(No Model.) 2 Sheets—Sheet 1.

H. C. BAKER.

REVERSING DRIVING MECHANISM.

No. 504,651. Patented Sept. 5, 1893.

Fig. 1.

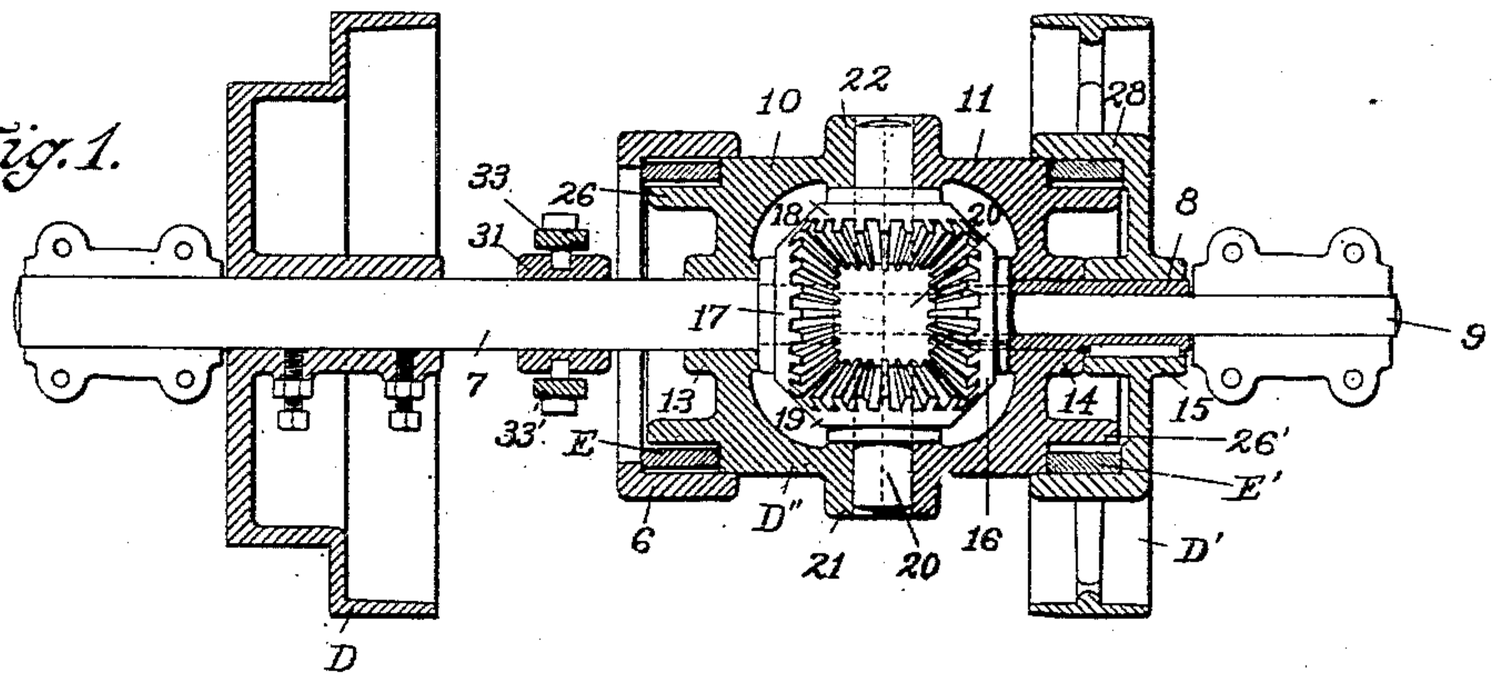


Fig. 2.

