

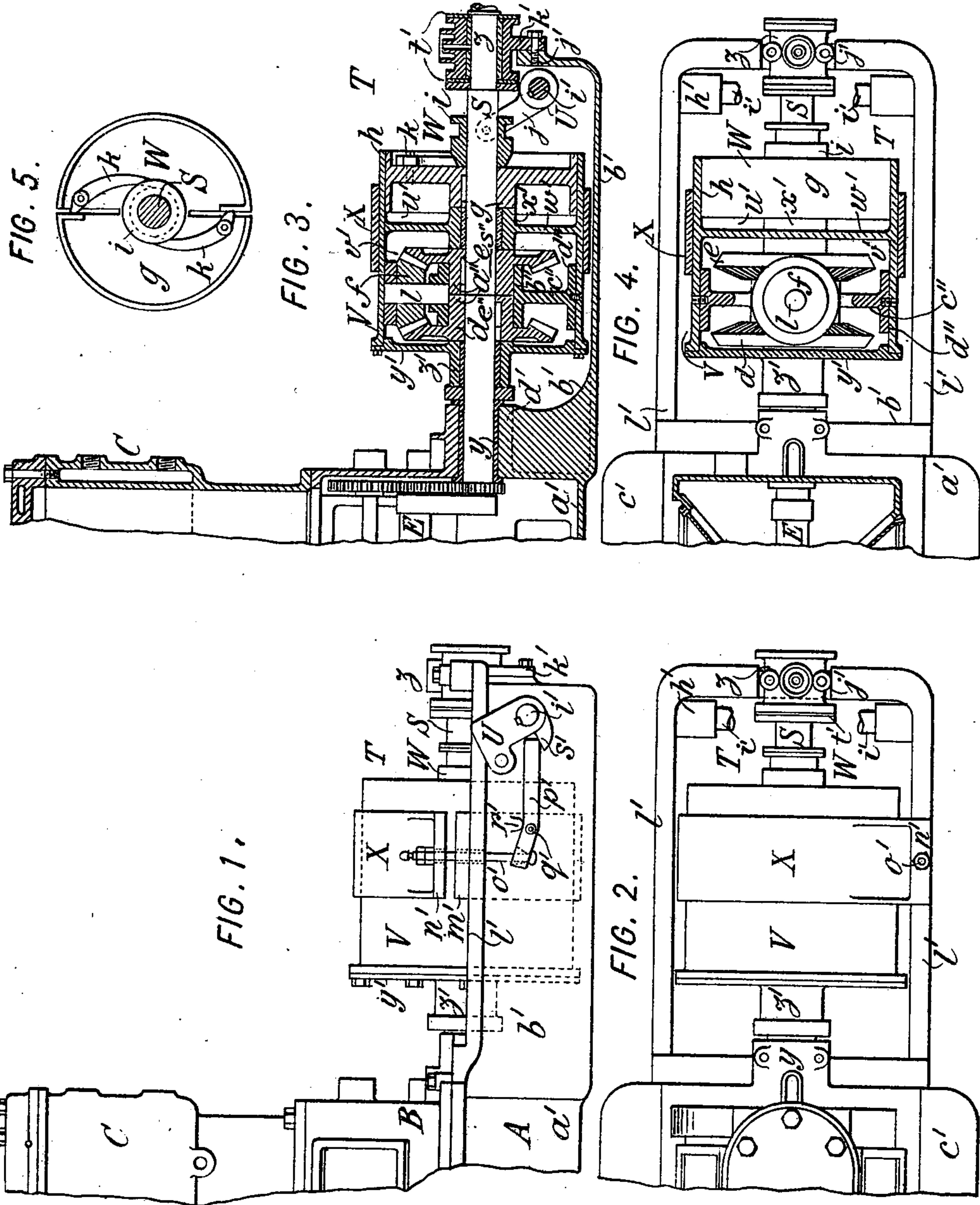
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C. C. & E. A. RIOTTE.
REVERSING MECHANISM.

(Application filed Nov. 29, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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REVERSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 671,935, dated April 9, 1901.

Original application filed August 30, 1899, Serial No. 728,944. Divided and this application filed November 29, 1899. Serial No. 738,673. (No model.)

To all whom it may concern:

Be it known that we, CARL C. RIOTTE and EUGENE A. RIOTTE, citizens of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Reversing Mechanisms, of which the following is a specification.

This application is a division of our application filed August 30, 1899, Serial No. 728,944.

10 This invention relates to reversing mechanisms, and is especially applicable to gas or hydrocarbon engines. Engines of this class generally have a reversing mechanism for transforming the continuous forward motion of the crank-shaft into reverse motion of the driven shaft when reversing is desired or for stopping the driven shaft without stopping the engine.

