O. HIVELY AND J. KLOOS.

HOISTING MECHANISM.

APPLICATION FILED JUNE 6, 1917.

1,315,124.

Patented Sept. 2, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

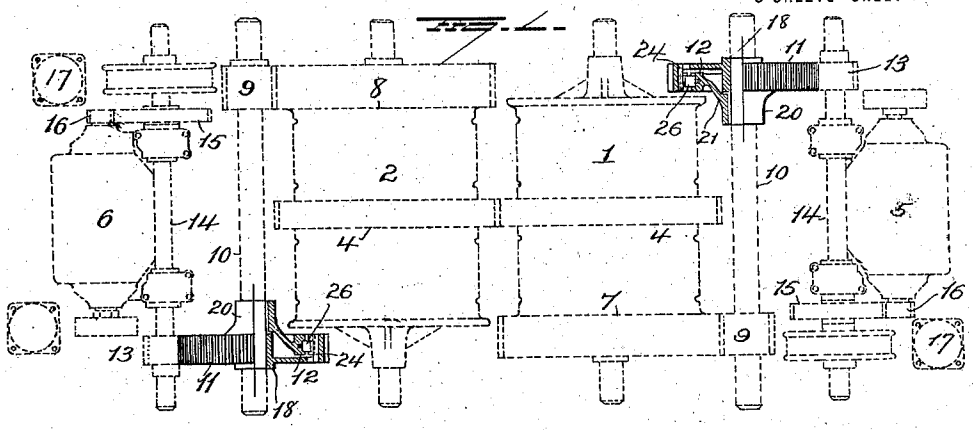
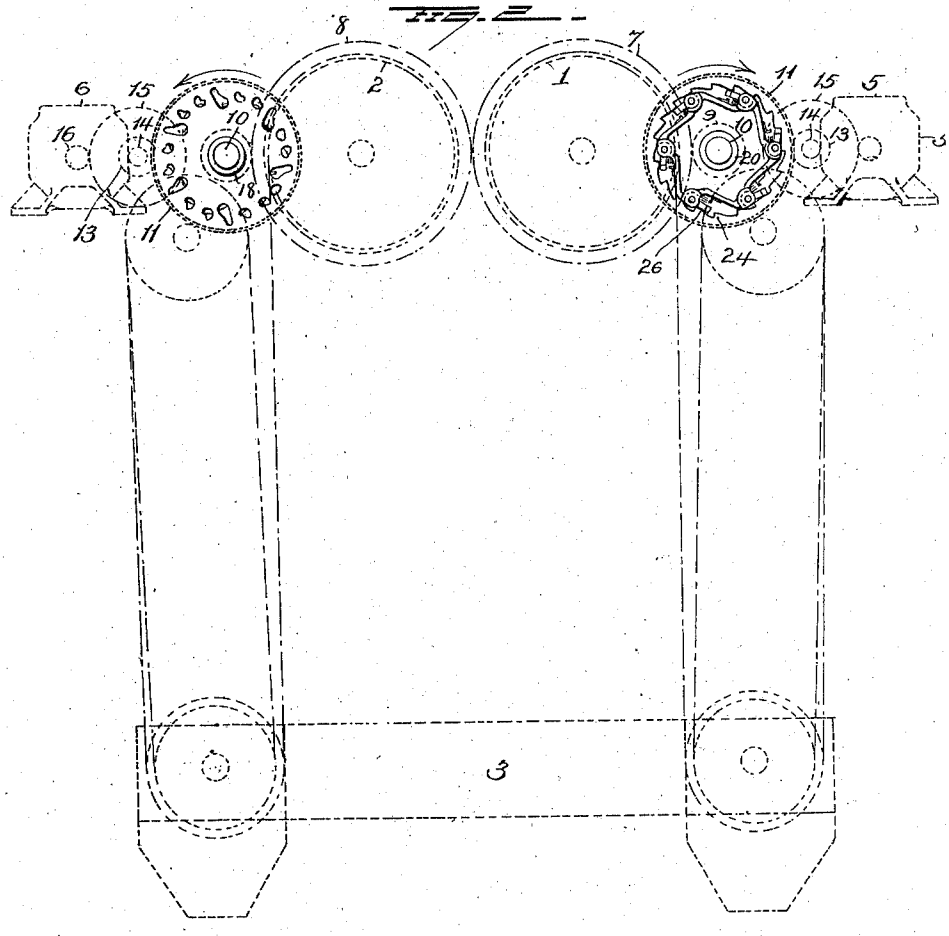


Fig. 2.



WITNESSES

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3 SHEETS—SHEET 2.

FIG. 3.

