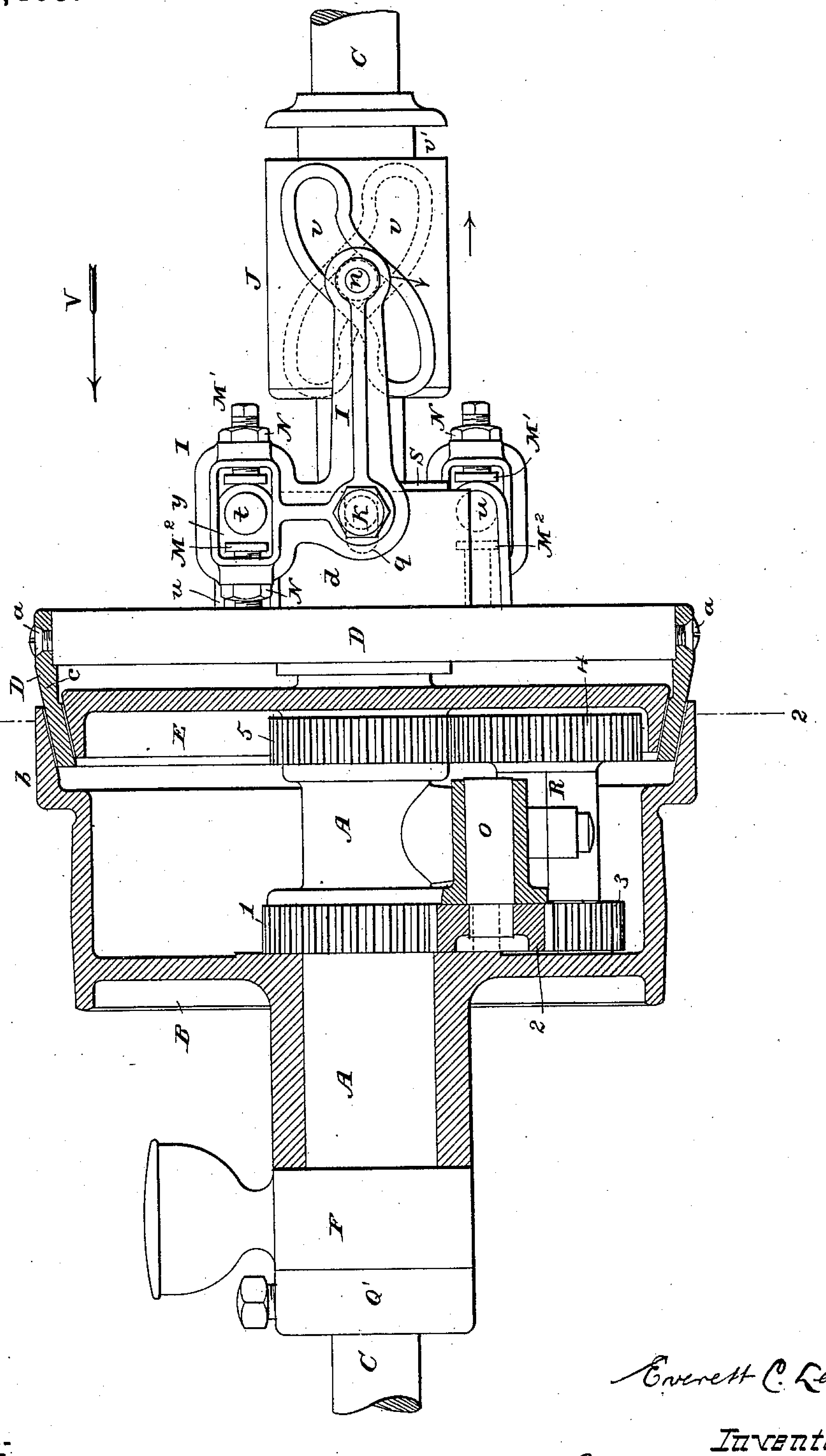
(No Model.) 3 Sheets—Sheet 1.

E. C. LEWIS.

SHAFT REVERSING MECHANISM.

No. 343,465. Patented June 8, 1886.

Fig. 1.



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H. C. G. Fansmann.

Everett C. Lewis,
Inventor:
By Foster & Freeman
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SHAFT REVERSING MECHANISM.

