(No Model.)

2 Sheets—Sheet 1.

W. H. MORGAN.

CLUTCH.

No. 562,478. Patented June 23, 1896.

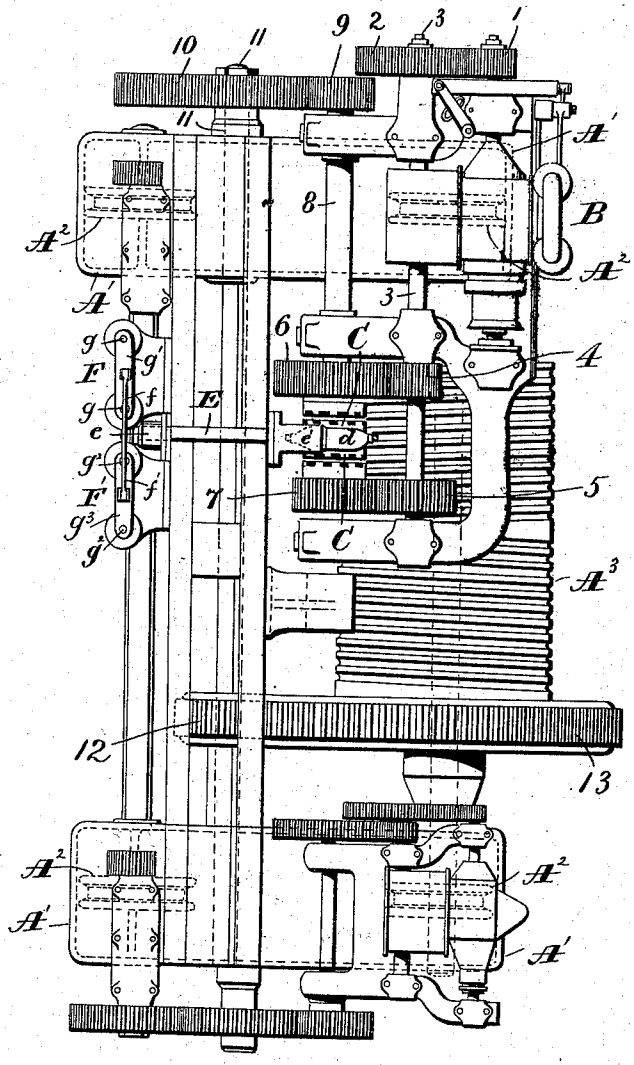


Fig. 1.

Witnesses
Jas. E. Hutchinson.
G. F. Downing.

Inventor
William H. Morgan
By H. A. Seymour
Attorney

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

(No Model.) 2 Sheets—Sheet 2.

W. H. MORGAN.

CLUTCH.

No. 562,478. Patented June 23, 1896.

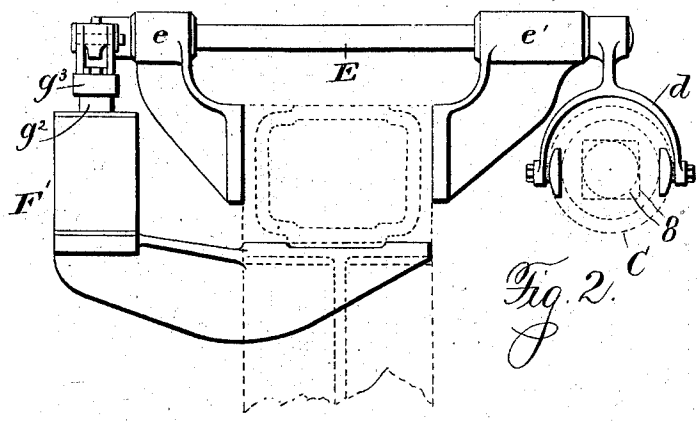


Fig. 2.

Fig. 3.