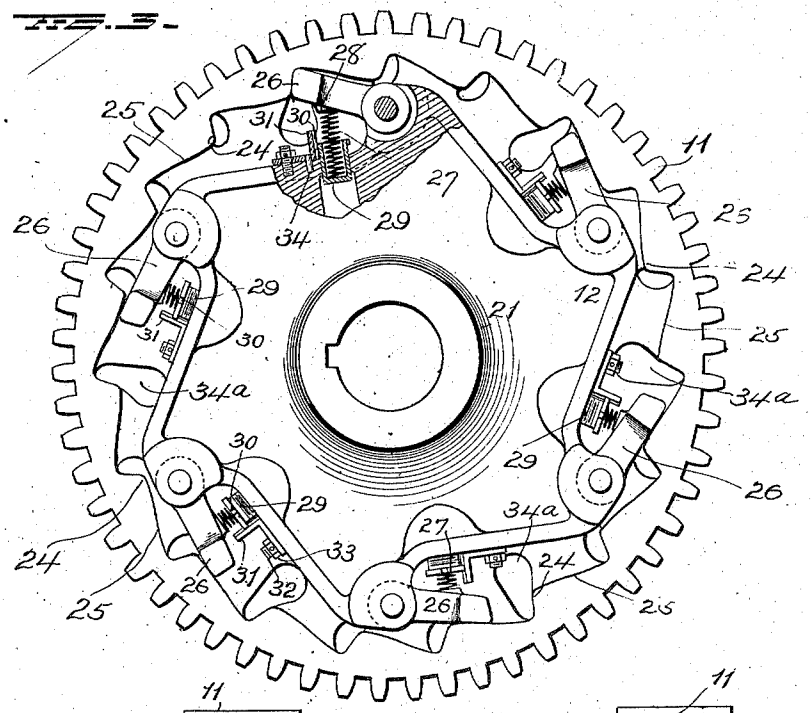


FIG. 4.

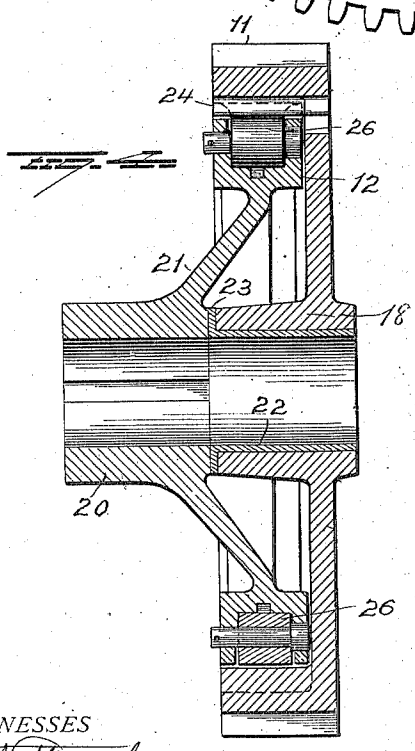
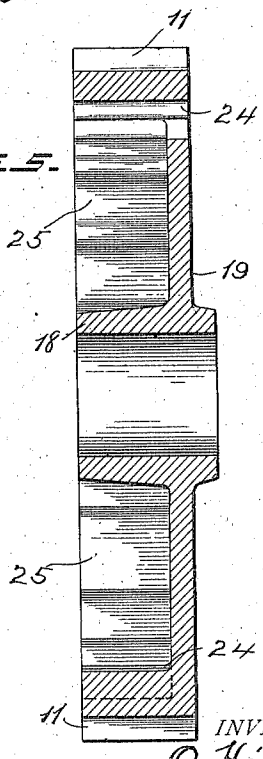


FIG. 5.



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3 SHEETS—SHEET 3.

FIG. 6.

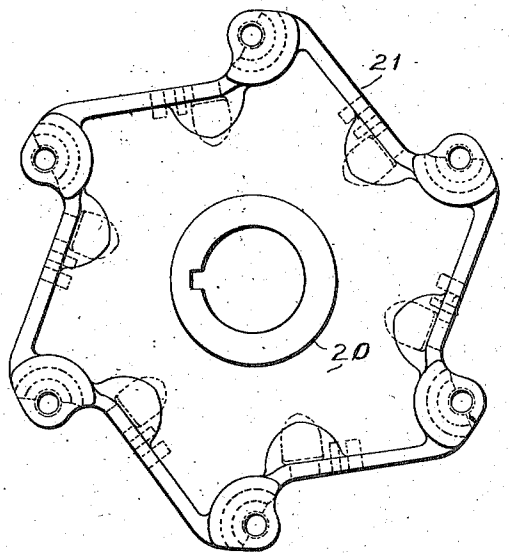
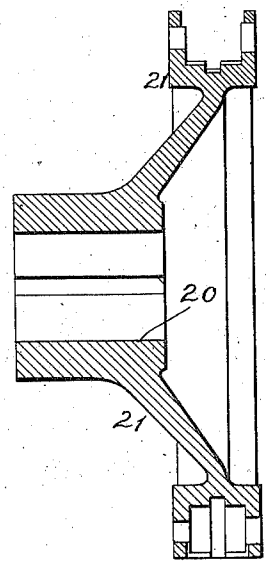


