(No Model.)

J. BRUYIÈRE.

CLUTCH.

No. 385,093. Patented June 26, 1888.

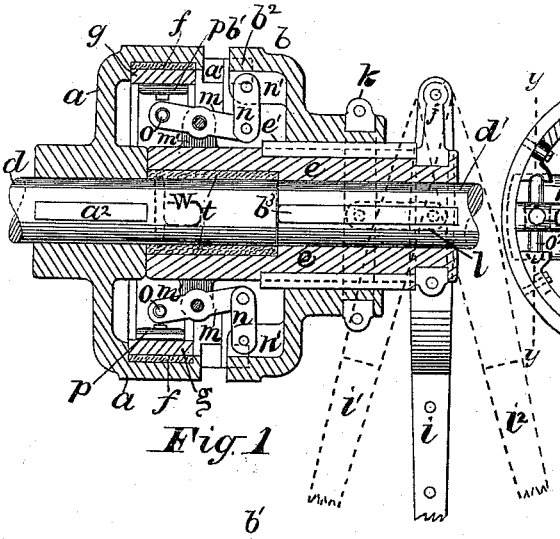

Fig. 1

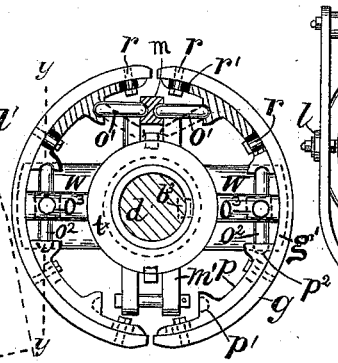

Fig. 2

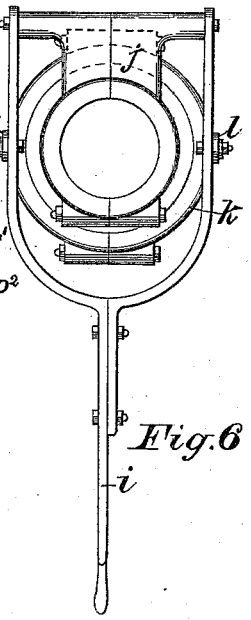

Fig. 6

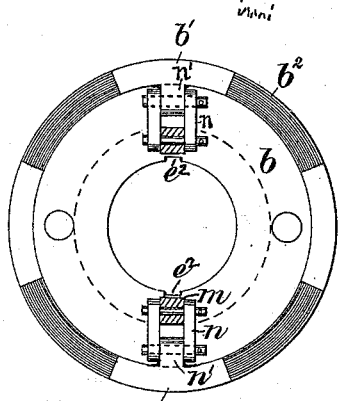

Fig. 4

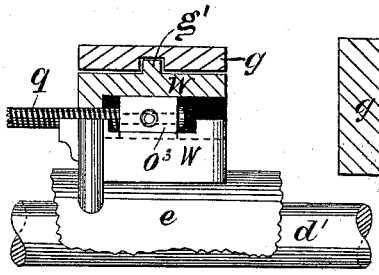

Fig. 3.

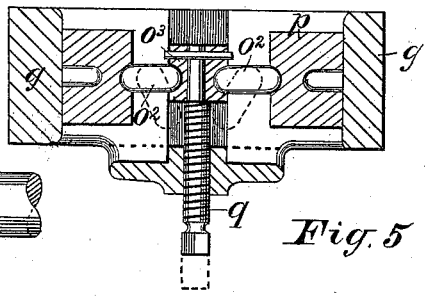

Fig. 5

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CLUTCH.

SPECIFICATION forming part of Letters Patent No. 385,093, dated June 26, 1888.

Application filed October 18, 1887. Serial No. 252,756. (No model.)

