

(No Model.)

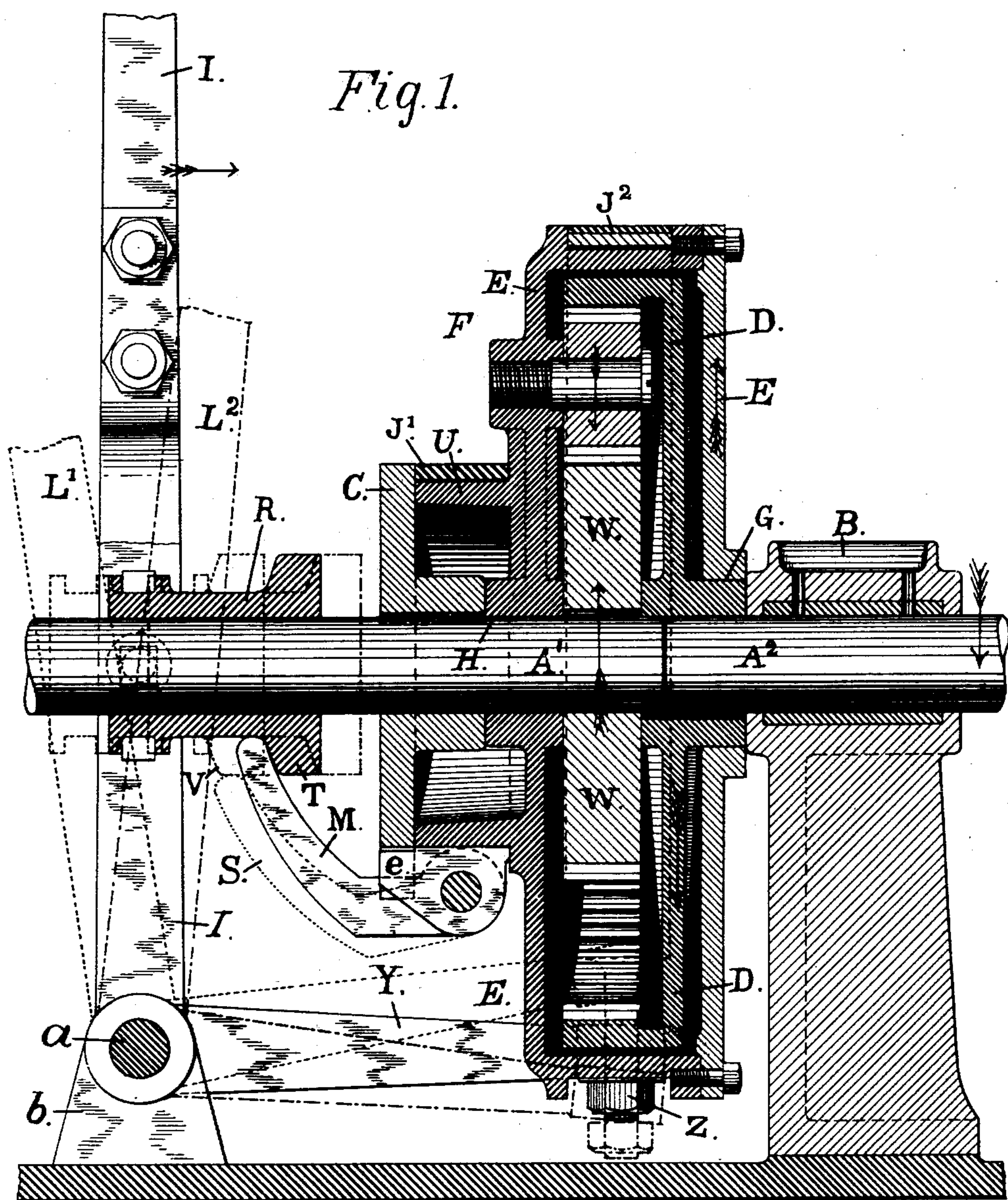
3 Sheets—Sheet 1.

