Jan. 8, 1924. 1,480,322

F. C. WALTERS

CABLE MECHANISM

Filed June 21, 1922 3 Sheets-Sheet 1

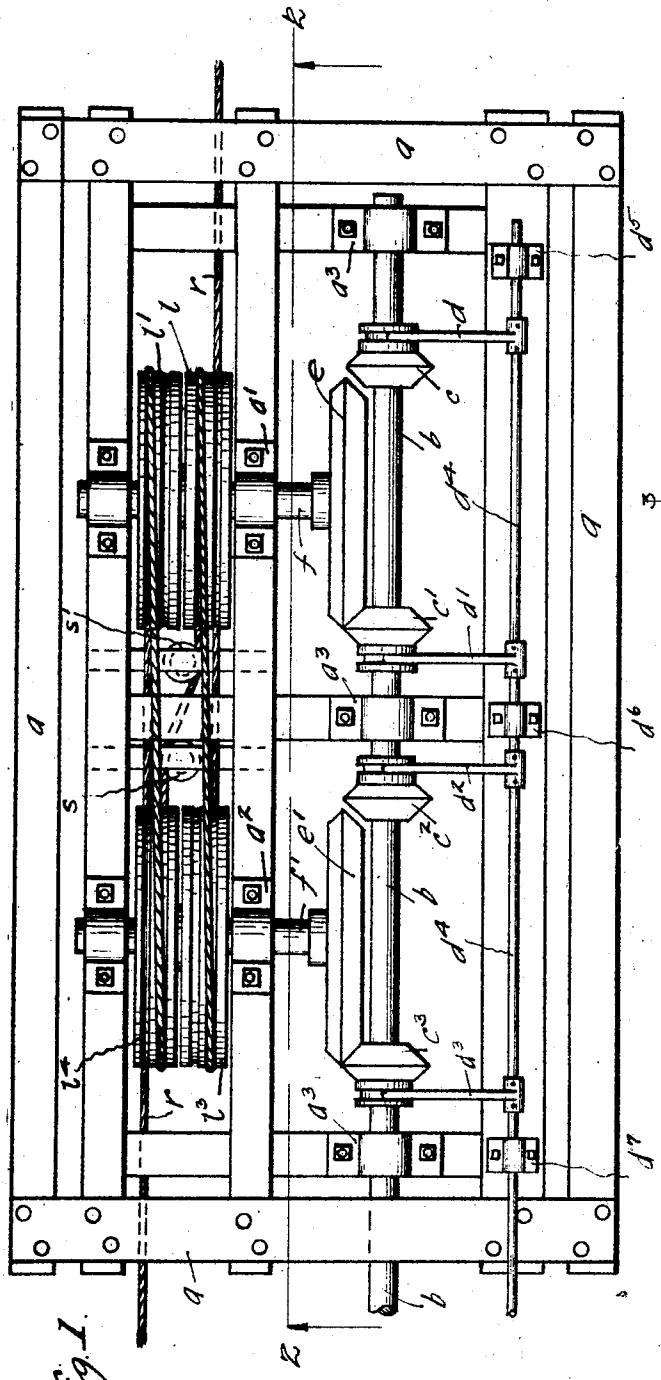


Fig. 1.

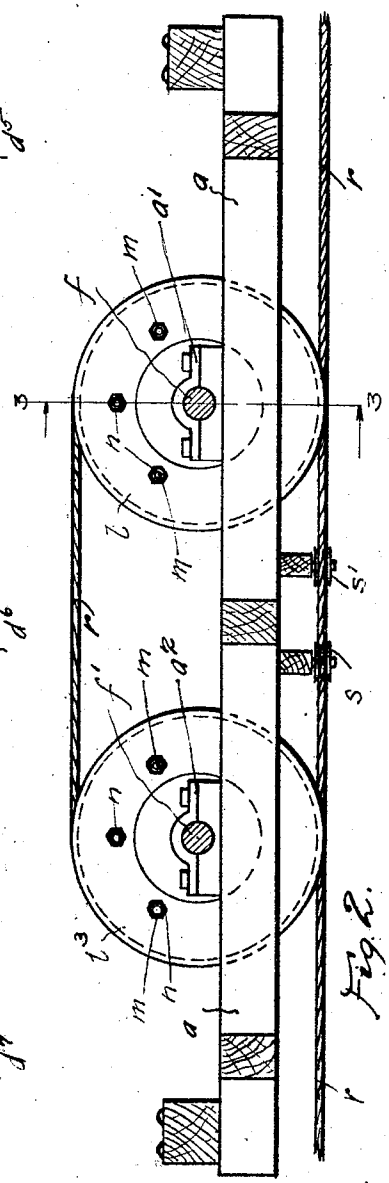


Fig. 2.

