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CLUTCH FOR WINDING DRUMS OF HOISTING MACHINERY.

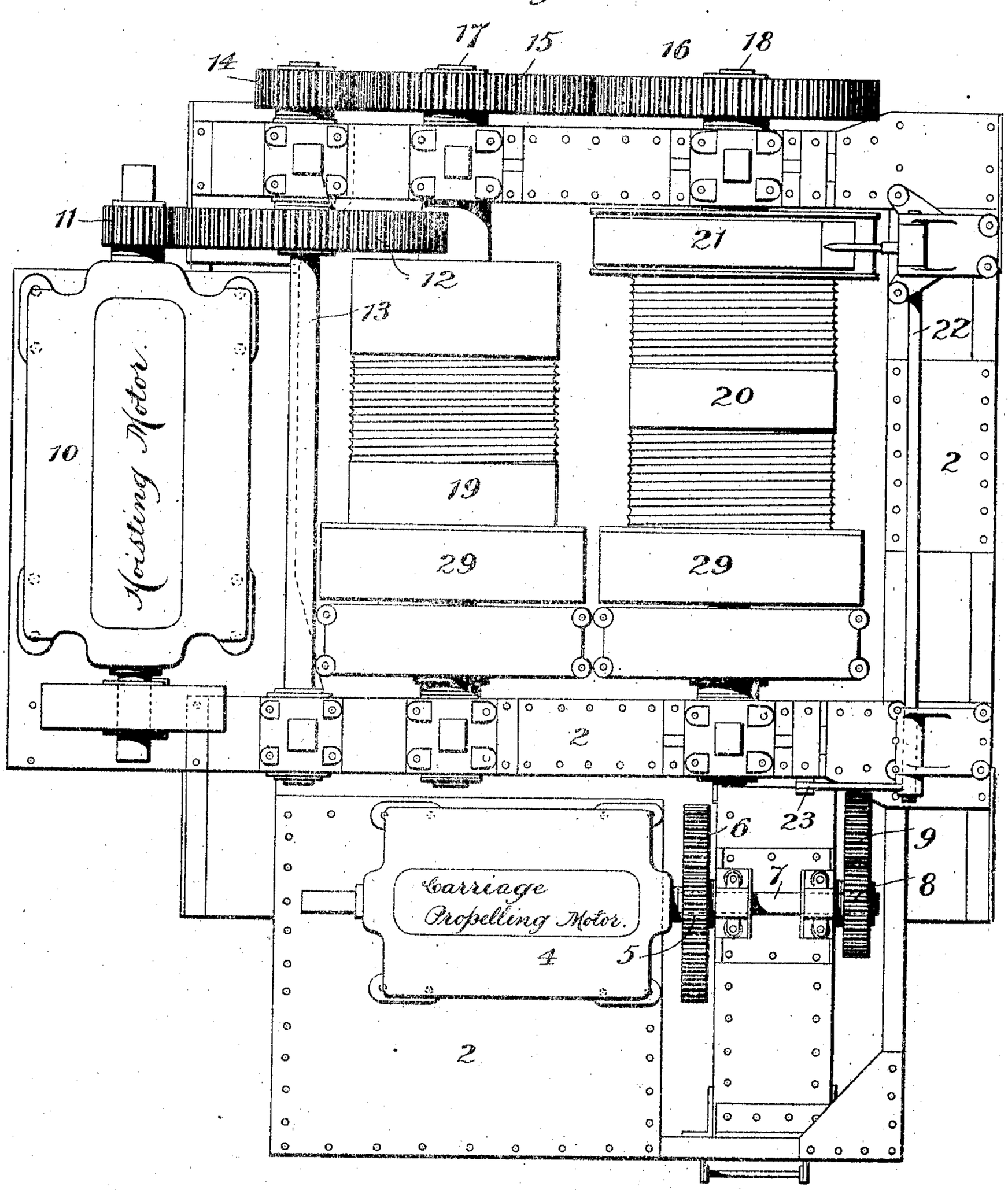
APPLICATION FILED FEB. 1, 1908.

928,482.