Our present invention aims to provide certain features of improvement in the construction, arrangement, and operation of reversing mechanisms especially advantageous for a marine engine. To this end in carrying out the preferred form of our present invention we provide certain features of improvement, which will be hereinafter fully set forth as applied to an explosion-engine of the marine type, although it will be understood that our improvements are not limited to use with an engine of this type.

In the accompanying drawings, which show the preferred form of our invention, Figure 1 is a fragmentary side elevation of a marine-engine reversing mechanism embodying our improvements. Fig. 2 is a fragmentary plan thereof, the reversing-lever being omitted and its shaft broken away for clearness. Fig. 3 is a fragmentary vertical axial section thereof. Fig. 4 is a fragmentary horizontal section thereof, and Fig. 5 is a fragmentary end view of the clutch W.

Referring to the drawings, let A indicate the base, and B the pedestal, of the engine-frame.

45 E represents the crank-shaft; S, the driven shaft; T, the reversing mechanism; U, the reversing-lever; V, the reversing-drum; W, the driving-clutch, and X the reversing-brake.

C is the engine-body.

50 The crank-shaft is continuously driven and has keyed to its rear end the constant beveled

gear *d*, while the reversing-shaft may be driven in either direction and has keyed to it the reversing beveled gear *e*, the drum V being rev-
olubly connected to either or both shafts and 55
having fixed to it the idler-pinion *f*, meshing with the gears *d* and *e* for either locking these gears to rotate together when the drum is locked to the driven shaft S or for reversing the motion of the gear *e* and driving shaft S 60
backward when the drum V is held stationary by the reversing-brake X, according to usual and well-known principles of operation. The driving-clutch W consists, as usual, of an expanding clutch-wheel *g*, the periphery of 65
which is expanded against the inner wall *h* of the drum by the tapering collar *i*, which is forced inwardly by the arm *j* of the lever U for forward driving, the levers *k* between the flange of the wheel *g* and the collar *i* trans- 70
mitting the motion of the latter to the flange of the wheel in a well-known manner, or this motion may be transmitted in any suitable manner. The brake X consists of a split band fitting the exterior of the drum, bearing at 75
one end on the base A and drawn together at its ends in any suitable manner to clamp the drum and prevent its rotation. When the drum is held stationary, the pinion *f* revolves around its axis *l* to drive the gear *e* in the re- 80
verse direction to the gear *d*.

As thus far described the parts may be of any suitable construction without materially affecting our present invention.

We will now proceed to describe in detail 85
the various features of improvement incident to our present invention.

Our invention provides certain improvements in the construction of the base A, which we preferably form of two integral parts—the 90
main bed *a'* and the longitudinal extension *b'*—each preferably half-round or semicylindrical on the under side both externally and internally, both having circular cross-sections corresponding to the arcs of circles of which the 95
longitudinal axis of the crank-shaft is the center, and the one differing in diameter relatively to the other, in the construction shown the extension being the part of greater diameter. The main portion or bed *a'* has wide 100
projecting flanges *c'* for resting on the foundation for the engine, the top faces of these

flanges being above the axis of the shaft, while the top face of the extension is on a line with its axis. The flange of the bed is formed with an integral box d' , extended out from the rear wall thereof. The upper edge of extension b' preferably extends in a horizontal plane coincident with the horizontal plane of the axis of the shaft and forms an integral connection between the bed a' and the thrust-bearing z of the driven shaft, so that all thrust on this shaft is transmitted directly to the bed, and there can be no variation in the relations existing between the thrust-bearing and the crank-shaft bearings. The hollow extension constitutes a pocket or housing for the reversing mechanism and incloses the lower side of the drum V. It is formed with bearings h' for the shaft i' of the lever U and with a socket j' for the thrust-bearing z , and this bearing is formed in a separate box k' , bolted onto the outer face of the extension b' and fitting through the socket j' therein, so that at any time it is desired to remove the driven shaft the thrust-bearing and its box can be separated bodily from the base and removed without disturbing the latter or the crank-shaft or other parts of the engine. To facilitate this, the adjacent ends e'' and s'' of the crank-shaft E and driven shaft S are terminated within the socket in the extension b' and abut against each other therein, so that at any time by opening the separable connection between the thrust-bearing box and the base the thrust-shaft can be removed.

The top edge l' of the extension b' supports one end m' of the reversing-brake X, and the other end n' of this brake stands normally above and out of contact with the supported end m' , the two being held in place by an adjustable tension-rod o' , traversing apertures through the ends of the brake and the flange l' of the extension and engaged at its lower end by a lever p' , operated by the reversing-lever U, and fulcrumed intermediate of its ends on an axis q' to the outer wall of the extension, being mounted intermediately below a fulcrum-lug r' , which takes the strains in use off from the fulcrum q' . The lever U has a short arm s' beneath the lever p' and engaging the latter to apply the reversing-brake when the lever U is tilted aft.

