

No. 894,717.

PATENTED JULY 28, 1908.

J. D. AUSTIN.

HOISTING APPARATUS.

APPLICATION FILED SEPT. 20, 1907.

3 SHEETS—SHEET 1.

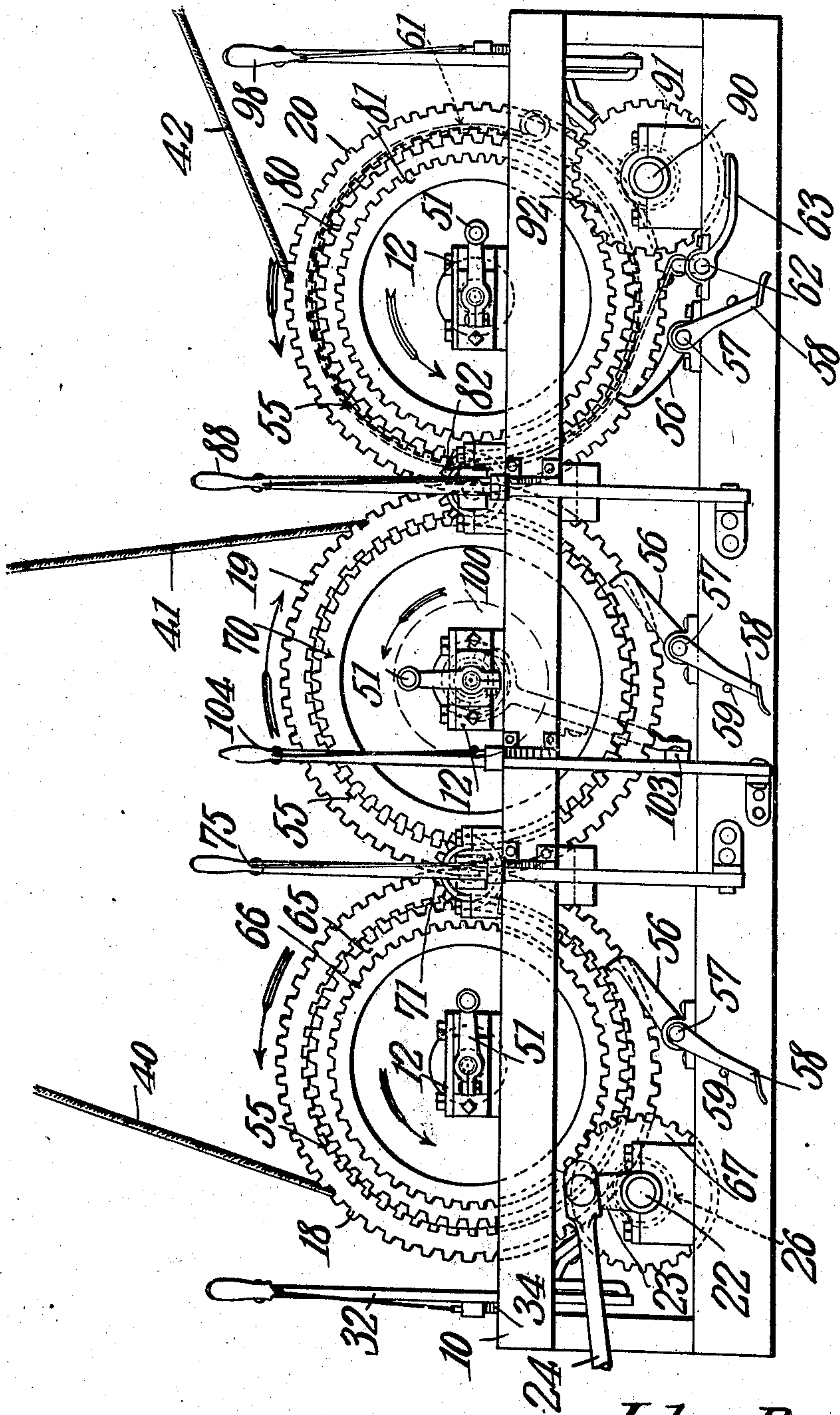


Fig. 1.