To all whom it may concern:

Be it known that I, JOHN BRUYIÈRE, a citizen of Canada, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Clutches, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a longitudinal vertical central section showing my device with its several parts, the shafts being shown entire. Fig. 2 is a transverse view of Fig. 1, showing the half-rings *g* and their attached segments *p*, the two upper ones in section, as also the walking-beam *m* in section, and an end view of the sleeve *e*, as seen from the lever end, with the lever *i* and its ring and crown-wheel *b* removed, also the lower walking-beam removed, and showing the arms *w* and their parts. Fig. 3 shows a short piece of shaft *d'*, on which is mounted a fragment of the sleeve *e*, having one of its arms *w*. Said view is taken on a plane intersecting the axis of the shafts *d d'*, at right angles to that cutting Fig. 1, and all that part above the plane *y y* of Fig. 2 is shown in section on a plane vertical to the plane *y y* and intersecting it on the axis of the screw *q;* but the screw and block o^3 are not cut by said plane. Fig. 4 is an interior view of the crown-wheel *b*, to show the end of the teeth and sectional end of the walking-beam *m* and connecting-link *n*, cut through the pins which connect them to the link *n*. Fig. 5 is an enlarged view, in plan, of the section cut by the plane *y y* from Fig. 2. Fig. 6 is a transverse or end view, from the outer end, of the trunnion-bands *j* and *k* and lever *i*.

Like letters refer to like parts.

The object of my invention is to produce a device which may at will work as a friction or a positive-motion clutch, constructed substantially as follows, namely: Upon one of the line-shafts, as *d'*, is secured, by means of a key, b^3, or otherwise, a sleeve, *e*, which is chambered and filled with a brass lining, *t*, for better wearing-surface to keep the end of the shaft *d* in line with that of *d'*. Upon said sleeve is mounted a crown-wheel, *b*, free to slide longitudinally, but held from turning thereon by means of splines *e'*. In the outer end of said sleeve is cut a circumferential groove, in which works a loose trunnion-band, *j*, connected by two bolts, one of which carries the end of a forked lever, *i*. The trunnions of said band are horizontally opposite the axis of the shaft and pass through holes in the lever at that point. Each trunnion also passes through one end of a link, *l*.

The outer end of the hub of the crown-wheel *b* has also a circumferential groove, in which works a loose trunnion-band, *k*, and upon its trunnions are carried the opposite ends of said horizontal links *l*. By means of said lever and links the crown-wheel *b* may be moved into positions indicated by the lever. (Shown in the three positions *i i' i²*.)

Integral with the sleeve *e* and on diametrically-opposite sides thereof are formed lugs *m'*, in about the position shown on the end of the sleeve. On said lugs are mounted walking-beams *m*. The inner ends of said walking-beams are free and provided on each side with a hemispherical socket, and the other end is connected by means of links *n* to the crown-wheel, by means of a lug, *n'*, forming a part of said wheel, and a bolt.

Upon the shaft *d* is secured, by a key, a^2, or otherwise, a crown-wheel, *a*, with teeth *a'* fitting into the cavities b^2, formed between the teeth *b'* of the wheel *b*. The hub of the crown-wheel *a* revolves against or near the end of the sleeve *e*, so that its crown and teeth overhang the said sleeve in about the proportion shown, this construction being preferable to other forms. When a positive motion is desired, the teeth *a'* are set into the cavities b^2 by moving the lever into the position *i'*. On the inner surface of the crown-wheel *a* is placed a lining, *f*, of copper, held within a channel, as shown, or secured in any other way. Other soft metal, or even wood, might be substituted. Against said copper lining works an expansion-ring, preferably of cast-iron, formed of two independent parts, each carried at its center on an arm, *w*, formed integral with the sleeve *e* and at right angles in position with the lugs *m'*, and inside of said ring and movably attached thereto by bolts are attached four adjustable segments, *p*. Each of said segments is held by two or more bolts, *r*, secured in the segments *p* and working in longitudinal slots

r', cut through said segments p. Said slots allow the necessary longitudinal motion required for the segments p. Each of said adjustable segments p has two lugs, p' and p^2, provided with sockets to receive the ends of toggle-joint bars o' and o^2.