The shaft S is independent of the crank-shaft in all respects except the connection between the two for revolving the driven shaft from the crank-shaft, and the driven shaft is provided with opposite thrust-collars t' at the fore and aft sides of the thrust-box k' , so that all the propelling and reversing strains on the shaft S are taken up by these collars and transmitted both directly to the thrust-box and through the latter to the base independently of the crank-shaft and its bearings, so that the strains in use are prevented from in any manner affecting the operation of the engine proper or from wearing or disturbing the adjustment of the engine or reversing mechanism, the separated top flanges l' of the extension

constituting a stiff frame for the transmitting of the thrust strains from the thrust-bearing to the bed and the solid bottom wall adding rigidity to this frame and assisting in transmitting such strains.

According to another feature of improvement our invention provides for permitting ready separation of the reversing-gear from the crank-shaft and also for protecting this gear from dust and foreign matter and for enabling it to be run in oil. To this end we provide an improved construction and arrangement for this gear and its mounting, constructing the drum V with a hollow clutch-chamber u' , open at its rear end, with a hollow gear-chamber v' , open at its forward end, and with an intermediate solid wall w' , extending from its hub x' to its outer wall and isolating the gear-chamber from the clutch-chamber, and we provide the drum with a closed cover y' , bolted with a leak-tight joint to its forward end and having a hub z' , the hubs x' and z' making revoluble bearings with the adjacent ends of the shafts S and E, respectively, so that the drum and its cover may have the additional functions of assisting in holding the adjacent ends of these shafts in alinement and relieve them of the separation thrusts of the gears d and e . The gears d and e are fixed to the ends of their respective shafts within the chamber v' and have projecting hubs a'' , which are turned off on their outer faces and are passed within the hub b'' of a skeleton frame c'' , which carries the pinion f between this hub and its rim d'' , being fixed within the gear-chamber of the shell and revolving with the latter. In this way the hub of the frame c'' assists in assuring alinement of the gears d and e and carries the strain of the pinion f , as well as relieving the drum from any wear from this pinion and avoiding the necessity of perforating the drum for the pinion-spindles. In this way it will be seen that the reversing-gear is completely inclosed in a hermetically-sealed chamber which is proof against ingress of dust or egress of oil and which may be charged with oil, so that the reversing-gear will always be running in oil, since there is no opportunity for escape of the oil in use. It will also be seen that access can readily be had to the reversing-gear or that it can be removed or replaced conveniently by simply unscrewing the cover y' , whereupon the drum V and the gears carried by it can be slid back on the shaft from the cover to give access to the interior, or by also unscrewing the thrust-box k' , whereupon the gear-shaft and box can be lifted out of the extension of the base and removed to any suitable place for repairs or inspection.

In marine engines the location of the gear-chamber at the forward end of the drum and the arrangement of an imperforate wall w' at the after end of this chamber is especially important, especially when a tight cover is not employed, as the axis of the engine is generally inclined toward the stern, and were

the reverse arrangement employed the oil in the gear-chamber would run out and escape. For the same reason the location of the driving-clutch chamber u' at the after end of the drum and forming it with an open rear end is advantageous, since thereby any water of condensation, foreign matter, or oil which may have accumulated in this chamber through any cause and which might interfere with the operation of the clutch is free to run outwardly and escape into the extension, so that there is always an assurance that the clutch-chamber is free and in condition for operation, as well as that the gear-chamber is clean and charged with oil.

Our invention provides an improved operating mechanism in that the one lever U operates both the driving-clutch and the reversing-brake, so that the user can be assured of the simultaneous reverse action of these parts, the lever for this purpose being formed with a short arm s' outside of the extension b' and acting against the lever p' for pressing the reversing-brake when the lever is tilted aft, and being also provided with the short arm j within the extension b , keyed to the shaft i' and engaging the groove of the ring i for pressing that ring inwardly and applying the driving-clutch W when the lever U is tilted forward. Thus the forward tilting of the lever applies the driving-clutch and simultaneously frees the reversing-brake and rearward movement of the lever applies the reversing-brake and releases the driving-clutch.

In the use of our improved reversing mechanism the engine can be easily and conveniently controlled. One hand will serve to reverse the driving direction, a single motion of the one lever U in either direction being sufficient for reversal.

It will be seen that our invention provides various improvements in reversing mechanisms which can be variously and advantageously availed of, and it will be understood that the invention is not limited to the particular details of construction, use, or combination of parts set forth as constituting the preferred embodiment of our invention, since our improvements can be employed in whole or in part, according to such combinations, uses, or details of construction and arrangement as circumstances or the judgment of those skilled in the art may dictate, without departing from the spirit of the invention.