G. E. HOYT.

REVERSING AND CONTROLLING GEARING.

No. 520,313.

Patented May 22, 1894.



Witnesses:

*Wilson D. Bent, Jr.*  
*Carlton M. Cornell*

Inventor:

*Geo. E. Hoyt*  
*John Richards*



(No Model.)

3 Sheets—Sheet 2.

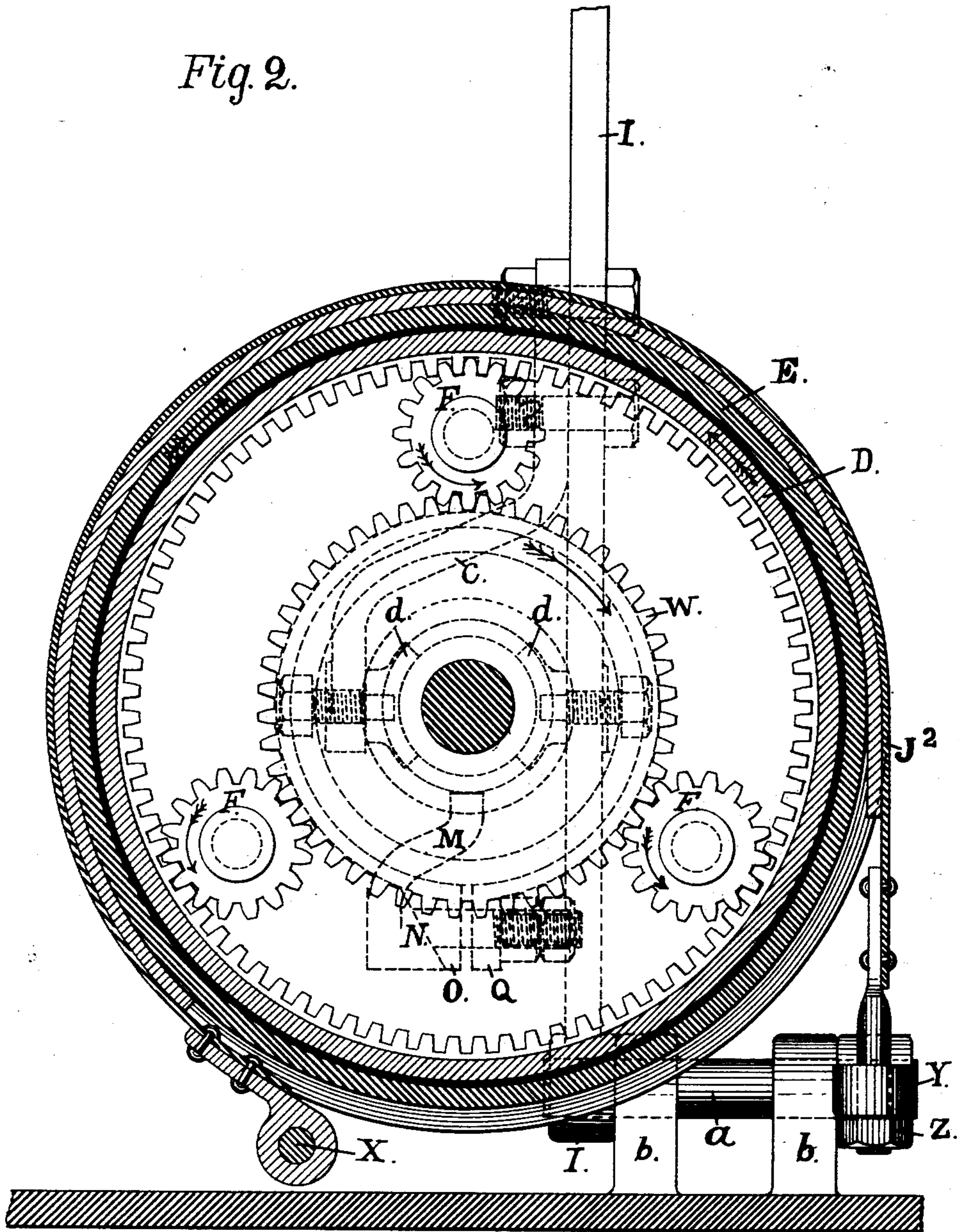
G. E. HOYT.