Witnesses

E. P. Hunt
John C. Carter

Inventor
John D. Austin.

By

Cashmore

Attorneys

No. 894,717.

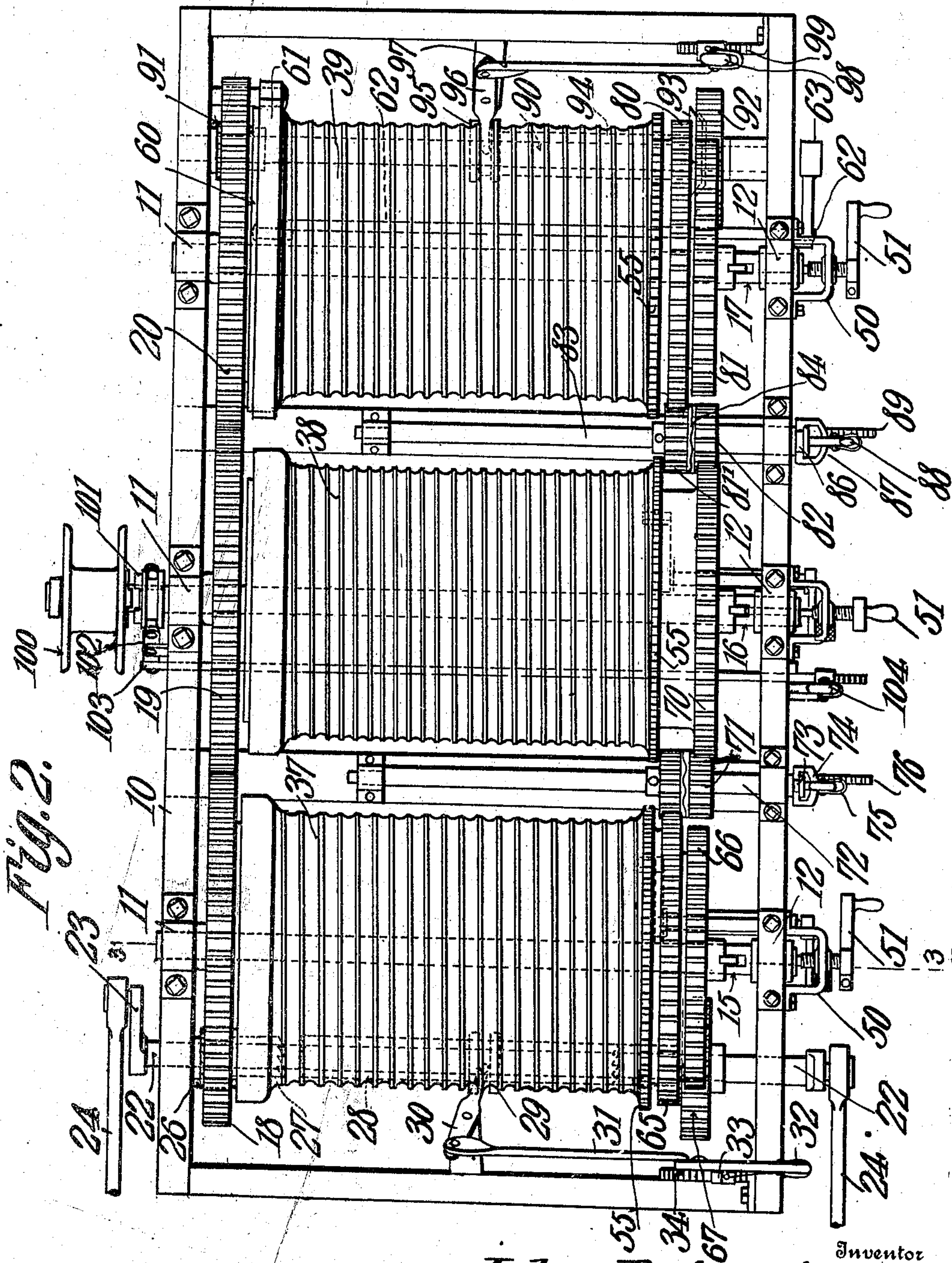
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3 SHEETS—SHEET 2



Witnesses

E. Stewart
Jno E Parker

John D. Austin.