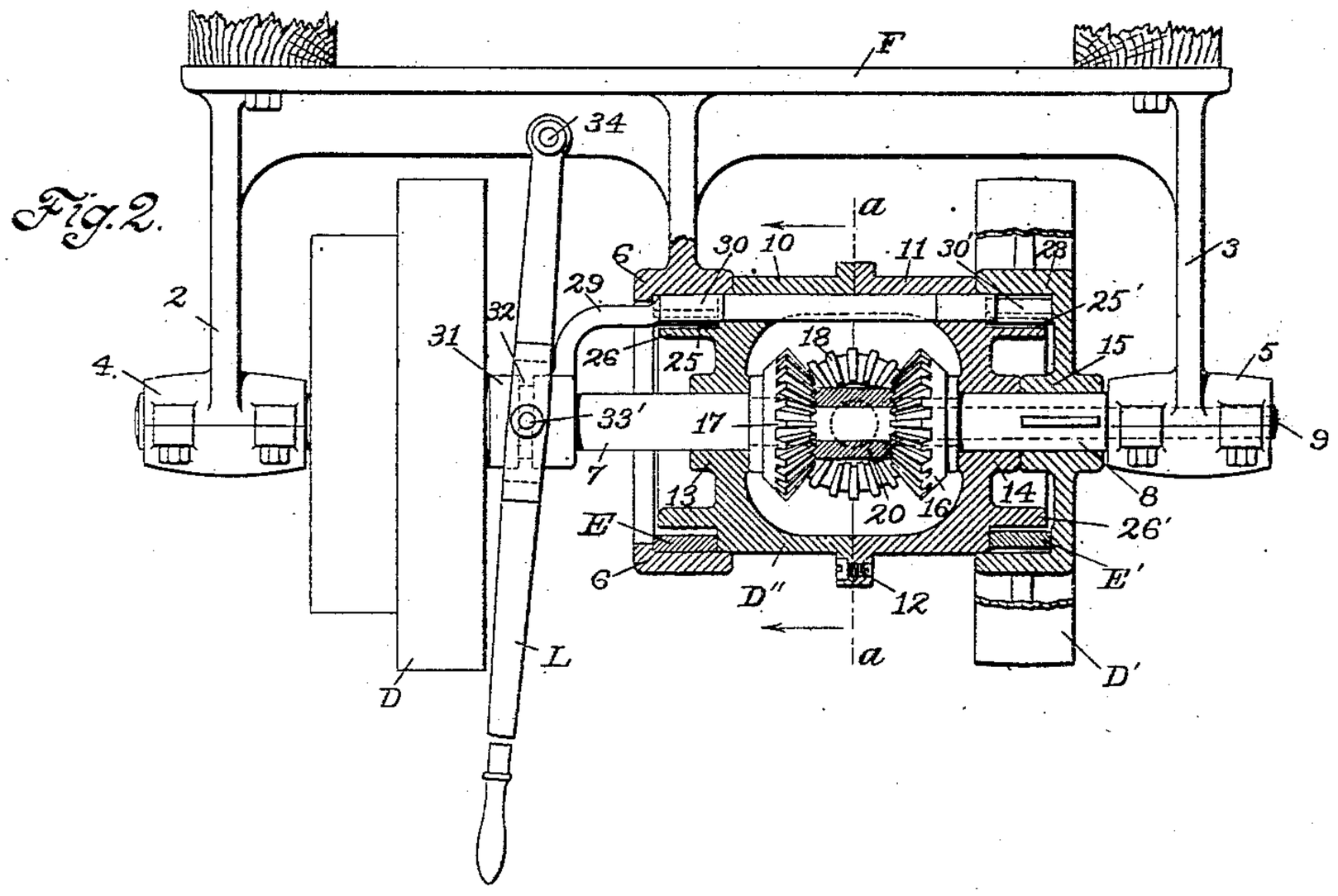
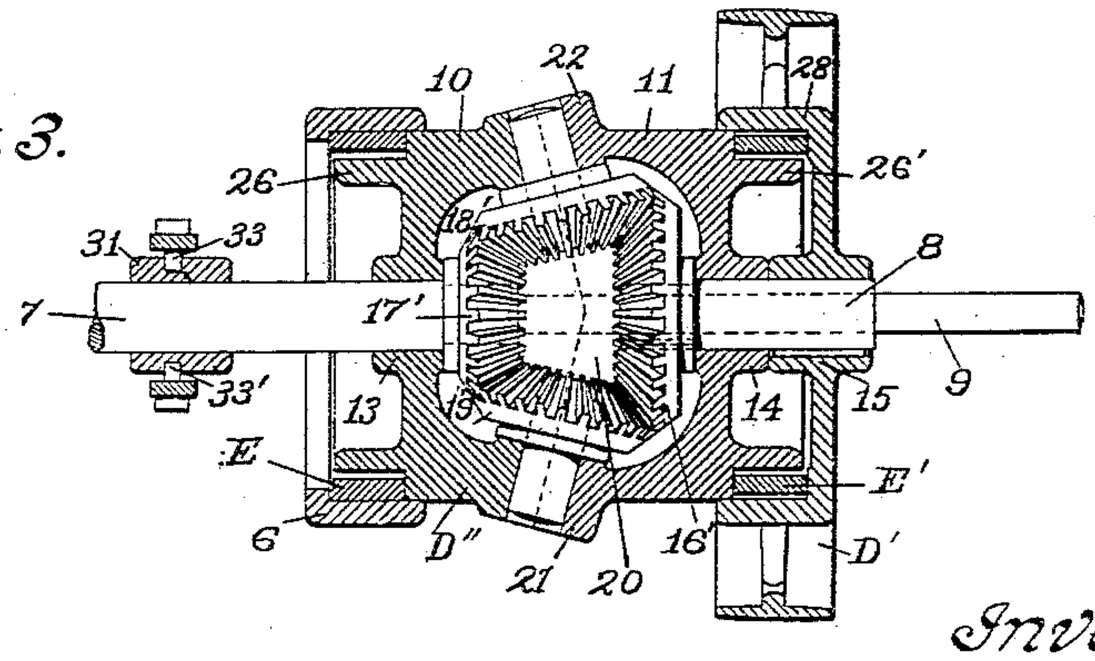