REVERSING AND CONTROLLING GEARING.

No. 520,313.

Patented May 22, 1894.

Fig. 2.



Witnesses

Wilson D. Bent, Jr.  
Carlton M. Cornwell

Inventor:

Geo. E. Hoyt  
John Richards  
Atty.



(No Model.)

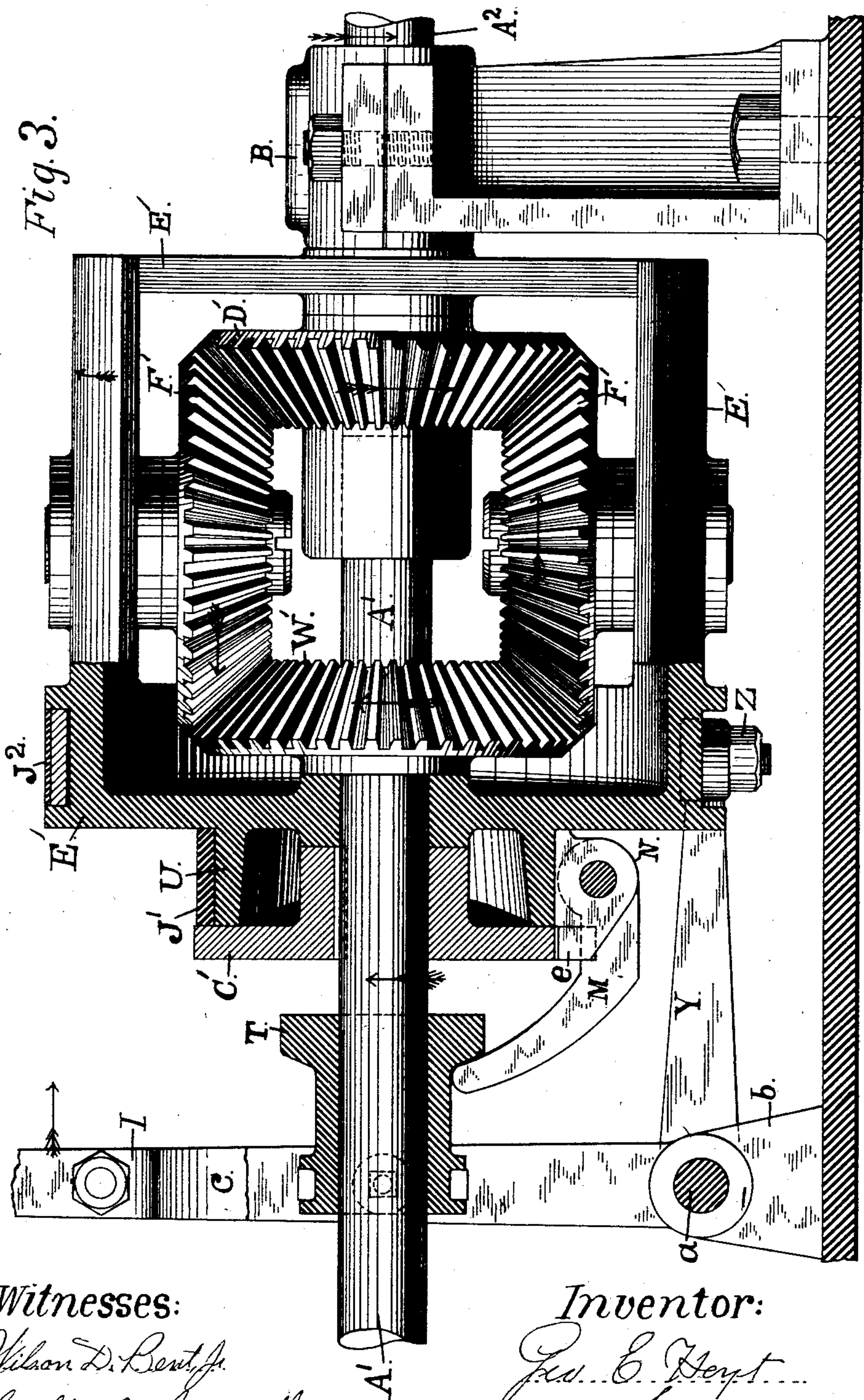
3 Sheets—Sheet 3.