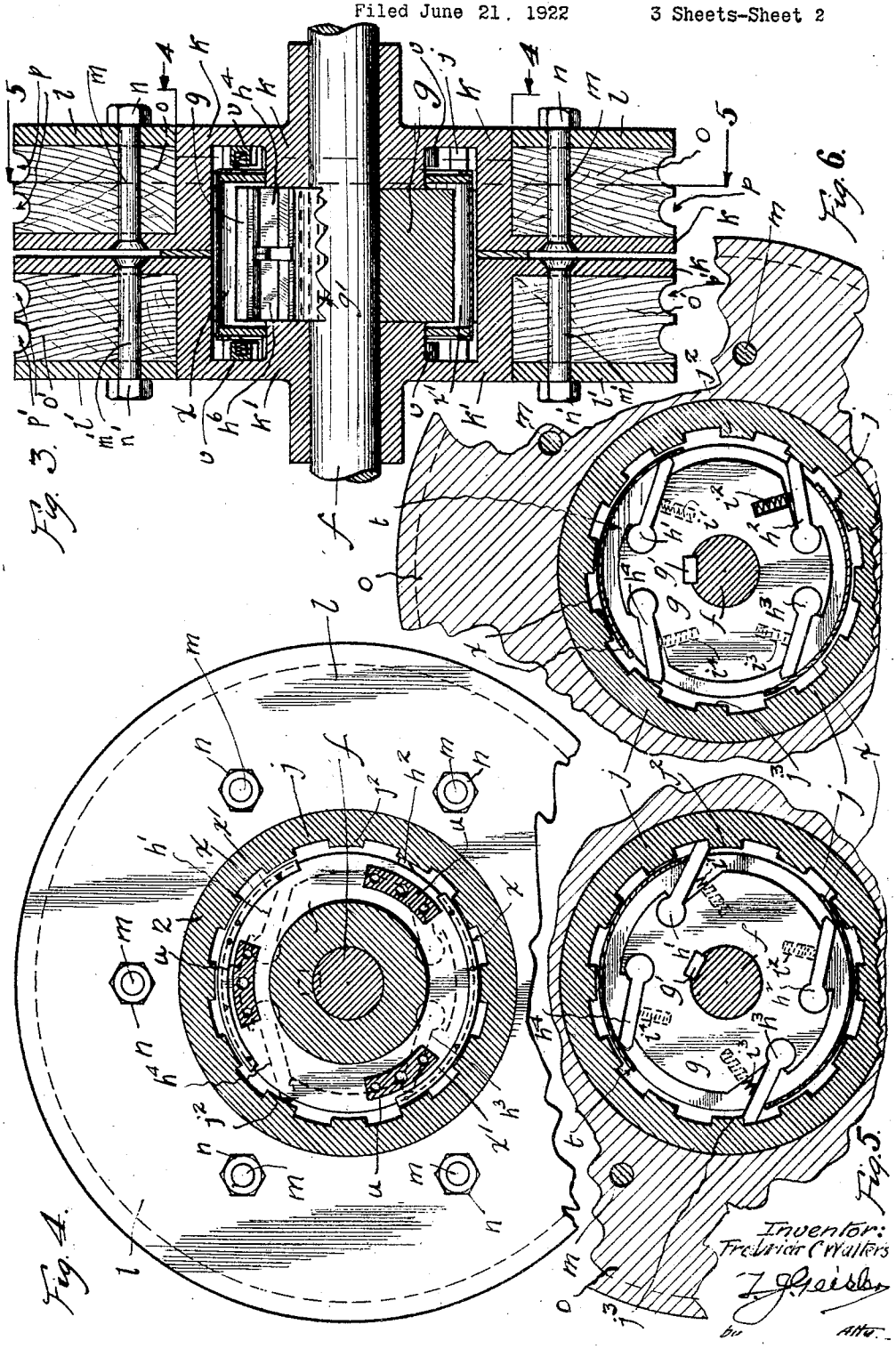
Inventor
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CABLE MECHANISM