Patented July 20, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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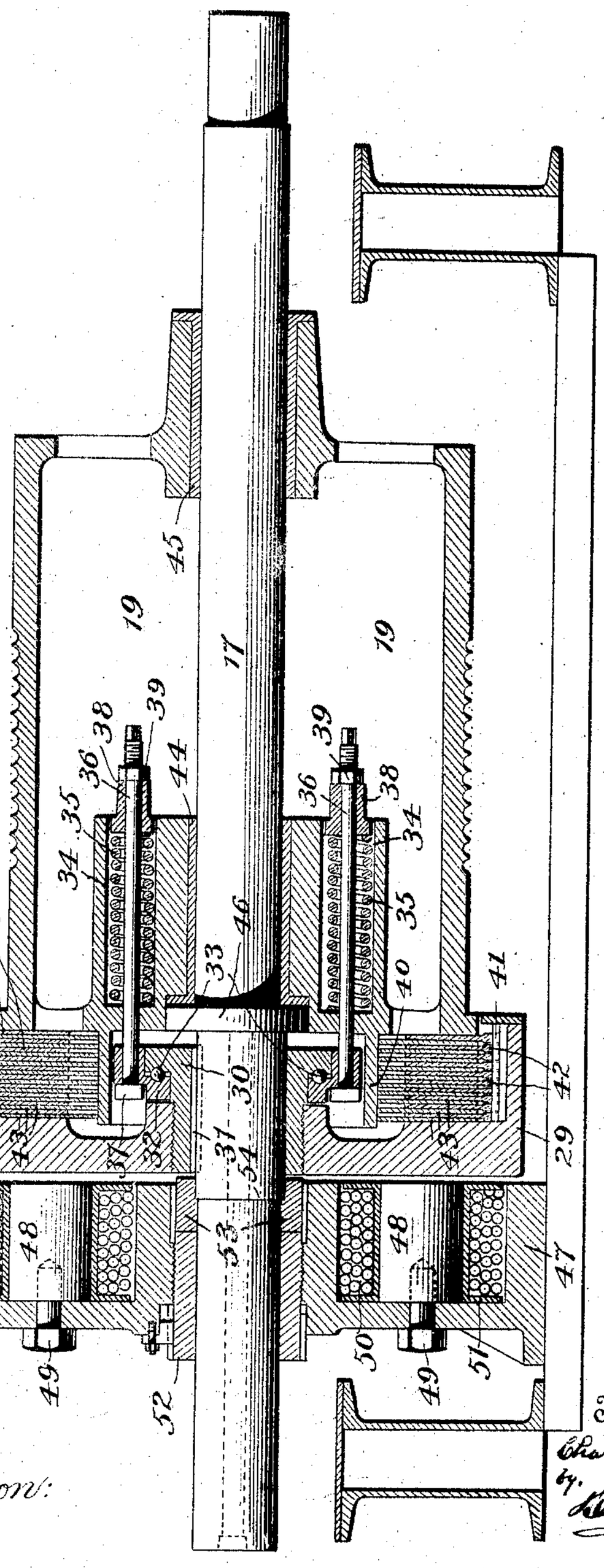
2 SHEETS—SHEET 2.

Fig. 2.



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CLUTCH FOR WINDING-DRUMS OF HOISTING MACHINERY.

No. 928,482. Specification of Letters Patent. Patented July 20, 1909.

Application filed February 1, 1908. Serial No. 413,843.

To all whom it may concern:

Be it known that I, CHARLES P. TURNER, a citizen of the United States, residing at Harrisburg, county of Dauphin, State of Pennsylvania, United States of America, have invented certain new and useful Improvements in Clutches for Winding-Drums of Hoisting Machinery; 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, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

My invention relates to clutches and more especially to clutches for the winding drums of hoisting machinery.

Referring to the drawings in which like parts are similarly designated Figure 1 is a plan view of a traveling crane having two hoisting drums thereon. Fig. 2 is a section through one of the drums showing the clutch mechanism in detail.

The object of the invention is the construction of a small and easily operated clutch for controlling the motion of a winding drum of a hoisting machine of any description, the construction being such that the load on the drum may be conveniently lowered without stopping or reversing the motion of the shaft.

I have shown the clutch as applied to the drums of a double drum, electrically driven trolley of a traveling crane, for handling a two rope grab-bucket.

Mounted on the trolley carriage 2 is a carriage-propelling motor 4 provided with a pinion 5, that drives a gear wheel 6, mounted on a short shaft 7, carrying a pinion 8, that drives a gear wheel 9, fixed on a wheel axle of the trolley carriage.

The hoisting motor 10 has mounted on its motor shaft a pinion 11 which in turn drives a gear wheel 12, on a shaft 13, mounted in the trolley frame, said shaft carries a driving pinion 14 meshing with the gear wheel 15 which in turn meshes with the gear wheel 16. The gear wheels 15 and 16 are preferably, but not necessarily, of the same size. These gear wheels 15 and 16 are mounted on shafts 17 and 18 respectively, said shafts carrying the hoisting drums 19 and 20, both of said drums loose on their shafts, and the drum 20 is provided with a band brake 21, operated by a shaft 22, parallel with the drum and provided with a crank 23 that is capable of being actuated by the operator from his cage (not shown).

Each drum is provided at one end with a clutch-casing 29 that is secured to a bushing 30 which in turn is connected by a spline or key 31 to the shaft, see Fig. 2 illustrating one of the drums, namely the drum 19 in section. The bushing 30 is however, free to move a slight distance longitudinally of the shaft, this being permitted by the spline.

Between the bushing 30 and the clutch-casing 29 is a ring 32 rotatable in relation to both the clutch-casing 29 and bushing 30, a set of balls 33 being placed between the ring and bushing, forming a ball bearing, said ball bearing acting as a thrust bearing between 30 and 32. Within the drum are pockets 34 for receiving coil springs 35 and passing through these springs, the pockets and the head of the drum are bolts 36, whose heads 37 engage the ring 32 and at the threaded ends of the bolts are nuts 38 forming abutments for one end of the springs, said nuts held against rotation by check nuts 39. These springs tend to draw the drum and clutch-casing 29 together.