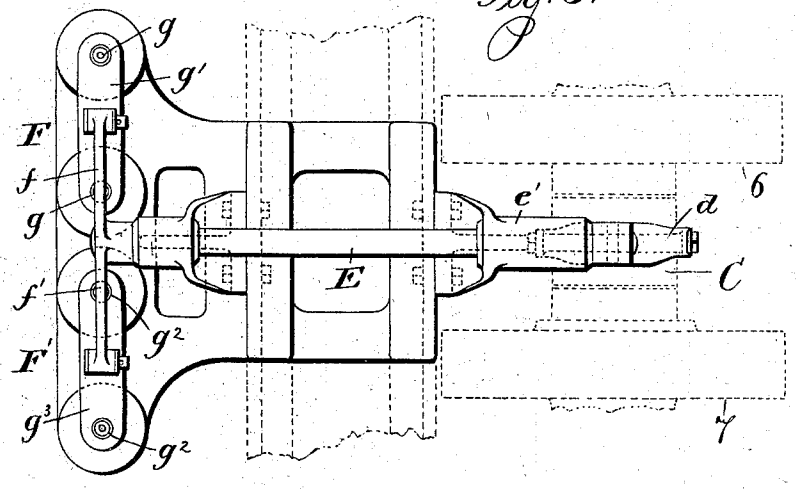
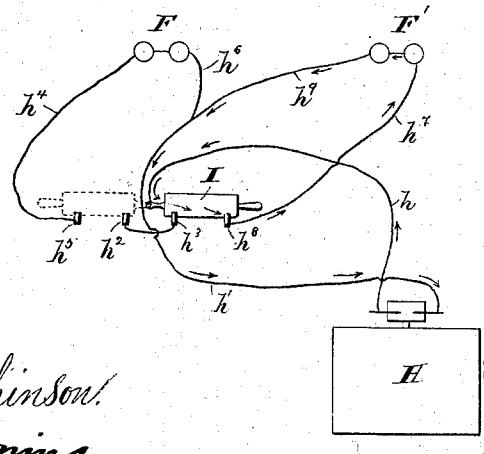


Fig. 4.



Witnesses
Jas. E. Hutchinson.
G. F. Downing

Inventor
William H. Morgan

By F. A. Seymour
Attorney

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY MORGAN, OF ALLIANCE, OHIO, ASSIGNOR OF THREE-FOURTHS TO THOMAS R. MORGAN, SR., THOMAS R. MORGAN, JR., AND JOHN R. MORGAN, OF SAME PLACE.

CLUTCH.

SPECIFICATION forming part of Letters Patent No. 562,478, dated June 23, 1896.

Application filed January 4, 1893. Serial No. 457,210. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Clutches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in clutches, and more particularly in clutches designed for use on trolleys of overhead traveling cranes.

The overhead traveling cranes now commonly employed for lifting and conveying heavy weights consists of a traveling bridge mounted at its ends on a suitable trackway and adapted to travel lengthwise the shop, and a trolley mounted on the bridge and adapted to travel lengthwise of said bridge, the trolley carrying the hoisting drums and chains. Some of these cranes are actuated by endless ropes, some by angular shafts, and others by steam-engines and electric motors carried by the bridge. In all, however, so far as I am aware, the clutches on the movable trolley are actuated by mechanical devices mounted on the bridge, the most familiar form of clutch-operating device being an angular shaft adapted to be rocked by a lever passing through a sleeve carried by the trolley, the said sleeve being connected directly or indirectly to the clutch-operating yoke.

While my device was designed more particularly for electrically-operated cranes it is evident that the clutch to be hereinafter described can be used in connection with machinery of any kind.

My invention consists in two electromagnets, preferably solenoids in the circuit of a generator, a rocking lever or equivalent device connected to the armatures or cores, whereby when one magnet is energized the lever is rocked or moved in one direction and when the other magnet is energized the lever is rocked or moved in the other direction, and a switch for bringing either magnet into circuit.

My invention further consists in the parts and combinations of parts as will be more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of a trolley having my improved clutch thereon. Fig. 2 is an enlarged view, in end elevation, of the clutch-actuating mechanism, the frame of the trolley being shown in dotted lines. Fig. 3 is a plan view of same; and Fig. 4 is a diagrammatic representation of the magnets, generator-circuits, and switch.

For the purposes of illustration I will describe my invention in connection with the clutch mechanism of a trolley, but, as before stated, it can be used on any machine employing a clutch.

A represents a trolley consisting, essentially, of a frame A′, mounted on wheels A^2, and provided with a hoisting-drum A^3. This drum A^3 is actuated by an electric motor B, through the intervention of the following parts: The armature-shaft of the motor carries a small pinion 1, which meshes with the larger pinion 2, carried by shaft 3. This shaft 3 carries the small pinion 4 and larger pinion 5, both fast thereon, and these pinions in turn mesh, respectively, with pinion 6 and smaller pinion 7, both loose on shaft 8. The shaft 8 carries on its outer end pinion 9, which is in engagement with larger pinion 10, fast on shaft 11. This shaft 11 carries toothed wheel 12, which engages the toothed wheel 13, rigidly secured to drum A^3.

From the foregoing it will be seen that motion is transmitted from shaft 3 to shaft 8 through either wheels 4 and 6 or 5 and 7, the former being employed when slow speed is desired and the latter when fast speed is desired.