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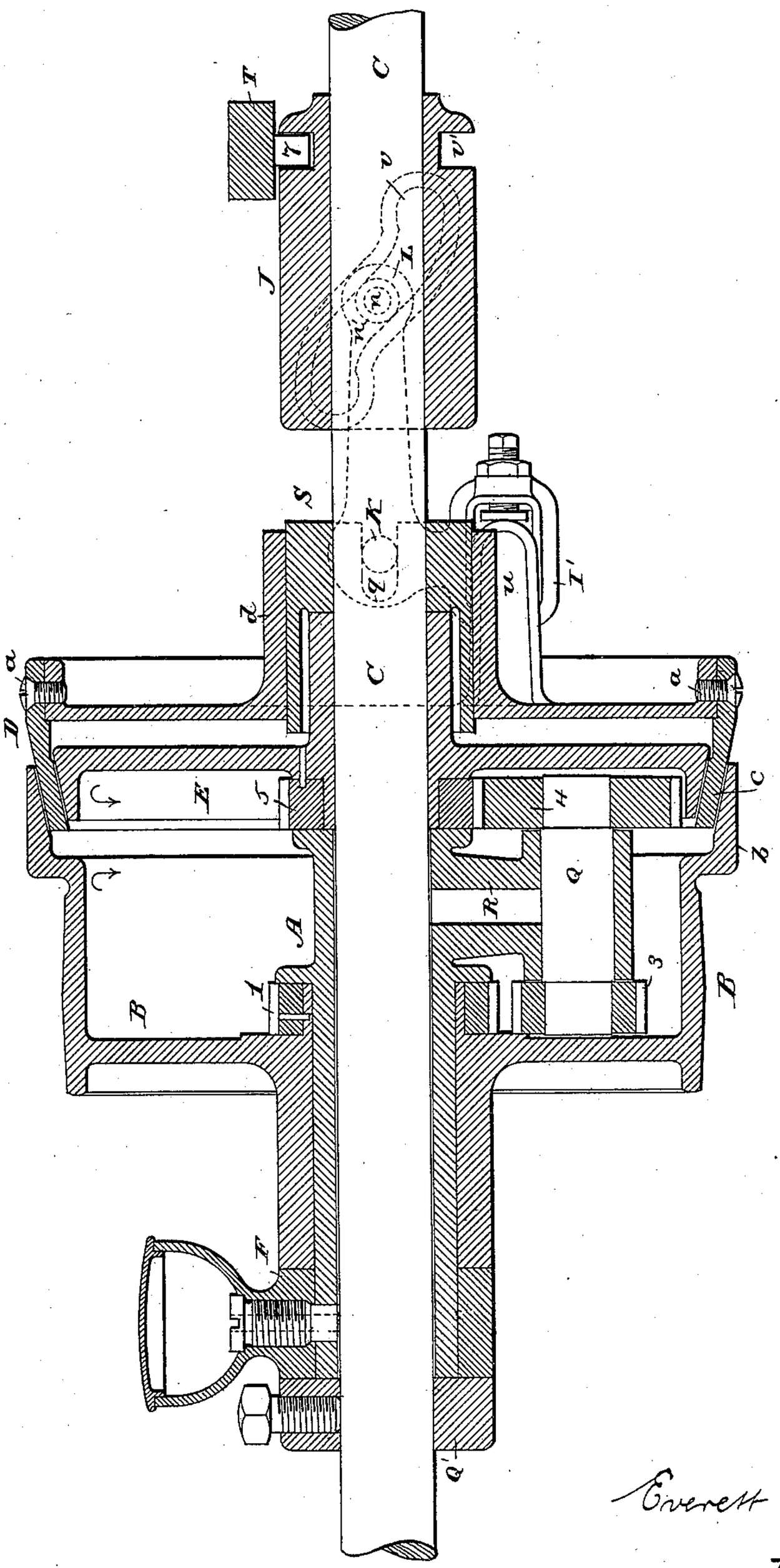
Fig. 2.



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K. G. J. Fanomann.

Everett C. Lewis,
Inventor:
By Foster & Freeman
Attys.

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E. C. LEWIS.

SHAFT REVERSING MECHANISM.

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Fig. 3.