G. E. HOYT.

REVERSING AND CONTROLLING GEARING.

No. 520,313.

Patented May 22, 1894.



Witnesses:

Oliver D. Bent, Jr.

Carlton M. Cornell

Inventor:

G. E. Hoyt.  
by John Richards  
Atty



# UNITED STATES PATENT OFFICE.

GEORGE E. HOYT, OF SAN FRANCISCO, CALIFORNIA.

## REVERSING AND CONTROLLING GEARING.

SPECIFICATION forming part of Letters Patent No. 520,313, dated May 22, 1894.

Application filed March 9, 1893. Serial No. 465,311. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. HOYT, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Reversing and Controlling Gearing, to be applied to propeller-shafts and in like cases; and I hereby declare the following specification and drawings therewith to be a full, clear, and exact description of my improvements.

My invention relates to machine gearing, for stopping, starting, and reversing the motion thereof, especially the shafts applied to driving propellers for boats or ships, and to engines impelled by explosive gases, called gas or vapor engines, that are difficult to reverse within themselves.

My improvements consists in the employment of two friction clutches or brakes with connected and interposed gearing, so that as the brakes are alternately engaged and disengaged, two shafts thus connected will revolve in the same, or in opposite directions at the same or a varying speed.

Referring to the drawings herewith: Figure 1 is a longitudinal section through my improved reversing and controlling gearing. Fig. 2 is an end view of the same. Fig. 3 is the same gearing, arranged with bevel instead of spur wheels.

Similar letters of reference are employed to indicate corresponding parts in the different figures of the drawings.

Referring first to Fig. 1,  $A'$  and  $A^2$  are two shafts to be connected or reversed, and B a journal bearing for the shaft  $A^2$ .

C is a driving disk rigidly fastened to the shaft  $A'$ , and D an internal gear wheel rigidly fastened to the other shaft  $A^2$ . These two are the driving members for the shafts.

E is a housing inclosing the main parts of the mechanism, also serving as a support for the intermediate pinions F, and also as a brake, as will hereinafter be explained. This housing or member E is supported on a loose bearing at G on the boss of the internal gear wheel D, and by a similar loose bearing at H on the shaft  $A'$ . This housing E consists of parallel vertical side-plates and a surrounding cylindrical rim, one of said side-plates being integral with the rim, while the other

is substantially a cover plate and is secured to the rim by screws, being thereby made removable so that access may be had to the interior gearing, all as is clearly shown in Fig. 1.

W is a spur gear wheel fastened to the shaft A the same as the driving disk C, and meshes into the pinions F.

I is the reversing lever operating the clutch strap  $J'$  and brake strap  $J^2$ , clamping and loosening these alternately as the lever is moved to either of the two positions indicated by the dotted lines  $L'$   $L^2$ , and when central as shown in Fig. 1, loosening both of these parts  $J'$   $J^2$  and permitting either of the shafts  $A'$  or  $A^2$  to run free.