FIG. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

OSSIAN HIVELY AND JOHN KLOOS, OF ALLIANCE, OHIO, ASSIGNORS TO THE MORGAN ENGINEERING COMPANY, OF ALLIANCE, OHIO.

HOISTING MECHANISM.

1,315,124. Specification of Letters Patent. Patented Sept. 2, 1919.

Application filed June 6, 1917. Serial No. 173,184.

To all whom it may concern:

Be it known that we, OSSIAN HIVELY and JOHN KLOOS, citizens of the United States, and residents of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Hoisting Mechanism; and we 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.

This invention relates to improvements in raising and lowering mechanism, and more particularly to such as may be employed on the trolley of a ladle or other crane and wherein intergeared and separately driven drums are employed.

Prior to our invention, it has been proposed to operate each of two permanently intergeared drums by means of separate motors, but on account of the necessity of rotating the drums at the same speed, much difficulty and danger to the mechanism have been occasioned by reason of inability to insure the running of one motor at the same speed as the other, and the failure of the brakes and motors to operate simultaneously. In other words, it has been found difficult to effect such synchronism in the operation of the driving and controlling means for the two drums as will cause the accurate operation of the latter and without undue strain being brought upon the shaft bearings and the gearing. It is apparent that should the motors not operate synchronously, there will be a tendency of the gearing for one of the intergeared drums to crawl upon the other, with the result that undue strain will come upon the journals and tend to loosen or disrupt the mountings for said journals or break some portion of the gearing. Inability to insure the necessary synchronism in operation of the two motors and controlling means for the two intergeared drums may be due to any of various causes. For example, inefficient or defective operation of the electric controllers for the motors circuits, may result in preventing the proper simultaneous operation of the two motors and brake devices. Again, the brake devices may fail to operate simultaneously, or the brake shoes may become defective, and furthermore, the two motors may not operate synchronously by reason of differences in internal or external resistance and lost motion.

The object of our present invention is to overcome the difficulties above mentioned, and to provide means which will operate to compensate for any variance which may occur between the simultaneous operation of the separate driving and controlling means for intergeared hoisting drums, whereby undue strain on the journal bearings and gearing due to such variance, shall be obviated.

With this and other objects in view, the invention consists in certain novel features of construction and combination of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings; Figure 1 is a plan view of a crane trolley (the framework being omitted) showing an embodiment of our invention; Fig. 2 is a diagrammatical side elevation, partly in section, and Figs. 3, 4, 5, 6 and 7 are detail views.

1, 2 represent two drums on which suitable cables connected with the framework 3 of a ladle or other object, are wound in a manner which is well understood in the art. These drums are permanently geared together by means of rim gears 4, 4 which may be located centrally between the ends of said drums. Separate electric motors 5—6 are provided for driving the respective drums through the medium of interposed gearing, and magnetic brakes may also be employed, as is usual in mechanism of this class. In the present instance, the drums 1—2 are provided with gears 7, 8 respectively, the gear 7 being located at one end of the drum 1 and the gear 8 being located at the opposite end of the drum 2. The gears 7, 8 receive motion from pinions 9 on shafts 10 and the latter receive motion through the medium of gears 11 and interposed ratchet devices 12 from pinions 13 and driven shafts 14,—the latter being provided with gears 15 receiving motion from pinions 16 on the armature shafts of the electric motors. Suitable magnetic brakes 17 may be connected with the driven shafts 14 for controlling the operation of the mechanism.

The ratchet devices 12 interposed in the gearing between the motors and the drums, constitute an important feaure of our in-

vention, whereby the curing of the defects and obviating of the dangers incident to the operation of prior hoisting mechanisms of the type to which our invention relates, are successfully accomplished, and these devices will now be explained in detail.