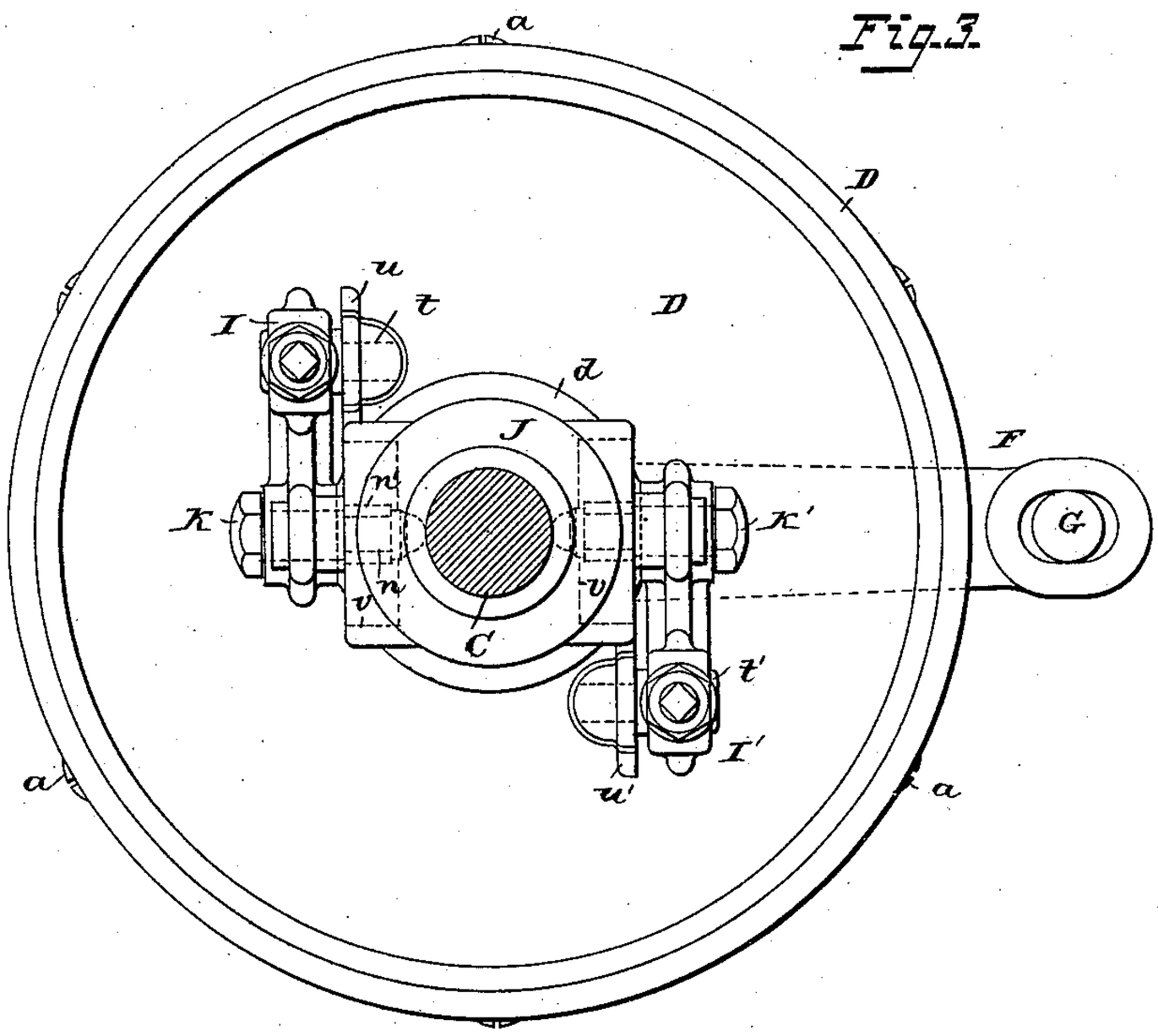