The wheels 6 and 7 are, as before stated, loose on shaft 8 and each is provided on the inner face of its hub with clutch-teeth adapted to be engaged by corresponding teeth on clutch C. This clutch C is located between wheels 6 and 7, and the section of shaft 8 on which said clutch is mounted is made angular in cross-section, so as to permit the clutch to slide freely thereon, but prevent it from ro-

tating independently thereof. Instead of making the shaft 8 angular in cross-section a spline and groove would answer all purposes.

The clutch C is provided at its ends with teeth, and hence when in engagement with the teeth of either wheel 6 or 7 locks said wheel to shaft 8 and transmits motion through the parts described from the motor to the drum. The clutch C is provided with a groove on its periphery for the clutch-actuating yoke *d*. This yoke is secured to one end of shaft E, mounted in bearings *e e'*, and the shaft is provided at its opposite end with the oppositely-projecting arms *f f'*.

F and F' are electromagnets, represented in the present instance as solenoids, the cores *g* of solenoid F being connected at the top by plate *g'* and the cores g^2 of solenoid F' being connected together by plate g^3. The plate *g'* is connected by a hinged joint with arm *f* of shaft E, and the plate g^3 is connected by hinged joint with arm *f'* of shaft E, the several parts being so arranged that when the cores of one solenoid are down, one toothed end of clutch C is in engagement with one wheel and when the cores of the other solenoid are down the opposite end of clutch is in engagement with the other wheel.

From the foregoing it will be seen that by cutting out one solenoid and energizing the other the shaft E is rocked and the clutch shifted from one wheel to the other. These solenoids F and F' are in the circuit of an electric generator H. The arrangement of the circuits is shown in Fig. 4, in which one conductor *h* leads from generator H to the pivot of the double-knife switch I, while the other conductor *h'* runs from the generator H to the conductors h^6 h^9. Solenoid F is connected by one terminal wire h^4 to contact h^5, and by the other wire h^6 to the conductor *h'*. Solenoid F' is connected by one terminal h^7 to contact h^8 and by another terminal h^9 to conductor *h'*. For the purposes of illustration we will suppose that it is desired to couple up the drum A^3 with the motor for slow speed. This is accomplished by throwing the switch over to the position shown in full lines in Fig. 4. When in this position, the solenoid F is out of the circuit completely, and the current from the generator passes from generator H to the pivot of the switch I, through the switch to contact h^8, and from there to solenoid F', through conductor h^7, from the solenoid to the common return *h'*, and from thence to the generator.

The passage of the current through solenoid F' energizes the latter, thus causing it to attract or draw down the cores g^2. This movement of the cores turns the shaft and moves the clutch into contact with wheel 6. When a comparatively light weight is to be lifted or lowered and a faster movement or speed desired, it can be accomplished by throwing the switch over to engage contacts h^2 and h^5. When in this position, the current passes through *h* to switch, and from thence to contact h^5, through conductor h^4 to solenoid F, and back through conductor h^6 to the common return *h'*. The current now energizes solenoid F, and by the movements before explained shifts the clutch to engage wheel 7. The act of cutting in one solenoid cuts out the other. Hence there is no liability of the solenoids acting in opposition at the same time.

It is evident that many slight changes and alterations of the several parts of my device might be resorted to without departing from the spirit and scope of my invention. Hence I would have it understood that I do not confine myself to the exact construction and arrangement of parts herein shown; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a trolley, a motor and a drum thereon, and fast and loose wheels of different sizes for varying the speed of the drum, the said wheels being located between the motor and the drum, of a clutch for locking either loose wheel to its shaft, a clutch-operating mechanism, an electromagnet located on the trolley for moving said clutch-operating mechanism in one direction, and means for moving said mechanism in the opposite direction, substantially as set forth.

2. The combination, with a trolley, a motor and a drum thereon, and fast and loose wheels of different sizes for varying the speed of the drum, the said wheels being located between the motor and the drum, of a clutch for locking the loose wheels to their shaft, a clutch-operating mechanism, and two electromagnets located on the trolley for actuating the clutch-operating mechanism, substantially as set forth.

3. The combination, with a trolley, a motor and drum thereon, and fast and loose wheels of different sizes for varying the speed of the drum, located between the motor and the drum, of a clutch for locking the loose wheels to their shaft, two electromagnets located on the trolley, and mechanism intermediate said clutch and magnets and actuated by the latter for shifting the clutch, substantially as set forth.

4. The combination with a trolley, a drum and motor thereon, and fast and loose wheels of different sizes for varying the speed of the drum, located between the motor and the drum, of a clutch for locking either loose wheel to its shaft, a rock-shaft for actuating the clutch, and electromagnets located on the trolley for rocking the rock-shaft, substantially as set forth.

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

WILLIAM HENRY MORGAN.

Witnesses:
H. W. HARRIS,
F. E. DUSSEL.