J. H. GORMAN.

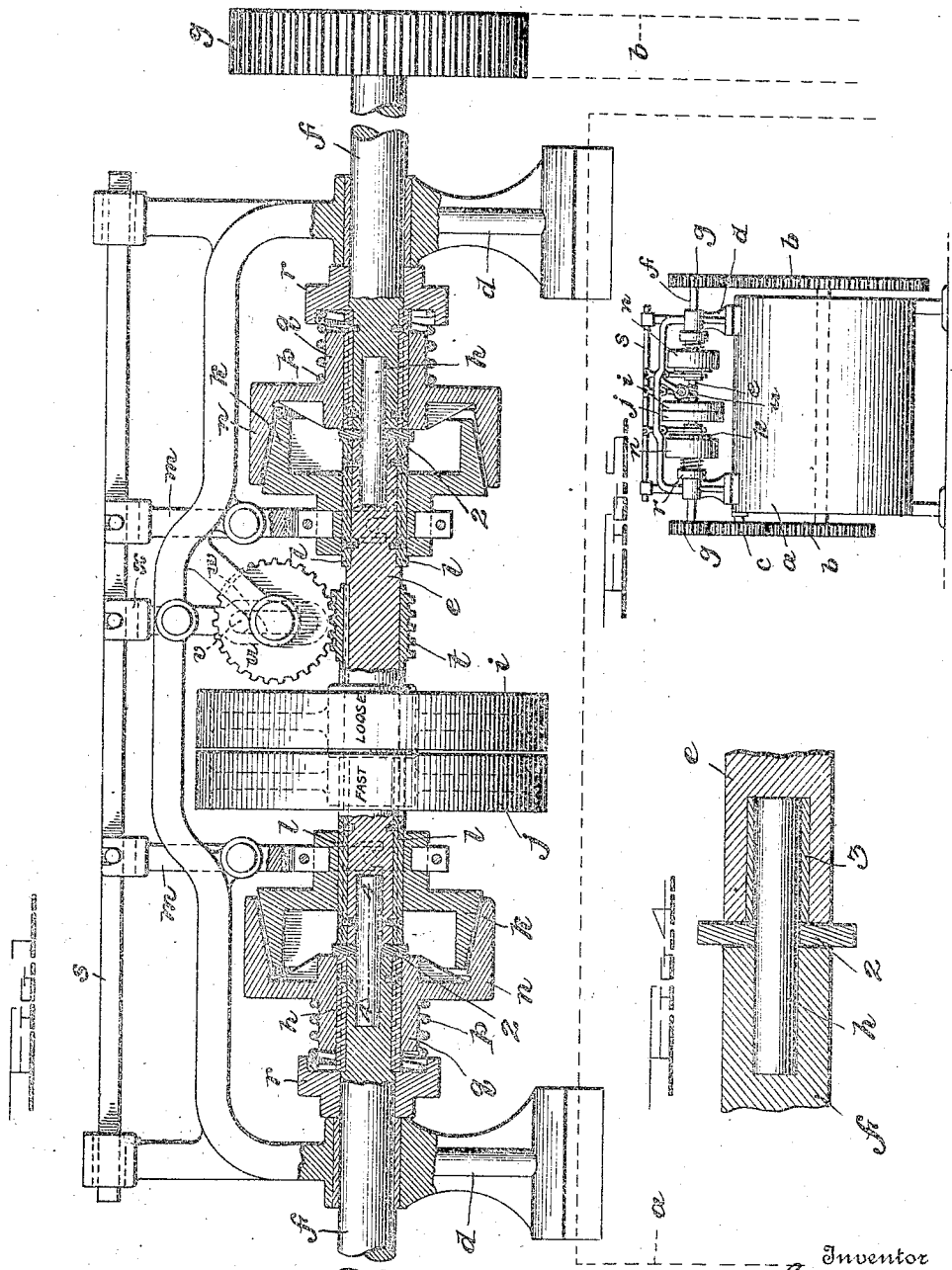
REVERSING DRIVING MECHANISM.

APPLICATION FILED MAR. 5, 1913.

1,082,691.

Patented Dec. 30, 1913.