Fig. 3.



Witnesses:
Fred. J. Dole.
John L. Edwards Jr.

Inventor:
Hurbert C. Baker.
By his Attorney,
F. A. Richards

(No Model.) 2 Sheets—Sheet 2.

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Fig. 9.

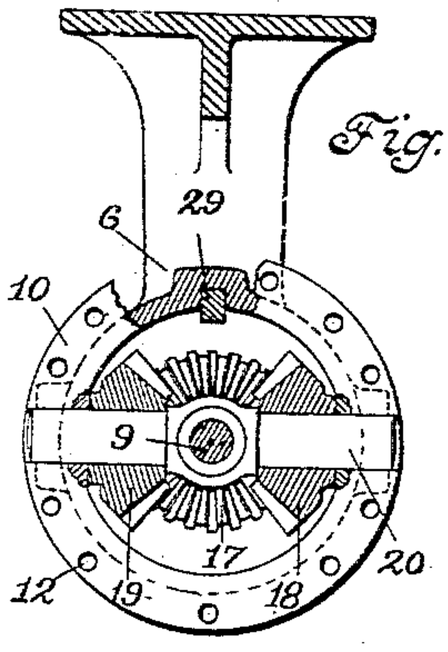


Fig. 4.

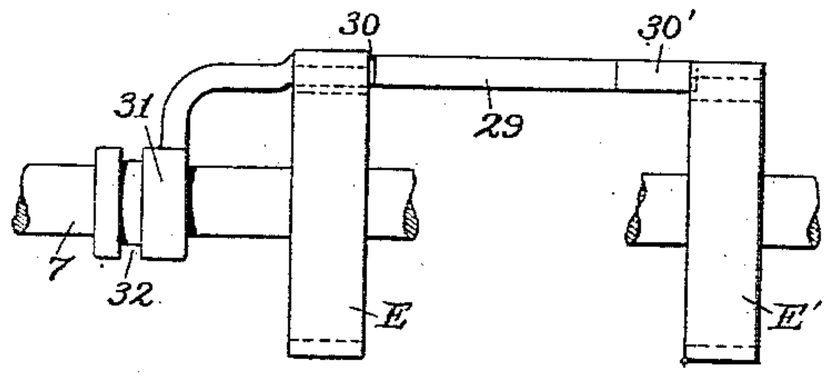


Fig. 7.

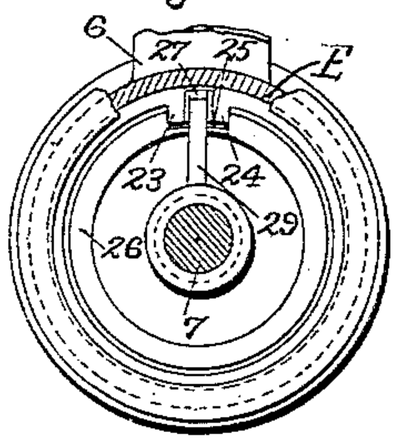


Fig. 5.