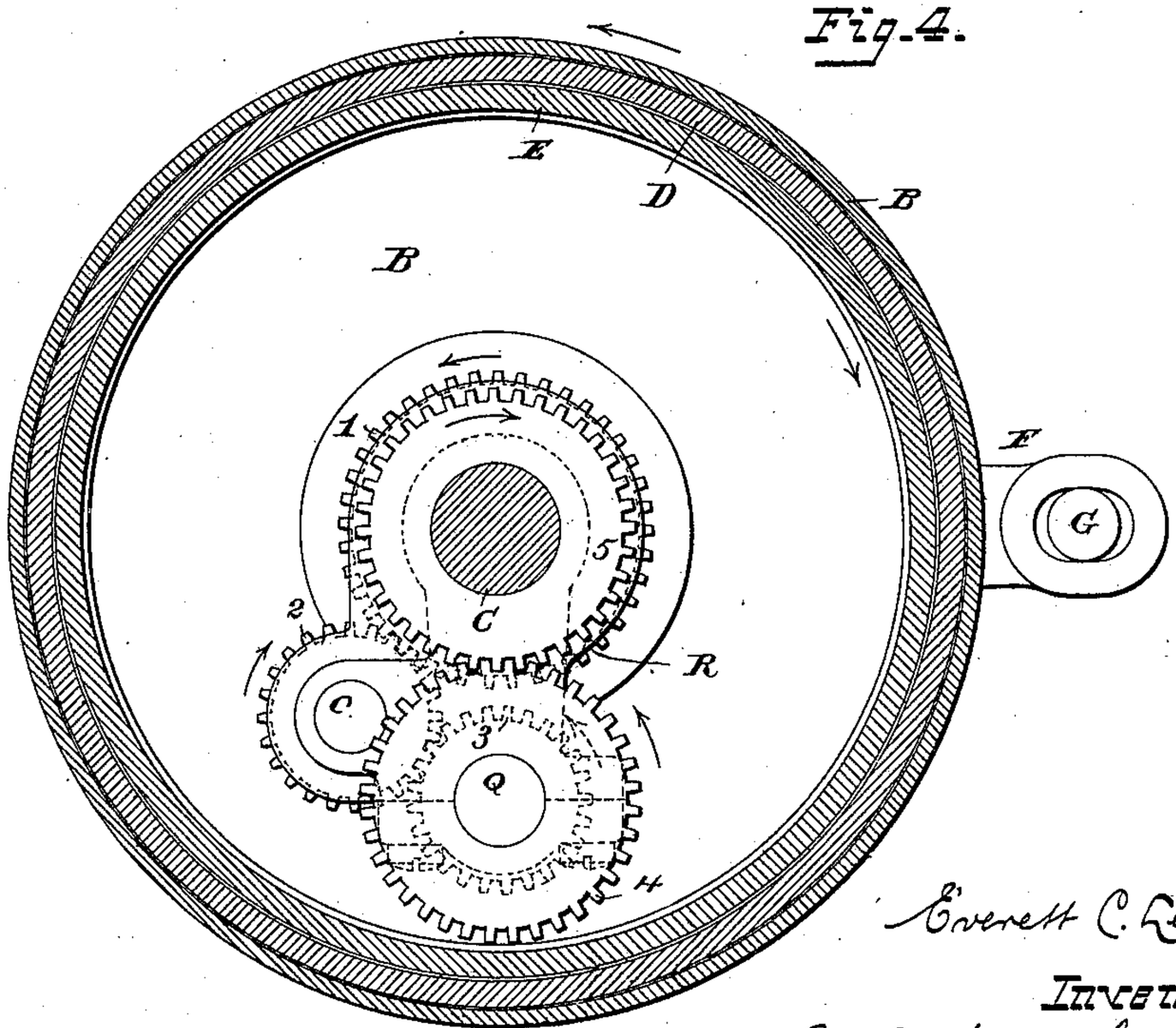