M is a lever or pawl having on its eye or boss a helical face, as shown at N Fig. 2, so that when turned, this helical face bearing on the back of a lug O, having a corresponding face, draws on the screw P, thus clamping together the two lugs O and Q, to which is attached the ends of the clutch strap  $J'$ . To close this strap the lever I is moved to the position indicated by the dotted lines at  $L'$ , the collar R being drawn back to the position indicated by dotted lines at V, the lever M resting on the flange T of the collar R, as shown at S. This closes the clutch strap  $J'$  so it will nip the flange U, which is formed integrally with the housing E, and the clutch strap  $J'$  and lever M then revolves with the member E.

The collar R on the shaft A is, as before explained, moved by this same lever I, by means of a fork c, and the usual sectional collars  $d$   $d$ , shown in the dotted lines Fig. 2, so that when this lever I is moved to the position  $L'$  the clutch strap  $J'$  is nipped around the flange U, and the lever M being driven by a notch e in the disk C, the housing or member E, with the lever M revolves with the shaft  $A'$ . The pinions F being thus held rigid by reason of the members E and W, both being fastened to and revolving with the shaft A, and meshing into the internal gear wheel D, the whole mechanism revolves together the same as if the two shafts  $A'$   $A^2$  were rigidly connected together.

The brake strap  $J^2$  is fastened to a stationary support at X, Fig. 2, passes around the periphery of the housing or member E, and is attached to the lever Y by a nut Z. This lever Y is fastened to a short shaft a,



supported in the bearings *b b*, and to which is keyed the lever *I*, so that when this lever is moved to the position shown by the dotted lines *L*<sup>2</sup>, and as indicated by the arrow in Fig. 1, the strap *J*<sup>2</sup> is drawn down, holding the housing or member *E*, preventing it from revolving. Then the spur wheel *W*, drives the pinions *F*, and these in turn drive the internal spur wheel *D*, and shaft *A*<sup>2</sup> in a reverse direction at a speed proportional to the relative number of teeth in the wheels *W* and *D*. In this manner the propeller of a boat or ship can be reversed while the engine is moving in the same direction. With less force applied, this strap will slip, permitting any desired speed of the housing *E*, and consequently of the shaft *A*<sup>2</sup> when *A*<sup>1</sup> is the driving one.

Referring to Fig. 3, similar letters indicate corresponding members in the two cases, bevel wheels being employed instead of spur gearing, as in Figs. 1 and 2. The clutch strap *J*<sup>1</sup> and brake strap *J*<sup>2</sup> are similarly operated. If the housing or member *E*<sup>1</sup> is fastened to the shaft *A*<sup>1</sup> by means of the clutch strap *J*<sup>1</sup> and the driving disk *C*<sup>1</sup>, then the whole revolves together the same as if the two shafts were rigidly connected, but if the clutch strap *J*<sup>1</sup> is loosened and the member *E*<sup>1</sup> is stopped by means of the strap *J*<sup>2</sup>, then the wheel *D*<sup>1</sup> and shaft *A*<sup>2</sup> are driven in reverse directions by means of the wheel *W*<sup>1</sup>, and the loose intermediate wheels *F*<sup>1</sup> *F*<sup>2</sup>, and wheel *D*<sup>2</sup>, fastened on the shaft *A*<sup>2</sup>.

By the use of spur gearing it can be seen that the apparatus as a whole, while the same in nature and operation, becomes much larger in diameter and shorter in the direction of the axis of revolution, also, that when required the member *E*<sup>1</sup> can be made to perform the functions of a fly wheel. In the other case by employing bevel wheels as in Fig. 3, the diameter of the apparatus is much reduced, but correspondingly lengthened in the line of the shafts connected.