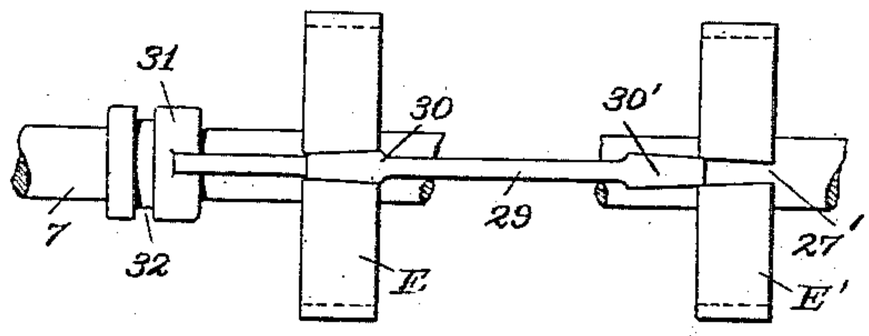


Fig. 8.

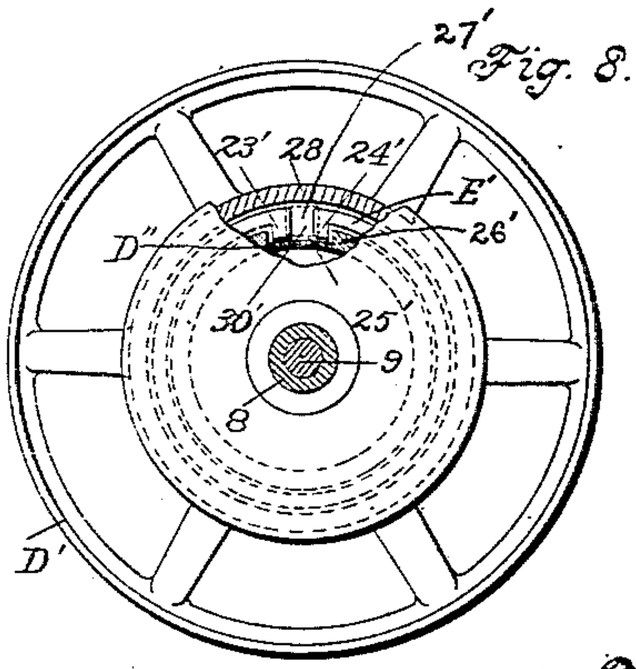


Fig. 6.

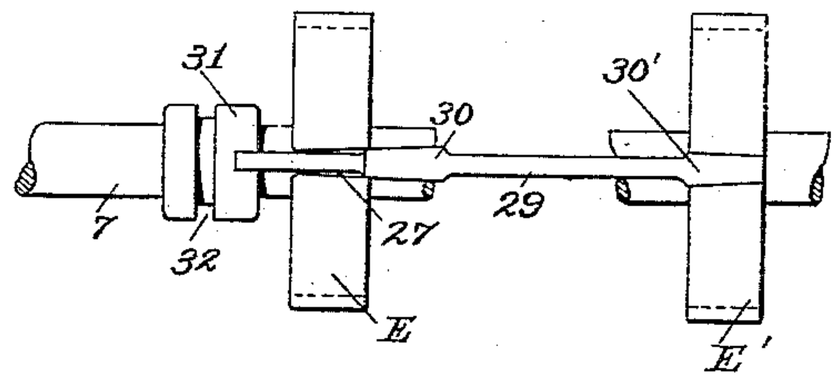
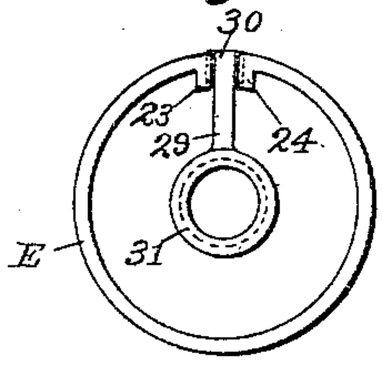


Fig. 10



Witnesses:
Fred. J. Dole.
John L. Edwards Jr.

Inventor:
Hurbert C. Baker.
By his Attorney,
F. H. Richards.

UNITED STATES PATENT OFFICE.

HURBERT C. BAKER, OF HARTFORD, CONNECTICUT.

REVERSING DRIVING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 504,651, dated September 5, 1893.

Application filed April 7, 1893. Serial No. 469,486. (No model.)

To all whom it may concern:

Be it known that I, HURBERT C. BAKER, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Reversing Driving Mechanism, of which the following is a specification.