2 SHEETS—SHEET 1.



Witnesses

Chas. L. Gridbauer.

B. J. Bridges

Inventor

John H. Gorman

By Davis & Davis

Attorneys

J. H. GORMAN.

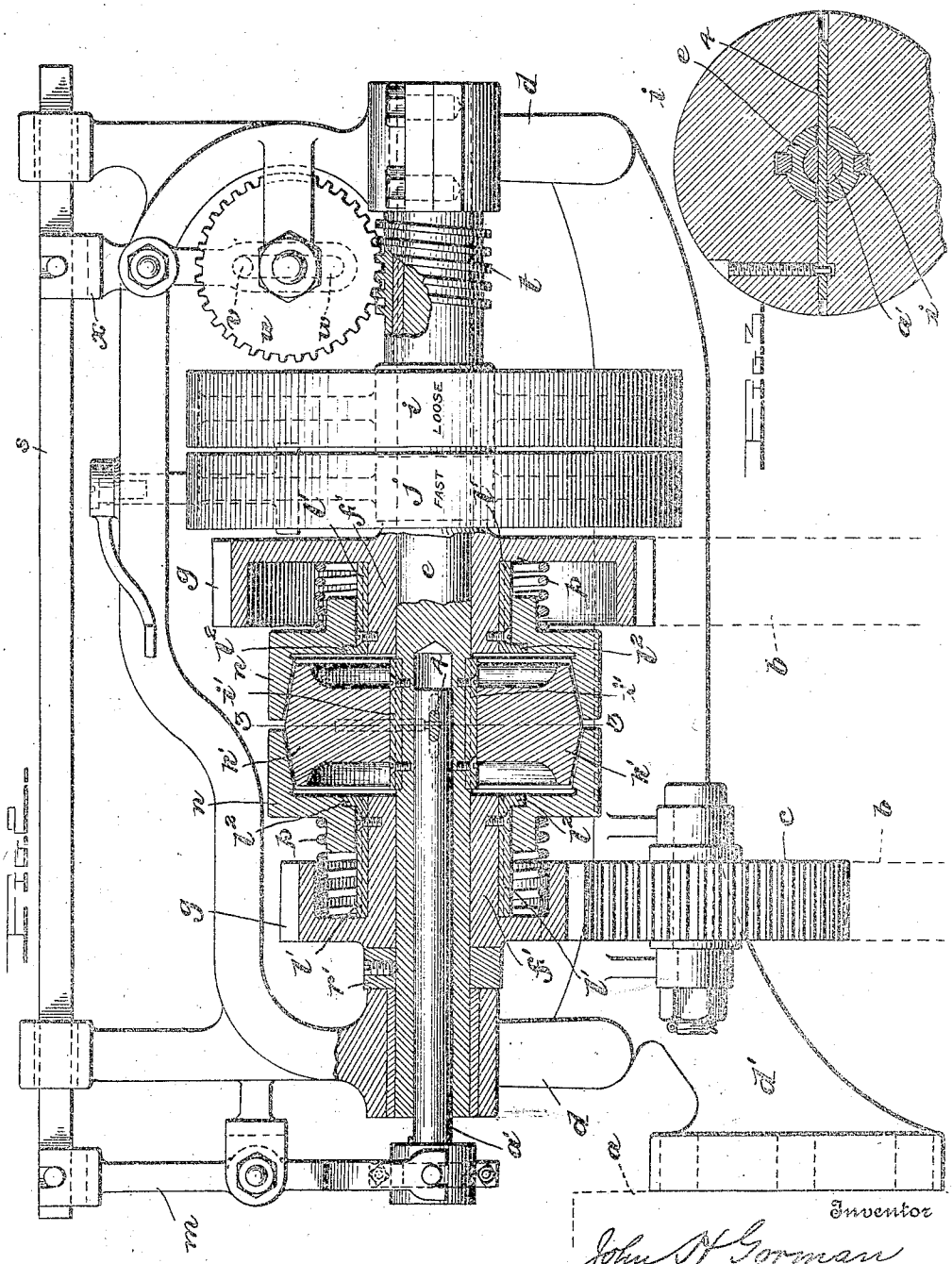
REVERSING DRIVING MECHANISM.