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Chas. Snow Geo

Inventor

Attorneys

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3 SHEETS—SHEET 3.

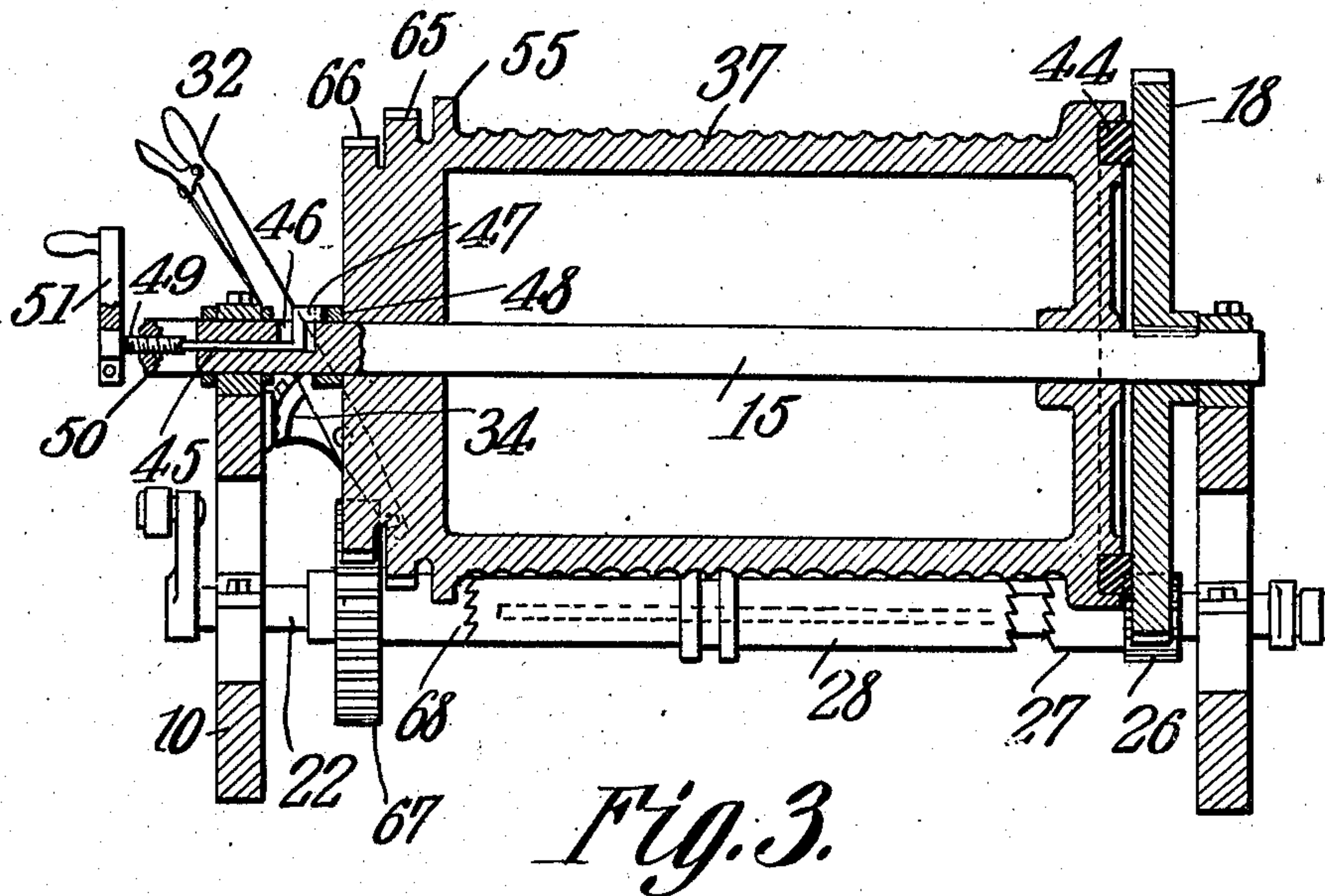


Fig. 3.