This invention relates to driving-gearing for use in connection with a driving-shaft revolving in one direction for operating a driven shaft in either direction; the object being to furnish a simple and effective gearing adapted to have the movement of the driven wheel reversed by means of clutches, and adapted for use in counter-shafts and other similar situations in which the principal shaft revolves only in one direction, and in which the driven shaft is required to be revolved first in one direction and then in the opposite direction.

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional plan view of a counter-shaft furnished with my present improvements. Fig. 2 is a side elevation, partially in section, of the counter-shaft and its reversing driving-gearing. Fig. 3 is a view similar to a portion of Fig. 1, illustrative of certain modifications of my improved gearing. Fig. 4 is a view of the friction-mechanism, shown in the same position as in Fig. 2. Fig. 5 is a view of the same mechanism, as seen from above in Figs. 2 and 4, with the clutch-actuating rod or wedge at one end of its stroke. Fig. 6 is a view similar to Fig. 5, showing said clutch-rod at the opposite end of its stroke. Fig. 7 is a view of the friction-gearing, as seen from the left hand of Fig. 4, showing the resistance-bearing and the clutch which is at the left hand in Figs. 1, 2 and 3. Fig. 8 is a view of the driven pulley and its clutch, as seen from the right hand in Figs. 1, 2 and 3. Fig. 9 is a sectional view on line *a a*, Fig. 2, showing the parts at the left hand of said line,—the driving-pulley and clutch-actuating mechanism being omitted. Fig. 10 is a view of one of the expansible friction-rings and the clutch-rod, as seen from the left hand in Figs. 2 and 4.

Similar characters designate like parts in all the figures.

For illustrating my present invention, I have shown the same applied to a counter-shaft adapted for use in driving engine-lathes and other machines in which the motion of the machine requires from time to time to be reversed. The framework, or hangers, of the counter-shaft consists of the frame F, which is shown furnished with the two depending hanger-arms 2 and 3, having the bearings 4 and 5, respectively, for the counter-shaft. The frame F also carries a fixed resistance-bearing 6, which is bored concentrically with the axis of said bearings 4 and 5. The counter-shaft 7, is journaled at one end in the bearing 4, and at its other (and in the present instance, smaller) end, in the opposite bearing 5. Said shaft 7 may carry the usual pulley, as D′, from which the power is taken, Figs. 1 and 2, shown fixed on the larger end thereof contiguous to said hanger-bearing 4. For carrying the driving-pulley D′ of the counter-shaft, this is shown fixed on a sleeve or tubular shaft, 8, which is loosely mounted on the smaller portion 9 of said counter-shaft 7. Intermediate to the said driving-pulley D′, and the aforesaid resistance-bearing 6, is the drum or gear-casing, designated in a general way by D″, and which, as illustrated in the drawings, is preferably made of two parts 10 and 11, which may be connected together by flanges and set-screws, as 12. Said casing D″ is journaled at one end by its hub 13, on said counter-shaft 7, and at the other end is journaled and free to revolve thereon by its other hub 14 on said tubular shaft 8, contiguous to the hub 15 of said driving-pulley D′, as will be understood from Figs. 1 and 2. The reversing-gearing is carried within the aforesaid gear-casing D″, and comprises a gear 16, fixed on the tubular driving-shaft 8; a gear 17, fixed on the driven-shaft 7; and one or more intermediate gears, as 18 and 19, journaled in the casing and connecting the aforesaid driving and driven gears 16 and 17, respectively, as will be understood by comparison of the figures of drawings. As a means for supporting said intermediate gears 18 and 19, within the gear-casing, said gears are shown mounted on a transverse shaft or stud 20, which is supported at its ends in the bearings 21 and 22 formed therefor between the two parts 10 and 11 of said casing. This construction and ar-

rangement of said parts provides a convenient means of assembling and disassembling the mechanism.