The reversing or controlling lever *I*, and indeed all parts except the housing *E*<sup>1</sup> and its gearing are interchangeable, as between Figs. 1, 2, and 3, and either can be applied to the same shafts at pleasure, or as the room and other circumstances may determine. It will be seen that in this method of reversing, the speed of the second shaft is at control, being as the strain on the brake strap *J*<sup>2</sup>, when the shaft *A*<sup>1</sup> is the driving one. The rotative force applied to the second shaft being as the strain of the brakes. In this manner the speed as well as force of a propeller for example, can be controlled at will without changing the speed of the driving engine. The same thing applies in respect to the clutch strap *J*<sup>1</sup> when the two shafts *A*<sup>1</sup> *A*<sup>2</sup> are revolving in the same direction. The amount of power transmitted to the driven shaft is controllable by the clutch strap *J*<sup>1</sup>, so that the devices in

addition to reversing constitutes a valuable friction brake operating either way on the driven shaft.

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

1. In a starting, stopping and reversing mechanism, the combination of two shafts, a driving-disk secured on one shaft, an internal gear wheel fastened on the other shaft, a housing supported on the hub of the said gear wheel and also on the other shaft, a gear wheel fixed on the first mentioned shaft, a pinion or pinions on the housing engaging the said gear and also the internal gear wheel, a brake-strap applied to the housing, a clutch-strap likewise applied to the housing near the driving-disk and serving to couple the housing to the driving-disk and the leverage mechanism for operating said straps, substantially as described.

2. In a stopping, starting and reversing mechanism, the combination of two shafts, a driving-disk secured on one shaft, an internal gear wheel fastened on the other shaft, a housing supported on said gear wheel and also on the other shaft, a gear wheel fixed on the first mentioned shaft, a pinion or pinions on the housing engaging the said gear and also the internal gear wheel, a brake-strap applied to the rim of the housing, a clutch-strap applied to the flange on the housing near the driving-disk, which flange is of less diameter than the rim, said clutch-strap serving to couple the housing to the driving-disk and the leverage mechanism for operating said straps, substantially as described.

3. In a gearing, the combination of the two shafts, a train of gear wheels connecting them, a housing supported on both shafts, said housing consisting of parallel side-plates and a surrounding rim and arranged to completely inclose said train of gears and also to support the intermediate gear wheels of the train, a brake-strap applied to the outside of the rim of the housing, a clutch-strap which may be positively revolved by the driven shaft, said clutch-strap being applied to a different part of the housing and serving to couple the housing to the driving-shaft, all arranged so that when the rotation of the housing is stopped the second shaft may be driven in an opposite direction, substantially as described.

4. In a mechanism for stopping, starting and reversing two shafts, the combination of the two shafts, a clutch-strap adapted to revolve with the driving-shaft, a screw mechanism for closing and releasing the clutch-strap, a lever operating with the screw mechanism, a slidable collar on said shaft, a pawl or lever engaging the collar and likewise the clutch-strap, a gear wheel and a disk both fast on the driving shaft, a gear wheel fast on the driven shaft, a revolving casing which surrounds said gears, intermediate gear



wheels supported by said casing together with the brake-strap applied to the casing, substantially as described.

5 In a stopping, starting and reversing mechanism, the combination of two shafts, a driving-disk on one shaft, an internal gear wheel on the other shaft, a housing supported on the hub of the said gear wheel and also on the other shaft, a gear wheel fixed on the first  
10 mentioned shaft, a pinion or pinions on the housing engaging the said gear and also the internal gear, the clutch-strap and the brake-strap applied to different parts of the housing and a reversing lever for operating both  
15 of said straps, substantially as described.

6. In a mechanism, for stopping, starting and reversing two shafts, the combination of the shafts, a clutch-strap adapted to revolve with the driving-shaft, a slidable collar on

said shaft, a gear wheel and a disk both fast 20 on the driving-shaft, the gear wheel fast on the driven shaft, a revolving casing which surrounds said gears, intermediate gear wheels supported by said casing, the brake-strap applied to the casing, said brake-strap 25 being fastened to a stationary support and attached to a lever, an operating lever to which said lever is connected, and another lever which engages the slidable collar and also the clutch-strap, substantially as de- 30 scribed.

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

GEORGE E. HOYT.

Witnesses:

ALFRED A. ENQUIST,  
WILSON D. BENT, Jr.