APPLICATION FILED MAR. 5, 1913.

1,082,691.

Patented Dec. 30, 1913.

2 SHEETS—SHEET 2.



Witnesses

Chas. L. Griebauer

B. D. Bridges

Inventor

John H. Gorman

By Davis & Davis

Attorneys

UNITED STATES PATENT OFFICE.

JOHN H. GORMAN, OF SALISBURY, NORTH CAROLINA.

REVERSING DRIVING MECHANISM.

1,082,691. Specification of Letters Patent. Patented Dec. 30, 1913.

Application filed March 5, 1913. Serial No. 752,134.

To all whom it may concern:

Be it known that I, JOHN H. GORMAN, a citizen of the United States, and a resident of Salisbury, county of Rowan, State of North Carolina, have invented certain new and useful Improvements in Reversing Driving Mechanism, of which the following is a full and clear specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation partly in section of one embodiment of my invention; Fig. 2 is a similar view of another form of the apparatus; Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2; Fig. 4 is a detail longitudinal sectional view through adjoining ends of the drive shaft sections shown in Fig. 1; and Fig. 5 a diagram, greatly reduced, showing the form of mechanism illustrated in Fig. 1 applied to a washing machine.

This invention has relation to that class of mechanisms adapted to rotate a shaft or member positively in one direction and then, after the shaft or member has rotated a predetermined degree or number of revolutions, reverse the shaft or member and rotate it in the opposite direction to the same extent; and the object of this invention is to especially adapt this type of reversing mechanism for use on laundry washing machines, to the end that the mechanism will be positive and absolutely accurate in operation, noiseless, strong and durable, safe, of neat appearance, economical as to construction and up-keep which will require little attention and be removed out of the way of the operatives and will require small space, and which will eliminate, in a large measure all danger of accidents to the operatives or attendants.

The particular embodiment of my invention which I have illustrated in Figs. 1, 4 and 5 of the accompanying drawings is adapted for use on that type of washers which embodies a long horizontal cylindrical casing and the shaft extending therethrough and provided with a gear wheel at each end of the shaft, the shaft being attached to a perforated clothes carrying cylinder within the casing. In the drawing I have shown the casing by the letter *a* and also the gears by the letter *b*. The letter *c* designates the usual intermediate gear which transmits motion from one of the driving gears to one of the gears on the washer shaft. I have adapted this type of mechanism to be mounted stationarily upon the upper side of the casing cylinder, the two supporting pedestals *d* being arranged to be fastened to the casing at the opposite ends of the same. The driving shaft of my mechanism consists of a central section *e* and two end sections *f*, these latter sections *f* being journaled in suitable bearings in the aforesaid pedestals and each carrying a driving gear *g* at its outer end for engagement with the gears to be driven. The middle section *e* of the driving shaft is adapted to rotate independently of the end sections and is held in exact alinement therewith by means of pins *h* which are respectively affixed in the ends of the sections *f* and enter corresponding axial holes in the ends of the shaft section *e*, whereby all three sections of the shafting are held in alinement and are permitted to rotate independently of each other. The ends of the shaft sections abut interposed washers 2, and a suitable bushing 3 may be affixed in each end of the shaft *e* to afford a suitable bearing for the coupling pin *h*.

Upon the central shaft *e* is mounted a loose pulley *i* and closely adjacent to the same is affixed a tight pulley *j*. Slidably mounted on each end of the central shaft *e* is a clutch member *k*, the connection with the shaft being secured by one or more keys or feathers *l* so that while these clutch members may slide independently of the shaft they are compelled to rotate with it. Each of these clutch members is adapted to be slid back and forth on the shaft by means of a suitable clutch fork *m* pivoted in a suitable manner upon the frame of the mechanism.

Slidably mounted on the inner end of each of the shaft sections *f* is a clutch member *n*, which is attached to the shaft in the same manner as the clutch members *k* or in any other suitable manner whereby it may slide longitudinally upon the shaft but is com-

pelled to rotate with it. Each clutch member n is normally pressed toward its companion member k by means of a coil spring p which surrounds a hub q on the clutch member n and is adapted to abut against the collar r mounted on the shaft-section f and abutting against the adjacent pedestal d. Any suitable form of friction clutch may be employed but I prefer the interfitting conical type, the member k being beveled on its exterior and being adapted to fit within the cup-shaped member n, the interior of this latter member being beveled to correspond with the conical surface of the inner member k.