What we claim is the following-defined novel features and combinations, substantially as hereinbefore set forth, namely:

1. The combination with a driving and a driven shaft and a separable connection between said parts, of a reversing-gear connecting the ends of said shafts and comprising a hollow drum consisting of a cylindrical member having a clutch-chamber opening at one end and a gear-chamber opening at its other end, and an intermediate wall isolating said chambers, a clutch revolving with one of said shafts and engaging said drum in said clutch-

chamber for locking the drum to the shaft to which the clutch is fixed, spur-gears fixed respectively to the abutting ends of said shafts, and located within said gear-chamber, a reversing-pinion carried by said drum between said gears and fixed within said gear-chamber, and a cover connected to and closing the open end of said gear-chamber, and surrounding the adjacent one of said shafts, whereby said gears are inclosed in said gear-chamber, and isolated from the clutch-chamber, and access to the gears can be had by separating said cover and drum.

2. The combination with a driving and a driven shaft of a reversing-gear connecting the ends of said shafts consisting of a drum V having a clutch-chamber u' , a gear-chamber v' and an intermediate imperforate wall w' , said drum rotatively carried by one of said shafts, a brake X engaging the exterior of said drum, an expanding clutch W engaging said drum within said clutch-chamber, a cover y' closing said gear-chamber and rotatively engaging the other of said shafts, reversing-gears carried by said shafts and drum within said gear-chamber, means for operating said brake, and means for operating said clutch.

3. In a marine engine, the combination with a driving-shaft and a driven shaft, of a reversing mechanism connecting said parts, consisting of a drum V having a rearward inclination having a gear-chamber closed at both ends, and a clutch-chamber opening through the after end of the drum, a clutch entering said clutch-chamber, reversing mechanism carried by said shafts and drum within said gear-chamber, and a brake engaging the exterior of said drum, whereby owing to the list of said drum, oil will be retained in said gear-chamber and foreign matter can flow out of the open after end of the clutch-chamber, thus preserving lubricant for the gears and permitting escape of oil or water from the clutch-chamber.

4. The combination with driving and driven shafts and a reversing mechanism, of a drum V therefor, a clutch W for locking said drum to the driven shaft, a brake X comprising a split ring for preventing rotation of the drum, a lever U for operating said clutch and brake, a nose s' fixed to said lever and adapted to engage a separate connection for operating said brake and an arm j for operating said clutch.

5. The combination with driving and driven shafts, of a drum V , a reversing mechanism carried thereby, comprising a clutch for locking said drum to the driven shaft, a brake comprising a split ring for preventing rotation of said drum, a lever for operating said brake, a frame carrying said shafts and lever and engaging one end of said brake, and an independently-mounted lever p' engaged by said first-mentioned lever and connected to the other end of said brake for applying the latter to said drum.

6. The combination with a driving and a

driven shaft, of a reversing-gear connecting the ends of said shafts, and consisting of a drum having a gear-chamber, revolubly engaging the end of one shaft, a cover remov-
 5 ably connected to said drum, and revolubly engaging the end of the other shaft, beveled gears fixed to the ends of said shafts respectively, a beveled pinion between said gears, and carried by said drum, and means for
 10 locking said drum to rotate with one of said shafts, and means for preventing rotation of said drum, said drum and its cover embracing the remote sides of said gears respectively and resisting separation tendency thereof,
 15 whereby the shafts are relieved from the tendency of the beveled gears to separate in use.

7. The combination with a driving and a driven shaft, a reversing-gear connecting the ends of said shafts, and consisting of a drum
 20 of substantially the same diameter throughout its length having a gear-chamber, revolubly engaging the end of one shaft, beveled gears fixed to the ends of said shafts respectively, and a beveled pinion between said
 25 gears, of a compression-brake X surrounding said drum, and an expanding clutch W keyed to one of said shafts and within said drum, and means for operating said parts, said drum having concentric faces on its external and
 30 internal walls for engaging with said brake and clutch respectively.

8. In reversing-gears, a drum having a con-

tinuous periphery, and having a gear-chamber for containing the reversing-gears, a clutch-chamber for containing the clutching
 35 mechanism, and an intermediate wall isolating said chambers, said chambers being open at opposite ends to permit access to their interiors.

9. In reversing-gears, a drum having a con-
 40 tinuous periphery, and having a gear-chamber for containing the reversing-gears, a clutch-chamber for containing the clutching mechanism, an intermediate wall isolating
 45 said chambers, said chambers being open at opposite ends to permit access to their interiors, and a cover closing one of said chambers.

10. In reversing-gears, a drum having a con-
 50 tinuous periphery, and having a gear-chamber for containing the reversing-gears, a clutch-chamber for containing the clutching mechanism, an intermediate wall isolating
 55 said chambers, said chambers being open at opposite ends to permit access to their interiors, and a cover closing the gear-chamber.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

CARL C. RIOTTE.
 EUGENE A. RIOTTE.

Witnesses:

GEORGE H. FRASER,
 THOMAS F. WALLACE.