Surrounding the ring 32 is a polygonal flange 40 formed on one end of the drum and projecting into the clutch-casing 29. Loosely mounted on suitable pins 41 in the clutch-casing 29 are a series of annular disks 42 which alternate with similar disks 43, mounted on the polygonal flange 40. Instead of a polygonal flange 40 any other suitable means may be used for non-rotatably connecting the disks 43 to the drum so as to permit slight axial movement. Under normal conditions the tension of the springs 35 is sufficient to pull the clutch-casing 29 with sufficient force towards the end of the drum to produce friction between the plates required for holding the drum against rotation on its shaft.

44 and 45 are suitable bushings for the drum.

46 is a flange on shaft 17 which prevents the movement of the drum toward the clutch-casing and forms an abutment against which ultimately the pull of the springs is exerted in pulling the clutch-casing toward the drum.

Mounted on the frame of the trolley is a clutch releasing device comprising a stationary casing 47 having a number of cylindrical

recesses arranged around its center, in each of which recesses is secured an iron core 48 held in place by a bolt 49 passed through the casing 47. On each core 48 is placed a winding 50, which for convenience is wound on a thin spool 51 capable of being slipped over the core 48 with a tight fit.

The casing 47 surrounds one of the bearings 52 of the shaft 17 and is secured thereto. Between this bearing and the clutch-casing 29 is a stop collar 53 which takes against a step 54 on the shaft. This collar prevents the longitudinal movement of the shaft in its bearing when current is passed through the coils 50 and projects slightly beyond the faces of the cores 48 and the face of the casing 47 so as to prevent the clutch-casing 29 from coming into actual contact with the electro magnets, thereby preventing the sticking of the clutch-casing due to remanent magnetism. The hoisting ropes are secured at their ends to the drums 19 and 20 respectively there being two ropes as is customary for handling a two rope bucket, the structure of which latter forms no part of the present invention.

The operation as will be observed from Fig. 2 is such that the clutch-casing 29 is drawn toward the driven member or drum 19 by springs 35 thereby causing the friction plates to produce sufficient friction to lock the drum to the clutch-casing which in turn is connected to the driving member or shaft by the spline so that the drum, the clutch-casing and the shaft will rotate as a unit. By sending current through the solenoids or coils the clutch-casing 29 which forms an armature for the electro-magnets, composed of the cores 48 and the coils 50 is attracted, axially moving the clutch-casing 29 toward the magnets against the tension of the springs 35 that exert a pull on the clutch-casing in a direction opposite to the magnetic pull, thereby releasing the friction plates from one another and permitting the drums to rotate independently of their shafts, whether said shafts at the time being are being driven or not.

I claim:

1. The combination with a shaft and a drum free to rotate thereon; of mechanical clutch-mechanism to automatically connect the drum and shaft and electro-magnetic mechanism surrounding the shaft to move and hold the mechanical clutch-mechanism against its automatic operation to permit the drum to rotate freely with respect to the shaft.

2. The combination with a driving member and a driven member loose thereon, of a mechanical clutch-mechanism constantly urged into clutching position to connect the two members; of electro-magnetic means surrounding the axis of the driving member and brought into operation at will to move and hold the clutch-mechanism out of operation to permit the members to rotate independently of one another.

3. The combination with a shaft and a drum free to rotate thereon; of mechanical clutch mechanism; springs to automatically urge said mechanism into clutching position and electro-magnets surrounding the shaft brought into operation at will to move and hold the clutch-mechanism against the action of their springs to permit the drum and shaft to rotate independently of one another.

4. The combination with a shaft and a drum free to rotate thereon; of a clutch-casing slidably but non-rotatably mounted on the shaft, friction plates secured to the casing and friction plates secured to the drum coöperating with those secured to the casing, springs to urge the casing and its plates toward the drum to frictionally engage the plates and lock the drum to the casing and electro-magnets mounted in proximity to the casing to withdraw it from the drum against the tension of the springs.

5. The combination with a shaft and a drum free to rotate thereon; of a clutch-casing having an annular recess in one of its faces, annular friction plates mounted in said recess, a polygonal flange on the drum projecting into the casing through the centers of the plates on the flange coöperating with those in the casing, a ring in the casing free to rotate, spring urged means to connect the ring and drum to urge the casing toward the drum and the plates in frictional engagement, a magnet casing and electro-magnets fixed therein to retract the clutch casing.

6. The combination with a plurality of shafts, a gear wheel secured to each shaft, the gear wheel on one shaft gearing with the gear wheel on the adjacent shaft, a motor and a speed reducing gear train between the motor and one of the aforesaid gear wheels; of a winding drum, loose on each shaft, mechanical clutch mechanism between each drum and its shaft, springs mounted in each drum about its axis to urge the clutch mechanism into clutching action and an electro-magnetic means surrounding each shaft to release each clutch at will.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

CHARLES P. TURNER.

Witnesses:
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ELMORE DE WITT.