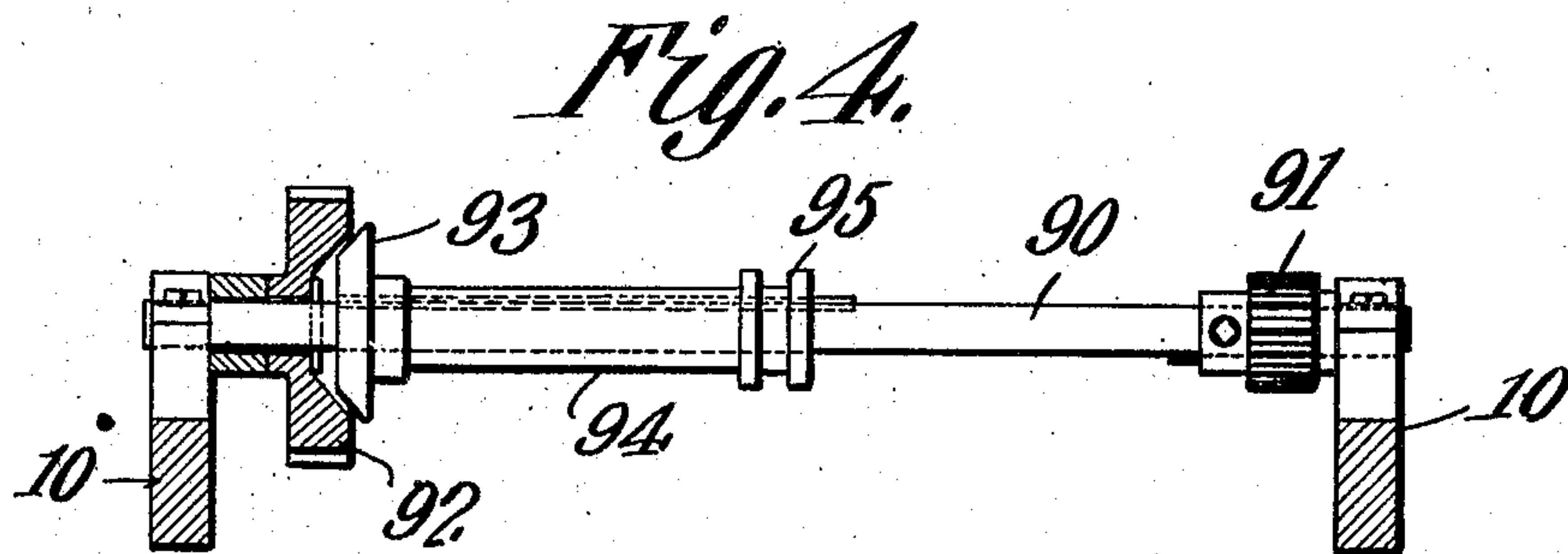


Fig. 4.

John D. Austin,
Inventor.

Witnesses

E. J. Stewart
Jno. E. Parker

By

C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JOHN D. AUSTIN, OF TAMPA, FLORIDA.

HOISTING APPARATUS.

No. 894,717.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed September 20, 1907. Serial No. 393,837.

To all whom it may concern:

Be it known that I, JOHN D. AUSTIN, a citizen of the United States, residing at Tampa, in the county of Hillsboro and State of Florida, have invented a new and useful Hoisting Apparatus, of which the following is a specification.

This invention relates to hoisting devices for use in connection with excavating and similar mechanism of that general type in which a hoisting cable is used for elevating a bucket or other carrier, and a pair of hauling cables are employed for moving the bucket between the loading and unloading points.

The principal object of the invention is to provide a mechanism in which separate winding drums are employed for the cables and in which provision is made for so mounting and connecting the various drums as to place them under ready control, so that the engineer may hold the hauling cable stationary while raising or lowering the hoisting cable, or may operate the drums in such manner as to wind on any drum while paying out on the others, or wind on two drums while paying out on the third.