The driven-shaft 7 is shown having its reduced portion 9 extending through the enlarged middle portion of said stud 20, and is thus supported against lateral movement, and prevents said stud from longitudinal or rotative movement in the gear-casing. One end of the gear-casing, at the right hand in Figs. 1, 2 and 3, carries thereon the expansible friction-ring E′, whose ends 23′ and 24′ (see Fig. 8) project inwardly into a notch 25′, formed in the flange 26′, of said casing, and have between them a space, as 27′, Fig. 5, for receiving the clutch-actuating wedge whereby said ring is expanded. In Fig. 8, said ring is shown closed together free of the friction-rim 28 of said driving-wheel D′, and the hooks thereof free of the end-walls of the aforesaid notch 25′ of the casing D″. The opposite end of the gear-casing is similarly provided with a flange 26′, having a notch 25′, (Fig. 7,) for receiving another and similar friction-ring, whose hooks 23′ and 24′ engage in the aforesaid notch 25′ of the gear-casing. This feature of the mechanism is shown in Fig. 7, where the friction-ring is shown expanded into firm engagement within said friction-bearing; the hooks 23′ and 24′ of said ring being also expanded nearly into engagement with the end-walls of said notch 25′ of the casing-flange 26′, for controlling the circumferential position of this ring on the gear-casing.

For properly actuating the friction-rings to open and close the same, and to open one simultaneously with the closing of the other, the gear-casing carries a wedge-bar, 29, extending lengthwise thereof at one side of the set, or "nest" of gears, and having the two oppositely-disposed wedges 30 and 30′ fitting between the ends of the friction-rings E and E′, respectively. One end of said wedge-bar is carried through the resistance-bearing 6, (toward the left hand in Figs. 1 to 6, inclusive) and connects with a collar 31, having the annular grooves 32 in which engage the usual pins 33 and 33′ of a clutch actuating lever, L, that is pivoted at 34 to the frame F of the mechanism.

In operating the mechanism, the handle of the lever L, being thrown toward the right hand, carries the collar 31 to the position shown in Figs. 1 and 6, thereby releasing the friction-ring E within the resistance-bearing 6, and expanding the opposite friction-ring E′ firmly within the driving-pulley D′, and thereby, and by the aid of the gearing aforesaid and the transverse stud 20, rigidly connecting the driven-pulley D with the driving-shaft 8. The parts being thus related, the entire mechanism, comprising the driving-shaft 8 the gear-casing and its internal mechanism, and the driven pulley D, may be revolved as one part, and operate as an ordinary counter-shaft without reversal of motion. On swinging the operating-lever L toward the left-hand, as shown in Figs. 2, 4 and 5, the wedge-bar is withdrawn from the driving pulley clutch ring E′, and the other wedge 30 is forced between the ends of the opposite friction-ring E, to expand this into firm engagement with the resistance-bearing 6, as illustrated in Fig. 7. By this means the casing D″ is rigidly locked against rotation; so that the power is transmitted from the driving-shaft 8, through the gear 16 fixed thereon, through the intermediate gear or gears, (as 18 and 19,) on said transverse stud 20, to the gear 17, which is fixed on the driven-shaft 7 that carries the driven-pulley D. The power being thus conveyed from a driving-gear, through an intermediate gear, to a driven-gear, the driven-gear is revolved in a direction opposite to the direction of the driving-gear, in this respect following the usual rule of mechanics.

In Fig. 3, I have shown a modification of the gearing described in connection with the other figures of the drawings. According to this modification, the driving-gear 16′ is of a different size from the driven-gear 17′, the intermediate gears 18′ and 19′ being set upon a corresponding angle. By means of this construction and combination of said details, the mechanism operates not only to reverse the motion of the driven-wheel relatively to the motion of the driving-wheel, but to change the speed thereof to be either slower (as shown in Fig. 3) or faster, accordingly as the small gear or the larger one, respectively, is placed on the driving-shaft.

By means of the brake-clutches described, the locking of the reversing-gear frame D″ to the driving-pulley or to the resistance-bearing is readily effected, without shock and without requiring the stoppage of the mechanism. When the right hand brake-clutch is engaged with the driving pulley, the power is transmitted directly to the driven shaft or other element to be driven, through a set of mechanical devices which in themselves are non-active, so that no power is lost by friction and the reversing apparatus is subjected to no wear.

My present improvements are adapted not only for use in connection with counter-shafts and like machinery of transmission, but are also adapted for use in connection with motors, and especially for driving and reversing propeller-shafts when driven from a motor adapted to run only in one direction.

It will be understood that instead of the particular friction brake clutches shown and described in connection with my present improvements, other well-known forms of such clutches adapted to be used for locking and unlocking the gear-frame as described, may be substituted for the clutches herein shown; also, that ordinary toothed clutches may be substituted for friction-clutches for said purpose, without departing from my present invention.