The forks m are adapted to be simultaneously shifted by means of a slidable rod s, and this rod s is adapted to be shifted alternately by means of the following devices: Upon the central shaft e is affixed a worm t, which meshes with a worm gear u affixed on a suitable stub shaft whose axis is arranged above and at right angles to the axis of the shaft e. Affixed to the gear u is a pin v which works in a slot w formed in a depending lever x, which lever is suitably pivoted on the frame and has its upper end pivotally connected to the rod s. With this mechanism it will be observed that the continuous rotation of the shaft e in one direction will cause the lever x to vibrate regularly on its pivot, and this movement of the lever x will cause the clutch forks m to swing alternately in opposite directions and thus alternately throw the clutches into and out of action. This shifting of the clutches will cause the coupled clutches to be alternately rotated in the same direction, and the power will be transmitted from the gears g to the driven shaft or member by the gears b and c heretofore described or by any suitable mechanism. It will be understood that to start or stop the machine the belt is to be shifted from one pulley to the other by any suitable hand belt shifter, which is not shown in Fig. 1 of my drawing. It will be observed that the washers 2 project beyond the faces of the shaft sections sufficiently to form stops to limit the inward movement of the outer clutch members.

A feature of great importance lies in the employment of the duplicate friction clutches, one member of each clutch being normally pressed toward its companion member, together with automatic clutch shifting mechanism whereby during the continuous rotation of the drive shaft in one direction the clutches are alternately put into engagement so as to thereby alternately rotate the driving gears g in the same direction. It is also essential that the gears g shall be always in positive mesh with gears on a driven shaft, such as the horizontal shaft of the washing machine, so that through the medium of this driven shaft and whatever intermediate gears may be employed that one of the driving gears g which is for the moment out of direct driving connection with the drive or fast pulley shaft shall be rotated in a direction opposite to that in which the direct-driving one of the gears g is rotated, whereby it is possible to utilize the clutch members of this indirectly driven gear g as a brake to slowly bring the driven or washing machine shaft to a stop before it is reversed. This action is brought about as follows: When either clutch member k is disengaged from its spring actuated companion, the instant after complete disengagement occurs, the other clutch member k begins to engage its companion spring actuated member and this engagement affords a frictional braking action on the shaft carried by the spring actuated member. This frictional braking action increases gradually with the increased tension of the spring until the shaft comes to a stop; whereupon the two clutch members start to rotate in the opposite direction. At the beginning of this rotation in the opposite direction there is a slipping action between the clutches which continues until the clutches are brought together under the maximum pressure of the spring, and this slipping action results in a gradual starting of the driven shaft with each reversal thereof. There is also a slipping action between each pair of clutch members as the same begin their disengaging movement and this slipping action assists the braking action in the opposite pair of clutches to bring the driven shaft to a stand-still prior to reversal.

With my construction friction, noise, wear in the gears, and torque of the shafting are reduced to a minimum; and furthermore my mechanism insures a uniform number of revolutions in both directions, this being obtained by elimination of danger of slipping of the belt on the drive pulley and by the automatic slowing down to stopping position and the slow starting upon each reversal. By insuring an exact number of revolutions in each direction and by the gradual starting and stopping, it will be seen that the clothes in the cylinder of the washer are agitated in a perfect manner, being prevented from being tangled or balled.

It will be seen also that by the employment of the slow worm gear shifting means and the spring actuated clutches I increase the gripping power of the clutches and thus produce positive action in the mechanism, and by the use of the thrust collars r I prevent all undue thrust against the bearings in the pedestals.

It will be seen that when the belt is shifted to the loose pulley the entire mechanism except the loose pulley is brought to com-

plete rest, whereby the mechanism is saved from unnecessary wear, the mechanism being in action only when the washing and rinsing is being done notwithstanding the fact that the countershaft continues to run. Another point in favor of my mechanism is that by reason of its positive and easy action and the fact that the drive shaft always moves in the same direction, burning and "screaming" of the belt is reduced to a minimum, thus increasing the life of the belt as well as the life of the mechanism. It will be seen also that the simplicity and ease of operation of my mechanism brings about many other advantages which will be apparent to persons experienced in the operation of large laundry washing machines.