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F. C. WALTERS

CABLE MECHANISM

Filed June 21, 1922 3 Sheets-Sheet 3

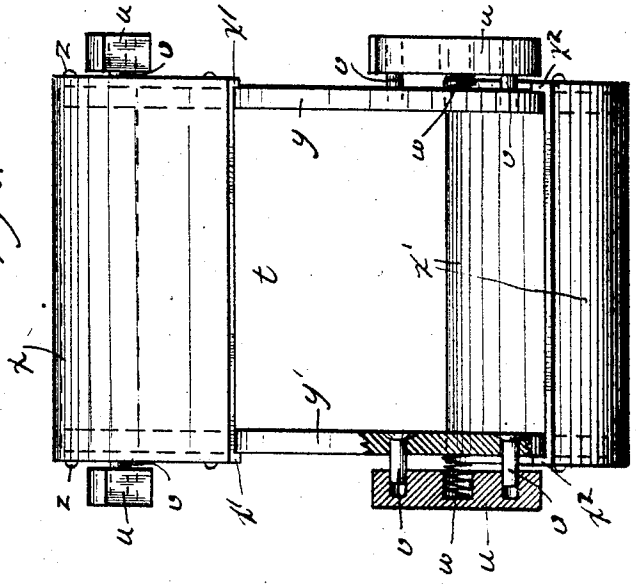


Fig. 7.

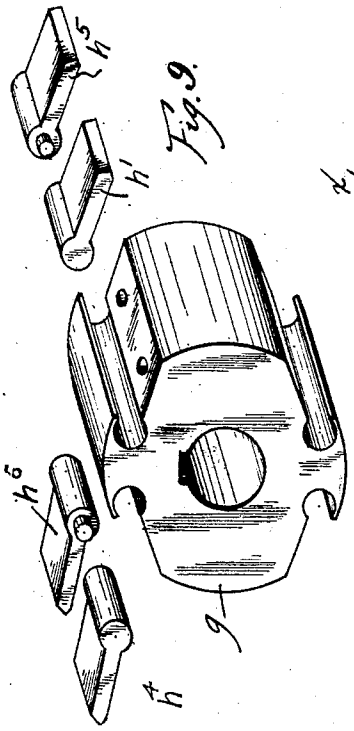


Fig. 9.

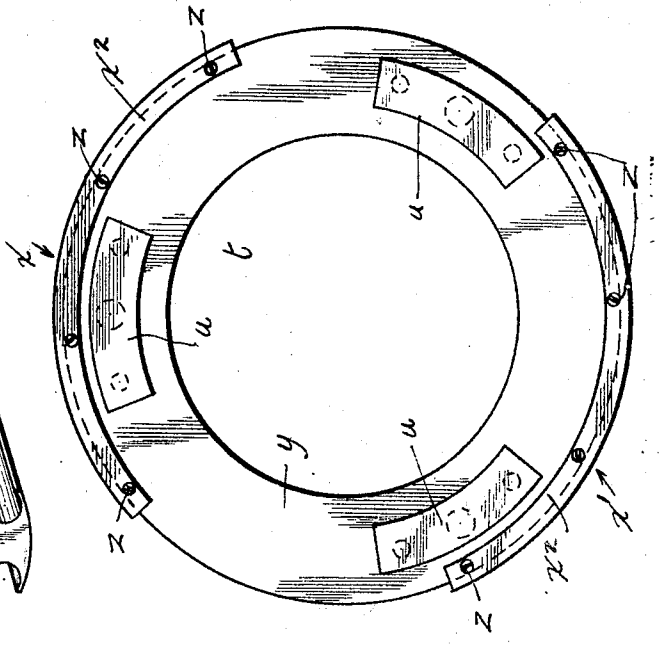


Fig. 8.

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Patented Jan. 8, 1924. 1,480,322

UNITED STATES PATENT OFFICE.

FREDRICK C. WALTERS, OF EUGENE, OREGON.

CABLE MECHANISM.

Application filed June 21, 1922. Serial No. 569,969.

To all whom it may concern:

Be it known that I, FREDRICK C. WALTERS, a citizen of the United States, and a resident of Eugene, county of Lane, and State of Oregon, have invented a certain new and useful Improvement in Cable Mechanism, of which the following is a specification.