Each gear 11 is made annular in form and is connected at one side with its hub 18 by a web 19,—said hub being loosely mounted on shaft 10 adjacent to the hub 20 of a spider 21. A bushing 22 is provided between the hub 18 and shaft and provided with a flange 23 disposed between the hubs 18 and 20. The gear 11 is provided in its inner face with an annular series of shoulders or ratchet teeth 24 and interposed beveled faces 25. The members 11 thus constitute combined gears and ratchet wheels, and with the shoulders or teeth of the same, pawls 26, pivotally mounted on the spider or carrier 21 are adapted to coöperate. In the present instance the wheel 11 is provided with an odd number of teeth, while an even number of pawls are provided, so that but one pawl will engage a tooth of the wheel at a time. In order that the slip of the wheel relatively to the pawl carrier or spider and the shaft to which the latter is secured, shall be slight between the disengagement of one pawl and the engagement of another pawl with a tooth of the wheel, we provide a number of ratchet teeth or shoulders 24 considerably in excess of the number of pawls employed. In the drawing, we have shown nineteen teeth in the wheel 11 and six pawls 26 on the carrier or spider 21, so that from the pawl which engages a tooth of the wheel, the other pawls shall be successively increasing distances from the teeth with which they are intended to coöperate as clearly shown in Fig. 3. Each pivoted pawl 26 is pressed outwardly toward the ratchet teeth or the inclined faces intervening between said teeth, by means of a spring 27. Each spring bears at its outer end against a shoulder 28 on one of the pawls and its inner portion is seated in an externally threaded cup 29 which enters a threaded socket in the carrier or spider. By adjusting the cup 29 in its socket, the tension of the spring may be properly adjusted. Each cup 29 is provided with a flanged outer end having notches 30, any one of which may receive a lock 31 removably secured to the spider or carrier by a bolt 32 having a nut 33 thereon, and a pin 34, and by these means the tension cup may be securely held at any desired adjustment.

The web of the wheel 11 may be provided with openings 34ª to facilitate assembling, adjustment and repair of the ratchet devices.

With the construction and arrangement of mechanism hereinbefore described, it will be apparent that should one of the motors tend to drive its drum faster than the other drum is being driven by the other motor, from any of the causes hereinbefore mentioned, or should the magnetic brakes fail to operate in synchronism, or should there be a tendency of one drum to rotate faster than the other from any other cause, a slip will occur in the ratchet mechanism in one or the other of the wheels 11 and such tendency of unequal operation of the means which drive and control the two drums will thus be compensated for by the said ratchet devices and any tendency of the gear of one drum to crawl upon or over the gear of the other drum and the consequent tendency to tear one of the drums from its mountings or to break the intermeshing gears, will be obviated.

Various changes might be made in the details of construction of our invention without departing from the spirit thereof or limiting its scope, and hence we do not wish to restrict ourselves to the precise details herein set forth.

Having fully described our invention what we claim as new and desire to secure by Letters-Patent, is:—

1. In hoist mechanism, the combination with intergeared drums, a motor for each drum, and gearing interposed between said motors and the respective drums, of compensating means in said gearing.

2. In hoist mechanism, the combination with intergeared drums, motors separately geared to the respective drums, and compensating means interposed between each motor and the drum which it operates.

3. In hoist mechanism, the combination with intergeared drums, a motor for each drum, a gearing between the respective motors and the respective drums, of compensating means constructed to permit slipping, interposed in the gearing between the respective motors and drums.

4. In hoist mechanism, the combination with intergeared drums, a separate motor for each drum, and gearing interposed between the respective motors and drums, of ratchet devices interposed in the gearing between the respective motors and drums.

5. In hoisting mechanism, the combination of intergeared drums, a separate motor for each drum, and sets of gearing between the respective motors and drums, each set of gearing including a loose gear and ratchet devices between said loose gear and its shaft.

6. In hoisting mechanism, the combination of intergeared drums, a separate motor for each drum, and sets of gearing interposed between the respective motors and drums, each set of gearing including a combined gear and ratchet wheel, a shaft on which said wheel is loosely mounted, a carrier secured to said shaft, and a plurality of pawls mounted on said carrier and differing in

number with the number of teeth of the ratchet wheel, whereby one tooth at a time will engage the ratchet wheel.

7. In hoisting mechanism, the combination of intergeared drums, a separate motor for each drum, and sets of gearing interposed between the respective motors and drums, each set of gearing including a combined gear and ratchet wheel, a shaft on which said wheel is loosely mounted, a carrier secured to said shaft, and a plurality of spring pressed pawls mounted on said carrier, the number of said pawls being considerably less than the number of teeth of the ratchet wheel and so arranged that a single pawl will engage the ratchet wheel at a time and the other pawls disposed successively greater distances from the ratchet teeth with which they may be brought into coöperation.

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

OSSIAN HIVELY.
JOHN KLOOS.

Witnesses:
CLARENCE L. TAYLOR,
HARRY W. KING.