A further object of the invention is to provide for the operation of the drums at different speeds, and to check the movement of one or more of the drums while allowing the remaining drum or drums to continue in operation.

A still further object of the invention is to provide for the employment of an auxiliary winch drum, which may be brought into play in the erecting of derricks, for the removal of obstructions, or other purposes.

With these and other objects in view, the invention comprises the various novel features of construction and arrangement of parts, to be hereinafter more fully described, and pointed out particularly in the appended claims.

In the accompanying drawings:—Figure 1 is a side elevation of a hoisting apparatus constructed in accordance with the invention. Fig. 2 is a plan view of the same. Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 2. Fig. 4 is a transverse sectional view through the lower counter-shaft for connecting the train of gears at one end of the drums to the set of gears at the opposite ends of the drums.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The working parts of the apparatus are supported in a suitable frame 10 that is provided with journal boxes 11, 12 arranged in pairs. In each pair of journal boxes is mounted a shaft, three of such shafts, 15, 16 and 17, being employed, and all of these being disposed in parallel relation and at equal distances apart.

Secured to the shafts are gears 18, 19 and 20, the gears being of uniform diameter and forming a continuously intermeshing train. At one end of the frame is journaled a shaft 22 provided at its opposite end with cranks 23 which are connected by rods 24 to any suitable source of power, a pair of steam engines being usually employed, and this shaft 22 is driven continuously. On the shaft is mounted a loose pinion 26 that is in constant mesh with the gear 18. The hub of the pinion has a clutch face which may be engaged by a clutch 27 formed at one end of a sleeve 28 that is feathered to the shaft. On the sleeve is secured a peripherally grooved collar 29 with which engages an operating lever 30 that is connected by a rod 31 to a manually operable lever 32 arranged at one side of the apparatus within convenient reach of the engineer. The lever 32 is provided with the usual latch bolt 33 arranged to engage a notched locking quadrant 34 for the purpose of holding the clutching sleeve in adjusted position.

Mounted loosely on the three shafts 15, 16 and 17 are winding drums 37, 38 and 39, respectively, and on these drums may be wound a hauling cable 40, a hauling cable 41, and a hoisting cable 42. That end of each drum adjacent the gears 18, 19 and 20 is provided with a friction ring 44 which, when the drum is moved endwise on the shaft, will be forced into frictional contact with the adjacent gear, so that the drum will receive motion from said gear.

At the engineer side of the apparatus, each of the shafts is provided with an axial bore for the reception of a thrust pin 45, the inner end of which extends out radially through a slot 46 in the shaft and thence is turned inward, forming an arm 47 that engages against a slidable collar 48 mounted loosely on the shaft and arranged to engage against the adjacent end of the drum. The thrust pin projects some distance beyond the end of the shaft and is entered in a socket formed in a thrust screw 49 that passes through a threaded opening formed in a yoke

50 that is rigidly secured to the frame. The outer end of the screw is secured to a handled crank 51 which may be turned by the engineer for the purpose of forcing the thrust pin inward and thus moving the drum longitudinally of the shaft until the friction ring at the end of the drum is pressed firmly against the gear wheel.

When the device is operating, the respective directions of rotation of the gears 18, 19 and 20 will be as shown by the arrows in Fig. 1, and any of the drums may be coupled to the gears for the purpose of winding up or paying out the cables. The directions of movement may be altered by reversing the engine, although this is not necessary, inasmuch as the reverse motion may be accomplished by other means, as will hereinafter appear. Provision is also made for changing the direction of rotation and for stopping one or more of the drums while permitting rotative movement of the others.

It is clear that both drums 37 and 38 may be released from their gears while the drum 39 is still locked to its gear, so that the hoisting operation may proceed while the hauling cables remain stationary, or the hoisting drum may remain idle while the hauling drums continue in operation.

