot *s* (Fig. 7) in which operates a stud or pin 18 formed on the bottom member of the sectional band 19 loosely mounted on the shaft 20. The inner end of the shaft 20 carries the reversing pinion 21 which is adapted (for a given position) to mesh simultaneously with the gear 3 and the interiorly geared rim or wheel 22 formed with or carried by, the pulley 6.

The operation will be readily understood from the previous description and drawings:—Let us assume that the controlling or shifting lever 13 occupies a central position or one at right angles to the axis of the shaft 1 as indicated in full position in Fig. 2. For that position of the lever, the pinion 21 is just outside the annular space between the gears 3 and 22. When the lever is oscillated to the left (Fig. 2) it shifts the sliding member or sleeve 4, 4′ with it, bringing the clutch faces 5, 7, 5′, 7′, into positive engagement, thereby locking the sleeve to the gear

3, and the pulley 6 to the sleeve. Since the gear 3 however, is keyed to the shaft 1, it follows that whatever be the direction in which the shaft rotates, the sleeve must rotate with it in the same direction; and since the pulley 6 is now clutched or coupled to the sleeve, the pulley must rotate with the shaft. The throw of the lever 13 which thus locks the pulley 6 to the shaft draws on the link 15 to throw the lever 16 outwardly and thus retract the pinion 21 still farther from the gears 3, 22 (Fig. 2). On the other hand, suppose the lever 13 is oscillated to the right of its middle position, it will, through the medium of the link and lever connections 15, 16, described, force the pinion 21 between the gears 3 and 22 (Fig. 2) causing a simultaneous engagement therewith, in which movement the clutch formations of the sleeve 4, 4′ will have been withdrawn from engagement with the members 3 and 6, leaving the member 6 free to rotate about the sleeve and shaft 1. Since the gear 3 however, rotates with the shaft (being keyed thereto), the intermediate pinion 21 between the gears 3 and 22 will now rotate the gear 22 in an opposite or reverse direction as obvious from the arrows indicated in Fig. 3. Of course, for a central position of the lever 13, the sleeve 4, 4′ and pulley 6 being both loose on the shaft 1, and the pinion 21 being disengaged from both gears 3 and 22, it follows that no motion will be imparted to the pulley 6 with any rotation of the drive-shaft. Since the lever 16 in shifting the shaft 20 between the engaged and disengaged positions of the reversing pinion 21 necessarily sweeps in the arc of a circle, it follows that the slot *s* (Fig. 7) must be sufficiently elongated to allow for the oscillation of the lever, the shaft 20 being capable of only a rectilinear movement. Obviously, the shaft 20 need not necessarily be capable of rotation, it being sufficient if the pinion 21 is free to rotate on it, as the only purpose of the pinion is to impart a reverse rotation to the pulley or member 6 when in simultaneous mesh with the gears 3 and 22. The ends of the sleeve 4, 4′, are preferably concealed within the hub formations of the pulleys 2 and 6 as shown, to prevent access of dirt to the shaft (Fig. 1). To this detail however, or to the details of the lever and link connections no importance is herein attached, as they fall within the skill of the ordinary mechanic and may be varied at pleasure.

Having described my invention, what I claim is:—

1. A reversing gearing comprising a rotatable drive shaft, a gear wheel secured thereto and rotatable therewith, a rotatable interiorly geared member mounted loosely about the shaft adjacent to the gear wheel aforesaid, a sliding member on the shaft adapted to be coupled to the gear and rotatable member by a movement of the sliding member in one direction, and a pinion for gearing said gear wheel to the rotatable member upon a movement of the sliding member in the opposite direction.

2. A reversing gearing comprising a rotatable shaft, a gear-wheel secured thereto, and rotatable therewith, a rotatable interiorly geared pulley mounted loosely about the shaft adjacent to the fixed gear-wheel, a sliding sleeve mounted loosely on the shaft and adapted to be coupled to the fixed gear wheel and pulley with a movement of the sleeve in one direction, a rotatable pinion, and intermediate connections between the pinion and sleeve for forcing the pinion into mesh with the fixed gear-wheel and the interior gear on the pulley with a movement of the sleeve in the opposite direction.

3. A reversing gearing, comprising a rotatable shaft, a fixed gear wheel carried thereby, a loose sleeve mounted slidingly on the shaft and provided at the end adjacent the fixed gear-wheel with a reduced extension, clutch formations on the free end of the extension and on the shoulder formed at the base thereof, a pulley mounted loosely about the sleeve extension, means for maintaining the pulley in contiguous relation to the fixed gear wheel, clutch formations on the fixed gear wheel and on the loose pulley adapted to coöperate with the corresponding formations on the extension and on the sleeve proper, an interiorly geared wheel or rim on the loose pulley encompassing the fixed gear-wheel, a pinion normally out of mesh with the gears aforesaid, and intermediate connections between the sleeve and pinion for forcing the pinion into engagement with said gears with a sliding movement of the sleeve in one direction, and for disengaging the pinion and engaging the clutch formations between the sleeve and its extension and the pulley and fixed gear wheel respectively with a sliding movement of the sleeve in the opposite direction.

In testimony whereof I affix my signature, in presence of two witnesses.

JACOB HUTHER.

Witnesses:
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JOS. A. MICHEL.