Fig. 4.



Attest:
Court. A. Cooper.
K. E. G. Fassmann.

Everett C. Lewis,
Inventor:
By Foster & Freeman
Attys.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

EVERETT C. LEWIS, OF WOONSOCKET, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO S. W. WARDWELL, JR., OF SAME PLACE.

SHAFT-REVERSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 343,465, dated June 8, 1886.

Application filed November 16, 1885. Serial No. 182,996. (No model.)

To all whom it may concern:

Be it known that I, EVERETT C. LEWIS, a citizen of the United States, and a resident of Woonsocket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Shaft-Reversing Mechanism, of which the following is a specification.

My invention has for its object to quickly reverse the direction of rotation of a shaft with the use of but a single belt moving continuously in one direction, and this object I effect by arranging to turn around the shaft to be reversed a loosely-turning belt-pulley, a second pulley geared to the belt-pulley to revolve in an opposite direction around the shaft, and a clutch-pulley sliding upon but revolving with the shaft, and appliances whereby the said clutch-pulley may at will be brought into frictional contact with either of the other pulleys, so as to be carried therewith, all as fully described hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal part section showing a counter-shaft and my improved shaft-reversing mechanism. Fig. 2 is the same in full longitudinal section. Fig. 3 is an end view looking in the direction of the arrow V, Fig. 1, the shaft being in section. Fig. 4 is a transverse section on the line 1 2, Fig. 1.

C represents the counter-shaft to which it is desired to impart rotation at different times in opposite directions, and around this shaft turns in one direction a belt-pulley, B, and in the reverse direction a second pulley, E, the belt-pulley having at one edge a flange, *b*, which extends over the edge of the pulley E at some distance therefrom, leaving an annular intervening space, the corresponding faces of the pulley E and flange *b* being beveled and parallel to each other, as shown in Figs. 1 and 2. Within the space between the periphery of the pulley E and the inner beveled face of the flange *b* extends the conical or inclined flange *c* of a clutch-pulley, D, which slides upon the shaft C to a limited extent and turns therewith. The flange *c* is not of sufficient thickness to completely fill the annular space between the pulley E and the flange *b*, so that it can occupy a mid-position free from contact with the flange or pulley, as shown in Figs. 1 and 2, in which case the shaft C may rest stationary, while the pulleys B E are revolving in opposite directions; but by moving the clutch-pulley D, so as to bring it into frictional contact with either the flange *b* or the pulley E, it will be caused to revolve with the part with which it is brought in contact. Thus by shifting the clutch-pulley D in one direction or the other, the shaft C may be caused to rotate in one direction or the other, as may be desired.

I have not referred to special mechanism for driving the pulleys B E in opposite directions and for shifting the clutch-pulleys, as different appliances for effecting these operations will occur to any one skilled in the art; but I have shown and will now describe such devices as I have found in actual practice to be very effective. The belt-pulley B, in the construction shown, does not revolve directly upon the shaft C, but upon a sleeve, A, through which said shaft passes, the said sleeve being kept from turning by means of an arm, F, extending to one side, and having an end bearing against any suitable fixed object—as, for instance, against a shaft, G, that extends through a slot in the arm. The pulley E, as shown, revolves directly upon the shaft C, and derives its motion in a direction the reverse of the pulley B through a train of gears. The said train of gears may be arranged in different ways. As shown, it consists of toothed wheels 1 and 5, connected to the hubs of the pulleys B and E, respectively, pinions 3 and 4, fixed to a short shaft, Q, revolving in a bearing, R, projecting laterally from the sleeve A, the pinion 4 gearing with the toothed wheel 5, and a loose pinion, 2, on a stud, O, also supported by the sleeve A. With the parts thus arranged the revolution of the belt-pulley B in the direction of its arrow, Fig. 4, will carry the toothed wheel 1 in the direction of its arrow to turn the pinion 2 in the reverse direction, the said pinion turning the pinion 3 in the same direction as the toothed wheel 1, and the pinion 3 carrying with it the pinion 4, by means of which the toothed wheel 5 together with the pulley E are turned in the direction

of their arrows, which is reversed in the direction of the pulley B.

The clutch-pulley D may be shifted directly by the clutch-lever; but I prefer to use the intermediate appliances illustrated in the drawings. Thus the hub *d* of the pulley D incloses a sleeve, S, that is secured to the shaft C by studs K K′, extending from the opposite sides of the sleeve S, through slots *q* (shown in dotted lines, Fig. 2) in the hub *d*, the said slots permitting the hub to slide upon the sleeve, and the studs K K′ compelling the rotation of the hub and its pulley with the sleeve and with the shaft to which the sleeve is attached.