For the purpose of positively locking any of the drums from rotating in either direction, each drum has an annular locking rack 55 with which engages a pawl 56, the pawl being carried by a small rock shaft 57 journaled in suitable bearings in the frame and provided at the engineer's side of the apparatus with a pedal lever 58. The pawl is so arranged as to normally assume an inoperative position by gravity, and its downward movement is stopped by the engagement of the pedal lever with a pin or lug 59 projecting from the side of the frame. Provision is also made for checking the speed of the hoisting drum 39 and for this purpose the flange 60 at the end of the drum is encircled by a band brake 61 one end of which is operatively connected to a rock shaft 62 that is provided with an operating pedal 63 at the engineer's side of the apparatus.

To that end of the drum 37 opposite the gear 18 are secured two gear wheels 65 and 66, which, in the present instance, are shown as integral with the drum. The gear 66 is in constant mesh with a pinion 67 that is mounted loosely on the shaft 22, and the hub of this pinion is provided with a clutch face that is arranged to be engaged by clutching teeth 68 arranged at the end of the sleeve 28, it being observed that said sleeve may be moved in the direction of its length for the purpose of clutching either of the pinions 26 or 67 to the shaft. The pinion 26 is of much smaller diameter than the pinion 67, and the two gears 18 and 66 are of proportionate diameter so that the drum 37

may be driven at slow speed when the pinion 26 is operated, or at high speed when the pinion 67 is operated.

The drum 38 is provided with a gear 70 of a diameter equal to that of the gear 65, and these two gears may be connected with each other by a pair of pinions 71 that are carried by a longitudinally movable shaft 72 mounted in suitable bearings in the frame, one of the pinions being secured to the shaft and the other being loose thereon, while the adjacent faces of the pinions have friction clutching faces. That end of the shaft 72 which projects beyond the engineer's side of the apparatus is provided with an annular groove 73 for the reception of a fork 74 that is carried by a lever 75 fulcrumed to the frame and carrying an ordinary latch bolt which may be engaged with a notched locking quadrant 76 for the purpose of holding the lever in any position to which it may be adjusted. By operating the lever, the shaft 72 may be moved in the direction of the plate for the purpose of engaging the two gears 65 and 70, and when the gears are thus in mesh, the two drums 37 and 38 will be rotated at the same speed and in the same direction, whereas if connected to the gears 18 and 19, they will move in opposite directions and at a much lower rate of speed.

To that end of the drum 39 opposite the gear 20 are secured two gears 80 and 81, and the gear 80 may be connected to the gear 70 by means of a pair of pinions 81' and 82 carried by a shaft 83 that is journaled in bearings between the two drums 38 and 39. The gear 81' is rigidly secured to the shaft while the pinion 82 is loose on the shaft. These two pinions are provided with friction disks 84 that preferably are provided with radial ribs in order to increase the extent of frictional contact with each other. The outer end of the shaft 83 is provided with a peripheral groove 86 that is engaged by a fork 87 carried by an operating lever 88, the latter having a latch bolt arranged to engage with a notched locking quadrant 89. When the shaft is pulled outward, the two pinions are moved into frictional engagement with each other and the gears 70 and 80 are thus connected.

Mounted in suitable bearings in the frame at a point below the drum 39 is a shaft 90 to one end of which is rigidly secured a pinion 91 that is in constant mesh with the gear 20. At the opposite end of the shaft 90 is a loose pinion 92 that is in constant mesh with the gear 81. The inner face of the pinion 92 has a conical frictional face with which engages a correspondingly shaped disk 93 that is arranged at the end of a sleeve 94 that is feathered on the shaft 90. The sleeve carries a peripherally grooved collar 95 that is engaged by a forked lever 96, the latter being connected by a rod 97 to a manually oper-

ated lever 98 having an ordinary latch bolt that is arranged to engage a notched locking quadrant 99. By moving the sleeve 94 the pinion 92 may be clutched to the shaft, and movement may thus be imparted to the train of gears 18, 19 and 20 and pinion 91, to the pinion 92, gear 81 and the drum 39, so that the drum 39 may be turned at a higher rate of speed than when it is connected to and driven direct from the gear 20, and, if necessary, this movement may be transmitted through the gearing 80, 81', 82 and 70 to the drum 38, and transmitted further through the gearing 70, 71 and 65 to the drum 37, so that it is possible to individually drive any drum in either direction and at different speeds, and any one drum may be stopped while the others are operated, or any two drums may be stopped while the third continues in operation, so that the apparatus is under thorough control and the bucket or other conveyer may be manipulated for the carrying of loads at any speed.