In Fig. 2 I have shown my improved gearing brought into a more compact arrangement especially adapting it for use as an end drive, that is, for attachment to one end of the washing machine casing instead of mounting it on top of the casing as shown in Fig. 1. In this view a part of the casing is shown at *a* and the two gears *b* carried by the washing machine shaft are shown by dotted lines. The intermediate gear is shown at *c* and is journaled on a bracket *d'* cast integral with the frame or adapted to be fastened to the washing machine casing. The live shaft *e* is journaled in the pedestals *d* which pedestals are carried by the aforesaid bracket or frame *d'*.

The two driving gears *g* are mounted on the same side of the fast pulley and they are affixed to two tubular shafts or sleeves *f'* mounted to rotate freely on the live shaft, one abutting against the fast pulley and the other against a collar *r'* affixed to the live shaft and adapted to abut against one of the pedestal journal boxes. The external members *n* of the two clutches are slidably and non-rotatably mounted on the sleeve shafts *f'* and they are normally pressed toward each other by the coil springs *p*.

Slidably and non-rotatably fastened to the live shaft *e* by keys *l'* at a point between the two clutch members *n* is a double clutch member *k'* which is in effect a consolidation of the two internal clutch members *k*, having oppositely inclined internal faces adapted to respectively frictionally engage the correspondingly beveled internal faces of the outer clutch members *n*. To shift the double clutch member *k'* from one clutch member *n* to the other I employ any suitable means, preferably a rod *a'* extending axially into the end of the live shaft and adapted to slide freely therein but to rotate with the shaft, the inner end of this rod being connected to the clutch member by a suitable pin 4 which works through slots in shaft *e*. The outer end of the rod *a'* is connected to one of the shifting forms *m*. The inner ends of the keys *l'* are turned radially outward and the coinciding faces of the spring actuated clutch members are recessed to receive these extensions l^2, whereby these radial extensions of the keys form stops to limit the inward movement of these clutch members.

It will be observed that in this construction shown in Fig. 2 the operation is precisely the same as the operation of the mechanism shown in Fig. 1.

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

1. In combination, three independently-rotatable shaft sections co-axially arranged, means for driving one section continuously in one direction and means for alternately driving the other sections in the same direction consisting of two friction clutches each consisting of two frictional members and means for resiliently pressing one of the members toward the other, means for automatically shifting the non-spring-pressed members of the clutches, a driven shaft, and gearing connecting the same with the alternately-driven sections.

2. In combination, three independently-rotatable co-axially arranged sections, means for driving one of the sections continuously in one direction, means for alternately connecting up the other sections to said section, said means involving the employment of two friction clutches and means for shifting them, a driven shaft, and gearing positively connecting said driven shaft to said alternately driven sections, whereby when one of the intermittently driven sections is positively driven from the continuously driven section the other alternately driven section will be indirectly driven in the opposite direction.

3. In combination, three independently-rotatable co-axially-arranged shaft-sections, means for driving one of the sections continuously in one direction, means for alternately connecting up the other sections to said section, said means involving the employment of two friction clutches and means for shifting them, a driven shaft, and gearing positively connecting said driven shaft to the alternately-driven sections, whereby when one of said alternately-driven sections is positively driven from the continual-driven section the other section will be indirectly driven in the opposite direction, each of said clutches consisting of a positively shifted friction member and a spring-pressed friction member, for the purpose set forth.

4. In combination, three independently-rotatable shaft sections, means for driving one of the sections continuously in one direction, friction clutches for intermittently

and alternately connecting up the other sections to said continuously driven section, automatic means for simultaneously shifting the clutches embodying a worm affixed to the continuously driven section, a worm gear meshing therewith, and means connected to the worm gear for alternately operating the clutches, and a driven shaft positively geared to each of said alternately-driven shaft-sections.

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

JOHN H. GORMAN.

Witnesses:

THOS. SMITH,

W. G. MCDANIEL.