The sockets in p' receive the bars o', and the sockets in p^2 the ends of the bars o^2. The spurs or lugs p^2 are preferably placed at the ends of the segments p, while the spurs p' are placed near the middle of each segment, so as to be directly opposite the sockets o in the levers m, when the opposite bars o' are in a straight line, as they will be when the free end of the lever m is in the position shown in Fig. 1 at its greatest distance from the center of the shaft. On the sleeve e are also cast two arms, w, pointing in opposite directions and at right angles to the lugs m' and in longitudinal position, so that the tenon g', which enters the socket formed for it in the half-ring g, shall place said ring directly opposite the lining f, and so that the sockets o in the end of the lever m shall be about midway between the edges of the half-rings g and also of the edges of the lining f.

A square hole is formed near the ends of the arms w, in which close-fitting blocks o^3 move back and forth by means of a screw, q, seated in one edge of the arm, and said block is provided with sockets on opposite sides, facing the spurs p^2, into which are placed the ends of the toggle-bars o^2. There are slotted openings in the side of the arm to allow said bars to work freely.

I prefer the contact of copper and cast-iron as the materials best suited for my purpose. Said half-rings g are also so made that their ends will spring inward toward the axis of the shaft, or they may have springs or other like devices to draw said ring inward from contact with the lining f, a gap of sufficient size being left at the ends of said segments g for such purpose.

The toggles o^2 and screw q are only moved when the half-rings g and lining f have become worn and fail to give the requisite contact-pressure. Said toggle-bars are never in line until their last position is attained; but the toggle-bars o' are intended to be in line, or nearly so, when the clutch is in full operation. When motion is to be given from one shaft to the other, the lever is moved from the position i^2 to i, when merely frictional contact will take place, which may be produced by the most gentle means by the slow motion of the lever, and when finally positive motion is desired the lever is moved to the position i', when the teeth forming opposite and interlocking jaws of the crown-wheels become engaged and then the friction-surfaces are again released, because the links n again move into a position in which they will release the toggles, because the free end of the lever m moves from the axis of the shaft as the link n necessarily assumes an inclined position when the lever i is moved into or toward either of its extreme positions, and when the toggles o' are released the ring, or parts of it, g, become released from contact-pressure with the inner surface of the crown-wheel a as an obvious result. The end of said lever m may press directly upon the ends of the ring or segments.

The toggles o^2 and screw q are preferred; but a right and left hand screw, wedges, or equivalent devices may work against those lugs p^2 of the segment p and answer the same purpose, or all said parts may be omitted and a spur, p', be formed on the free ends of said ring or segments g to receive the ends of the toggle-bars o^2 with practical results; and, again, the teeth and rim of the crown-wheel b may be omitted, except the lug n', as the remaining parts will still form an operative mechanism. The toggles o' may also be omitted, and the free end of the lever m press directly against the free ends of the said ring or segments g with practical results. Finally the sleeve e may be omitted by abutting the shafts at the inner end of the hub of the wheel a, and, if desired, kept in line by means of a dowel in the center of the shafts. The arms w and lugs m' may then be secured directly to the shaft d', or may together be cast on a hub secured to the shaft. In such construction the trunnion-band j might be held between collars attached directly to the shaft or otherwise secured. The splines e' would in such case be secured to the shaft d', and, as a matter of course, the key b^3 omitted.

What I claim is—

1. An interlocking jaw-clutch formed of opposed and toothed crown-wheels, of which one is fixed and the other movable longitudinally on the shaft, in combination with a friction-clutch operating on the cylindrical surface of the fixed crown-wheel through levers fulcrumed between said crown-wheels, connected at one end to said friction-clutch and at the other to the movable crown-wheel by connecting mechanism, whereby the friction-clutch is first and the jaw-clutch next engaged and the friction-clutch released, and, conversely, the jaw-clutch first released and the friction-clutch engaged and next released, each series of acts occurring by moving the loose crown-wheel first in one and then in the opposite direction, substantially as specified.

2. In combination with the line shafts d d' and crown-wheel a, a sleeve, e, carrying friction-segments against the cylindrical surfaces of the crown-wheel a, and levers fulcrumed between their ends on said sleeve, said levers being connected at one end to the said friction-segments and at the other to the movable crown-wheel by intermediate mechanism, substantially as specified.

3. In a clutch, the combination of a crown-wheel, a, friction-segments g, toggles o^2, block o^3, and screw q, substantially as specified.

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Witnesses:
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