My invention relates to cable mechanism in which the cable pulleys, or drums, are driven by a common source, or drive a common recipient of power. As the pulleys are in contact with a continuous piece of cable and move synchronously it is necessary that they be the same diameter. If one drum or pulley should become smaller in diameter due to wear or abrasion it follows that it will not present the same circumference to the cable. If this drum or pulley moves synchronously with the others a tension will be set up in the cable between the smaller drum and the succeeding drum. Means must be provided to permit the smaller drum independent motion, or else allow the cable to slip on the drum. Slippage on the face of the drum causes undue wear and further abrasion which reduces the diameter proportionately, and thus increases the harmful tension which I have sought to eliminate.

My invention permits independent motion to the smaller drum, thus permitting it to idle until the other drums are worn by abrasion to the same diameter as the smaller drum which then takes its proportionate load.

The object of my invention is to provide automatic means for eliminating the differential strain between the several pulleys or drums in a device using a plurality of pulleys and which is driven by, or drives cable operated mechanism.

A further object is to provide simple means for maintaining an equal maximum tractive force of the cable on each drum of a series of cable drums operating or operated at synchronous speed.

A further object is to provide a simple, efficient means for preventing spooling or lapping of one coil of the cable over another, which causes undue wear to the cable.

A further object is to provide automatic means which will eliminate stretch of the cable between the separate drums.

I attain these objects and incidental features by the device illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of the operating mechanism of a tram car in which the wheels, motive power and platform have been removed so as to show the relation of the drums to each other, the manner of coiling the cable about the several drums, and means for changing the direction of rotation of the power shaft which may be considered either as a driving or driven shaft;

Fig. 2 is a longitudinal sectional view taken on the line 2—2 of Fig. 1 and shows how the cable is guided to the proper grooves on respective drums by means of independent guide pulleys;

Fig. 3 is a cross sectional view of one drum assembly taken on the line 3—3 of Fig. 2 and shows how the separate drums can be built with wearing surfaces softer than metal and also shows some of the arrangement of the parts before the differential strains between the drums is eliminated;

Fig. 4 is a side elevation partially sectional, taken on the line 4—4 of Fig. 3 and shows in dotted lines the positions of the pawls;

Figs. 5 and 6 are sectional views respectively taken on the line 5—5 of Fig. 3 and differ only in the fact that Fig. 5 shows different phases of action of the mechanism by which the drums are operatively connected with the shafts on which they are mounted;

Fig. 7 is a detail view partially sectional, of a detail of construction of one of the parts which I call the releasing shoe in the body of my specification;

Fig. 8 is a side elevation of the parts shown in Fig. 7; and

Fig. 9 is a perspective view of details of arrangement of the pawls comprising the operative connection between the drums and their shafts.

The construction and operation of my device is as follows:

The bearings a^3 carried by the main frame a support the power shaft b to which are slidably mounted bevel pinions c, c', c^2 and c^3 which are held against rotation on said shaft in any conventional way. In the different positions of the bevel pinions c and c' they mesh on the opposite side of the bevel gear e and the pinions c^2 and c^3 mesh in a like manner with the bevel gear e' thus causing clockwise or counter clockwise rotation of the latter. The pinions c, c', c^2 and c^3 are moved into and out of engagement with the gears e and e' by

means of the shifter bars d, d', d^2 and d^3 which are mounted on the common shifter rod d^4. The rod d^4 is mounted in suitable bearings d^5, d^6 and d^7. The bevel gear e is affixed to the stub shaft f and the bevel gear e' is affixed in a like manner to the stub shaft f'.

Drums l, l' are loosely mounted on the stub shaft f and drums l^3 and l^4 are loosely mounted on the stub shaft f'. The stub shafts f and f' are mounted on the frame a by means of bearings a' and a^2 respectively.

In the future reference characters I shall refer only to the parts which constitute the forward drum assembly which is mounted on stub shaft f, as they are similar in all respects to the drum assembly mounted on the stud shaft f'. These parts are shown in the cross sectional view, Fig. 3.