On one end of the shaft 16 is mounted a loose winch drum 100. The hub of the drum is provided with clutch teeth which may be engaged by a clutching sleeve 101 that is feathered to the shaft. The clutch sleeve is under the control of a clutch lever 102 that is connected by a rod 103 to a manually operated lever 104 on the engineer's side of the apparatus.

The winch drum is advantageous in that it may be employed in the erection of derricks, for the removal of obstructions, or other purposes, when required, and, if necessary, each of the main shafts may be provided with one of these winch drums.

I claim:—

1. A machine of the character described comprising a series of winding drums, a train of gears arranged at one end of said drums by which said drums may be driven at a given speed, a set of gears arranged at the opposite ends of said drums for imparting thereto a different rate of speed, intermediate pinions forming a part of said set of gears and adjustable to connect the latter in a continuous train, an operating shaft, loose driving pinions carried by said shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said operating shaft.

2. A machine of the character described embracing a series of winding drums, a train of intermeshing gears arranged at one end of said drums, means for individually coupling said drums to said gear, said train of gears being adapted to rotate said drum at a given rate of speed, a set of gears of different rate of speed transmitting capacity arranged at the opposite ends of said drums, means for coupling the latter set of gears to said drum, intermediate independently adjustable pin-

ions arranged between the adjacent gears of the latter set, an operating shaft, loose driving pinions carried by said shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said driving shaft.

3. A machine of the class described comprising a series of winding drums, a train of intermeshing gears, means for individually coupling said drums to said gears for driving at a given rate of speed, a set of gears of different rate of speed transmitting capacity arranged at the opposite ends of said drum, intermediate individually adjustable pinions arranged between the adjacent gears of the set, and serving to couple two or more of the gears in a train, an operating shaft, loose driving pinions carried by said shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said driving shaft.

4. In combination, a series of winding drums, a train of intermeshing gears arranged at one end of the drums and to which said drums may be individually coupled, the second gears disposed at the opposite ends of the drums, individually adjustable pinions intermediate the gears of the set and serving to couple two or more of the drums in a train, an operating shaft, loose driving pinions carried by the shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said driving shaft.

5. In combination, a series of winding drums, a train of gears arranged at one end of the drum, means for individually coupling the drums to their respective gears, a set of disconnected gears arranged on the opposite ends of the drums, intermediate pinions for connecting adjacent gears of the set, an operating shaft, loose driving pinions carried by said shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said operating shaft.

6. In combination, a frame, a plurality of shafts journaled therein, a train of gears secured to said shafts, drums mounted loosely on the shafts and arranged to be connected to and disconnected from said gears, a power shaft, means for transmitting movement from the power shaft to the train of gears, disconnected gears permanently secured to the drums, means for transmitting movement from the power shaft to one of the drum gears, and independently adjustable means for connecting the gears of adjacent drums and means comprising an operating shaft, loose driving pinions carried by said shaft and connected one to the train of gears and the other to the set of gears, and means for coupling either of said pinions to said driving shaft.

7. In combination, a frame, a plurality of shafts journaled therein, a train of gears secured to said shafts, a power shaft, means for transmitting movement from the power shaft to the train of gears, a plurality of drums mounted loosely on the shafts, independent means for coupling the drums to the gears, a toothed wheel on each drum, a pawl arranged to engage therewith and lock the drum from rotative movement, a band brake for one of the drums, disconnected gears carried one by each of the drums, intermediate pinions adjustable to couple the gears of adjacent drums, auxiliary gears carried

by the end drums, means for coupling one of said auxiliary gears to the power shaft, a counter-shaft, means for connecting the train of gears through said counter shaft to the second auxiliary gear, a loose winch drum carried by one of the shafts, and means for coupling said winch drum to the shaft. 15 20

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN D. AUSTIN.

Witnesses:

JAS. M. WALKER,
JNO. E. PARKER.