To the studs K K′ are hung bell-crank levers I I′, each of which has a slot or loop at one end to receive a stud or pin, *t*, extending from an ear, *u*, upon the pulley D, and into the slot or loop *y* of each lever extend the ends of two set-screws, M′ M², which may be brought in contact with the opposite sides of the stud *t* by vibrating the lever upon its pivot, so that the hub and its pulley are caused to slide longitudinally in one direction or the other, accordingly as the studs *t* are struck upon one side or the other by the set-screws M′ or M². By setting the screws M′ M² so as to project to a greater or less extent through the slots *y*, the extent to which the levers may vibrate before bringing either screw against the stud may be regulated at will, each screw being secured after adjustment by means of a jam-nut, N. The slotted arm of the lever I extends in one direction from the pin K, and the slotted arm of the lever I′ extends in the opposite direction, so that the levers must be vibrated in opposite directions to bring both pins M′ M′ or both pins M² M² to bear at the same time upon both the studs *t*. I effect this vibration by means of a sliding sleeve, J, upon the shaft C, having at opposite sides cam-grooves *v*, inclined in opposite directions and each receiving a pin, *n*, extending inwardly from the end of the long arm of one of the levers, said pins each preferably carrying a frictional roll, *n′*, as shown in dotted lines, Figs. 2 and 3. When the sleeve J is moved in the direction of its arrow, Fig. 1, the longitudinal ends of the levers I I′ are carried in reverse directions, so that the slotted end of each lever is moved away from the pulley D, and when the sleeve J is carried in a reverse direction the slotted ends of the levers are carried toward said pulley. The sleeve J is preferably moved upon the shaft C by means of a shifting or clutch lever, T, having a stud, 7, which enters an annular groove, *v′*, in the sleeve.

I prefer to cast the body of the pulley D and its hub in one piece and to make the flange of a separate annular portion connected to the body of the wheel by means of screws *a*. A ring, Q′, is fixed by a screw upon the shaft C, so as to preserve the parts in their relative positions thereon.

It will be evident that instead of using set-screws M′ M² the levers may be provided with fixed contact-pieces, or the said contact-pieces might be constructed in different ways and otherwise adjusted than in the manner described.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination, with a shaft, of two pulleys turning around the same with intermediate gears, whereby they are constantly driven in opposite directions, and the clutch-pulley turning with but sliding in relation to said shaft and constructed to have a bearing upon either of the said revolving pulleys, according to the direction to which the said clutch-pulley is moved, substantially as set forth.

2. The combination of the shaft and pulleys B E, geared to revolve in opposite directions, a flange upon one of the pulleys overhanging the periphery of the other, and a clutch-pulley having a flange extending between the adjacent parts of the other pulleys and mounted to slide upon and turn with the shaft, substantially as described.

3. The combination of the belt-pulley having a flange, the pulley E, turning within the said flange and geared with the belt-pulley, the flange and pulley having parallel inclined faces, and a clutch-pulley, D, having an annular flange extending between said inclined faces and movable so as to be brought in contact with either face, substantially as set forth.

4. The combination of the shaft C, sleeve A, pulley B, turning upon said sleeve and provided with a toothed wheel, 1, pulley E, turning upon the shaft and provided with a toothed wheel, 5, and shaft Q, carrying pinions 3 and 4, and loose pinion 2, carried by bearings upon the sleeve A, all substantially as set forth.

5. The combination of the shaft and pulleys B E, rotating in opposite directions, clutch-pulley D, provided with a flange extending between the pulleys B E, and levers I I′, carried by the shaft and provided with bearings arranged to make contact with the opposite sides of studs carried by the pulley D, substantially as set forth.

6. The combination of the pulley D, shaft C, levers I I′, swinging upon pivots carried with the shaft, adjustable contact-pieces upon each lever, and a stud projecting from a support upon the pulley D, between the contact-pieces of each lever, substantially as set forth.

7. The combination of the shaft C, sleeve S, secured thereto, clutch-pulley D, provided with a hub sliding upon the sleeve S, but turning therewith, levers pivoted to pins carried by the shaft in its rotation and provided with contact-pieces arranged to make contact with studs carried by the pulley D, and a sliding sleeve, J, upon the shaft, having cam-

grooves inclined in opposite directions and receiving studs extending from the ends of the levers, substantially as set forth.

8. The combination, with the revolving shaft and sliding and revolving clutch-pulley having projecting studs, of pivoted levers carried by the shaft having arms extending in opposite directions, and each arm provided with two adjustable contact-pieces, substantially as described.

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

EVERETT C. LEWIS.

Witnesses:
JEFFERSON ALDRICH,
PHILIP L. A. MILLER.