The barrel g is rigidly mounted on the stub shaft f by means of the key g'. The barrel g carries removable pawls h', h^2, h^3 and h^4, which engage with the internal gear j which is made integral with the casting k. Similar pawls in the drum k' engage with the internal gear j' of the aforementioned drum. Only two of these pawls are shown, pawl h^5 working in the same slot as h' and pawl h^6 working in the same slot as h^4. Coil springs i', i^2, i^3 and i^4 hold the pawls h', h^2, h^3 and h^4 in engagement with the internal gear j. The removable sides l and l' are fastened to the main casting k and k' respectively, by means of bolts m and m' and nuts n and n'. These castings are spaced apart and hold between them filler pieces o and o'. On the periphery of these filler pieces o and o' are the parallel grooves p and p' respectively, which accommodate the cable r and thus help to avoid meshing of the separate coils of the cable as they pass around these drums. Independent guide pulleys s and s' are fixed between the drums in order to guide the cable into the proper grooves. The releasing shoe t which releases operative connection to drums l and l' will be used as typical because it is similar in respect to the releasing shoe which releases the operative connection to the drums l^3 and l^4. The releasing shoe t is composed of two curved pieces x and x' and two hollow circular side pieces y and y' which are fastened together by means of screws z which fasten thru the sides x^2 of the curved pieces x and x'. This releasing shoe is rotated solely by means of the frictional contact between the main castings k and k' and the blocks u which are fastened to said releasing shoe. These blocks are held against relative movement by the pins v and held in frictional contact against the main castings k and k' by the spring w.

It is to be noted that this releasing shoe t is is no way connected with the shaft or bearing. It is merely rotated with the frictional contact against the sides of the revolving drums.

Referring to Fig. 5 it can therefor be noted that if the barrel g tends to move faster than the internal notched face j the pawls h' and h^3 will remain in engagement against the teeth j^2 and j^3 but when the barrel g is moved slower than the notch face j the shoe t will be carried around as shown in Fig. 6 and will thus release the contacts of the pawls h' and h^3 and will cause the pawls h^2 and h^4 to come into engagement with the teeth j^2 and j^3. The pawls h^3 and h^4 are set so as to result in giving the drums a counter rotation to the rotation which was previously given by the engagement of the pawls h' and h^3. Thus it is to be noted that if the two drums are moving synchronously they can be propelled positively in either direction by the action of the two sets of pawls.

By referring to Fig. 3 it is seen that there is no connection between the separate drums on the same shaft and thus they are free to rotate independently at different speeds or directions without hindrance to each other were it not for the action of the pawls. As previously explained, one barrel and one revolving shoe serves both drums but separate sets of pawls actuate the separate drums. Thus if drum l has become worn so as to be slightly smaller in diameter than drums l', l^3 and l^4 it would not pass as much cable as the drums of normal diameter, which move at synchronous speed. Therefore if the cable was not allowed to slip on the surface of the drum, a tension would eventually be set up against drum l which would loosen its bearing or break the cable. Thus it is necessary that the two drums be allowed independent relative motion with each other.

This is accomplished as follows:

Assuming drum l to be smaller in diameter than the drums l', l^2 and l^3, it follows that it will not present the same rim length or circumference as the other drums. Therefore to present the same circumference to the cable, drum l must revolve faster. If it were not for the releasing shoe t the smaller drum could only take up the play between the opposed pawls as previously explained, but as the releasing shoe t is merely held by the frictional resistance against the sides of the drums k and k' it follows that the releasing shoe might tend to move at the same speed as drum k which moves the faster. The releasing shoe, however, passing over both sets of pawls would be held by the pawls still in engagement with drum l'. It is thus prevented from moving faster than the slower drum and thus the releasing shoe abuts the active pawl and allows the disengaged pawl to merely ratchet against the internal notches. Drum l could therefore deliver no power, and thus wear and abrasion

on its surface would be temporarily suspended until the other drums were reduced to the same diameter as drum *l*. Drum *l* would then take up its load because it would then be moving synchronously with drum *l'*.

These variations of course will not be very great, in fact are almost imperceptible and therefore this idling of one drum will only be momentary and hardly perceptible to the operator. No great amount of power is therefore lost by driving with three drums instead of four, but if this condition, which is eliminated from my device, were allowed to continue for any length of time the effect of tremendous tension would cause the evil effects which have been referred to heretofore.

It can be seen also that my device would automatically absorb the slack or stretch between the separate drums and would thus equalize the tractive effort. By means of the independent pulleys *s* and *s'* and the parallel grooves and the main drums I have provided a combination which will effectually prevent a spooling or lapping of the coil of cable on the drums.

It is to be noted that this invention is not limited to four separate drums because it can be seen that any even number of drums could be provided beyond these four. I am aware of the fact that the combination for communicating power to the shafts is not new to the art, and I therefore do not claim the combination broadly, but merely use this mode of application to illustrate one means.