Having thus described my invention, I claim—

1. In a mechanism of the class specified, the combination with the driving and driven-shaft and with the resistance-bearing, of the gear-frame intermediate to said bearing and driven-shaft, a gear secured to each of said shafts and one or more intermediate gears in mesh with the driving and driven-shaft gears carried by said gear-frame with the axes thereof transverse with the axes of the driving and driven-shaft gears, clutches adapted for locking and unlocking said gear-frame with and from the resistance-bearing and the driven-shaft, respectively, a clutch-actuating-bar carried in the gear-frame and connecting with a collar concentric with the axis of the shaft and means for actuating said clutch-bar by connection with said collar, substantially as described.

2. In a mechanism of the class specified, the combination of a driven-wheel revolubly supported substantially as described, a driving-shaft, a gear on the driving-shaft, a gear connected with the driven-wheel, a gear-carrier revolubly supported and carrying an intermediate gear connecting said driving and driven gears with its axis transversely disposed with relation to the axes of the driving and driven-gears, and two clutches constructed and arranged for alternate operation and adapted for locking and unlocking the revoluble gear-carrier with and from the driven-wheel and the fixed bearing successively, substantially as described.

3. In a reversing-driving-mechanism, the combination with the driving and driven-shaft, each having a gear thereon, of a gear-frame journaled on the said shaft and constructed in two parts, an intermediate-gear connecting said shaft gear and carried by said gear-frame with its axis transverse to the axes of said shaft gears, an intermediate-gear-carrying-stud journaled between the two parts of said gear-frame transverse to the axis of rotation thereof, and means for holding together the two parts of said frame, substantially as described.

4. In a reversing gearing, the combination with the driving-shaft and its gear, and with the driven-shaft and its gear, of the gear-casing journaled on said shafts and constructed in two parts connected together substantially as described, the transverse intermediate gear stud journaled in bearings between said gear-casing parts and having a bearing on one of said shafts, and an intermediate gear carried on said transverse stud and connecting the gears of said shafts, substantially as described.

5. In a reversing gearing, the combination with the driving-shaft and the driven-shaft each having a gear thereon, of the revoluble frame carrying a gear connecting said shaft-gears and having in one side thereof a longitudinal way for a clutch-rod, a fixed resistance-bearing, a clutch intermediate to said gear-carrier and said bearing, and a clutch intermediate to the driven-shaft and said gear-carrier, said clutch-rod being adapted for operating said clutches, substantially as described.

6. The herein described reversing-driving-mechanism, consisting, essentially, of a frame-work having the journal-bearings 4, 5, and a cylindrical resistance-bearing 6, the driven and driving-shafts supported in the journals 4 and 5, respectively, the driving-wheel carried by the driving-shaft and having the friction rim 28, a gear-casing revolubly supported at its ends upon said shafts within the rim of the driving-wheel and within the resistance-bearing 6, driving and driven gears located within said gear-casing and connected with the driving and driven-shafts, substantially as described, expansible rings located at each end of the gear-casing and intermediate to said casing and the resistance-bearing, and the casing and friction-rim of the driving-wheel, a clutch-bar carried by and rotating with said gear-casing and having wedges located in position and adapted for expanding the clutch rings alternately by the longitudinal shifting movements of said clutch-rod, and means for shifting said clutch-rod, substantially as described.

7. In a reversing-driving-mechanism, a driven-shaft supported in journals at its either end, a driving-shaft revolubly supported upon said driven-shaft, a driving-wheel secured to the driving-shaft and having an annular friction flange, substantially as described, and a fixed cylindrical resistance-bearing, in combination with a gear-casing or drum revolubly mounted upon the driving and driven shafts and having an annular flange at each end extended within the rim of the driving-wheel and rim of the resistance-bearing; two oppositely and remotely disposed bevel-gears, one of which is secured to the driven-shaft within the gear-casing, one or more intermediate bevel-gears in mesh with the driving and driven gears and revolubly mounted upon studs secured to the gear-casing with the axis or axes thereof transverse to the axes of the driving and driven gears, and a friction-clutch-mechanism carried by the gear-casing intermediate to said gear-casing and driving wheels and resistance-bearing, and so constructed as to lock the gear-casing with relation either to the driving-wheel or fixed resistance-bearing, substantially in the manner and for the purpose described.

HURBERT C. BAKER.

Witnesses:
WM. F. LOOMIS,
FRED. J. DOLE.