I claim:

1. A cable mechanism of the character described comprising, a frame, a pair of shafts journaled in the frame, two companion drums loosely mounted on each shaft, a cable running on said drums, releasable means adapted to connect operatively said companion drums individually with their respective shafts, in either direction automatic, means restraining the operative connection of that one of two companion drums which, because of the reduction of its diameter by wear of the cable, revolves the faster, thereby permitting such faster drums to idle until the cable has worn the companion relatively slower drum to a traction diameter equal to that of the faster drum, and means for communicating power thru said shafts.

2. A cable mechanism of the character described comprising, a frame, a pair of shafts journalled in the frame, two companion drums loosely mounted on each shaft, a cable led to and along the drums located in the same longitudinal plane and given a single turn around each of such drums, thence led by guiding pulleys to the drums located in the adjacent longitudinal plane, given a single turn around each of, and finally led away from, the latter drums releasable, means adapted to connect operatively said companion drums individually with their respective shafts, in either direction, means restraining the operative connection of that one of two companion drums which, because of the reduction of its diameter by wear of the cable, revolves the faster, thereby permitting such faster drum to idle until the cable has worn the companion relatively slower drum to a traction diameter equal to that of the faster drum, and means for communicating power thru said shafts.

3. A cable mechanism of the character described comprising a frame, a pair of shafts journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted on each barrel, means adapted to connect operatively said companion drums individually with the respective drums in either direction, means carried by said drums restraining the operative connection of that one of two companion drums which, because of the reduction of its diameter by wear of the cable, revolves the faster, thereby permitting such faster drum to idle until the cable has worn the companion relatively slower drum to a traction diameter equal to that of the faster drum, and means for communicating power thru said shafts.

4. A cable mechanism of the character described comprising a frame, a pair of shafts journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted over each barrel, the eyes of said drums being provided with cogs, pawls provided on each side of said barrels adapted to connect operatively the companion drums, respectively, with the barrel over which they are mounted, so that they will rotate relatively with said barrel, means adapted to prevent the normal action of the pawl element of that drum which rotates at relatively greater speed than its companion drum, and means for communicating power thru said shafts.

5. A cable mechanism of the character described comprising a frame, a pair of shafts journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted over each barrel, the eyes of said drums being provided with cogs, pawls provided on each side of said barrels adapted to connect operatively the companion drums, respectively, with the barrel over which they are mounted, so that they will rotate relatively with said barrel, means having frictional operative connection with the companion drums adapted to prevent the normal action of the pawl element of that drum which rotates at relatively greater speed than its companion drum, and means for communicating power thru said shafts.

6. A cable mechanism of the character described comprising a frame, a pair of shafts

journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted over each barrel, the eyes of said drums being provided with cogs, pawls provided on each side of said barrels adapted to connect operatively the companion drums, respectively, with the barrel over which they are mounted, so that they will rotate relatively with said barrel, a shoe slidable between the said cog surfaces of the drums and the barrels on which companion drums are mounted, said shoe being adapted to prevent the normal action of the pawl element of that drum which rotates at relatively greater speed than its companion drum, and means for communicating power thru said shafts.

7. A cable mechanism of the character described comprising a frame, a pair of shafts journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted over each barrel, the eyes of said drums being provided with cogs, pawls provided on each side of said barrels adapted to connect operatively the companion drums, respectively, with the barrel over which they are mounted, so that they will rotate relatively with said barrel, a shoe slidable between the said cog surfaces of the drums and the barrels on which companion drums are mounted, said shoe having frictional operative connection with the companion drums adapted to prevent the normal action of the pawl element of that drum which rotates at relatively greater speed than its companion drum, and means for communicating power thru said shafts.

8. A cable mechanism of the character described comprising a frame, a pair of shafts journalled in the frame, a barrel rigid on each shaft, two companion drums loosely mounted over each barrel, the eyes of said drums being provided with cogs, pawls provided on each side of said barrels adapted to connect operatively the companion drums, respectively, with the barrel over which they are mounted, so that they will rotate relatively with said barrel, adapted to prevent the normal action of the pawl element of that drum which rotates at relatively greater speed than its companion drum, a cable running said drums, and means for communicating power thru said shafts.

FREDRICK C. WALTERS.