(No Model.)

2 Sheets—Sheet 1.

C. C. PALMER.

MECHANISM FOR TRANSFERRING POWER FROM THE AXLES OF RAILWAY CARS TO REFRIGERATOR CARS.

No. 330,045. Patented Nov. 10, 1885.

Fig. 2

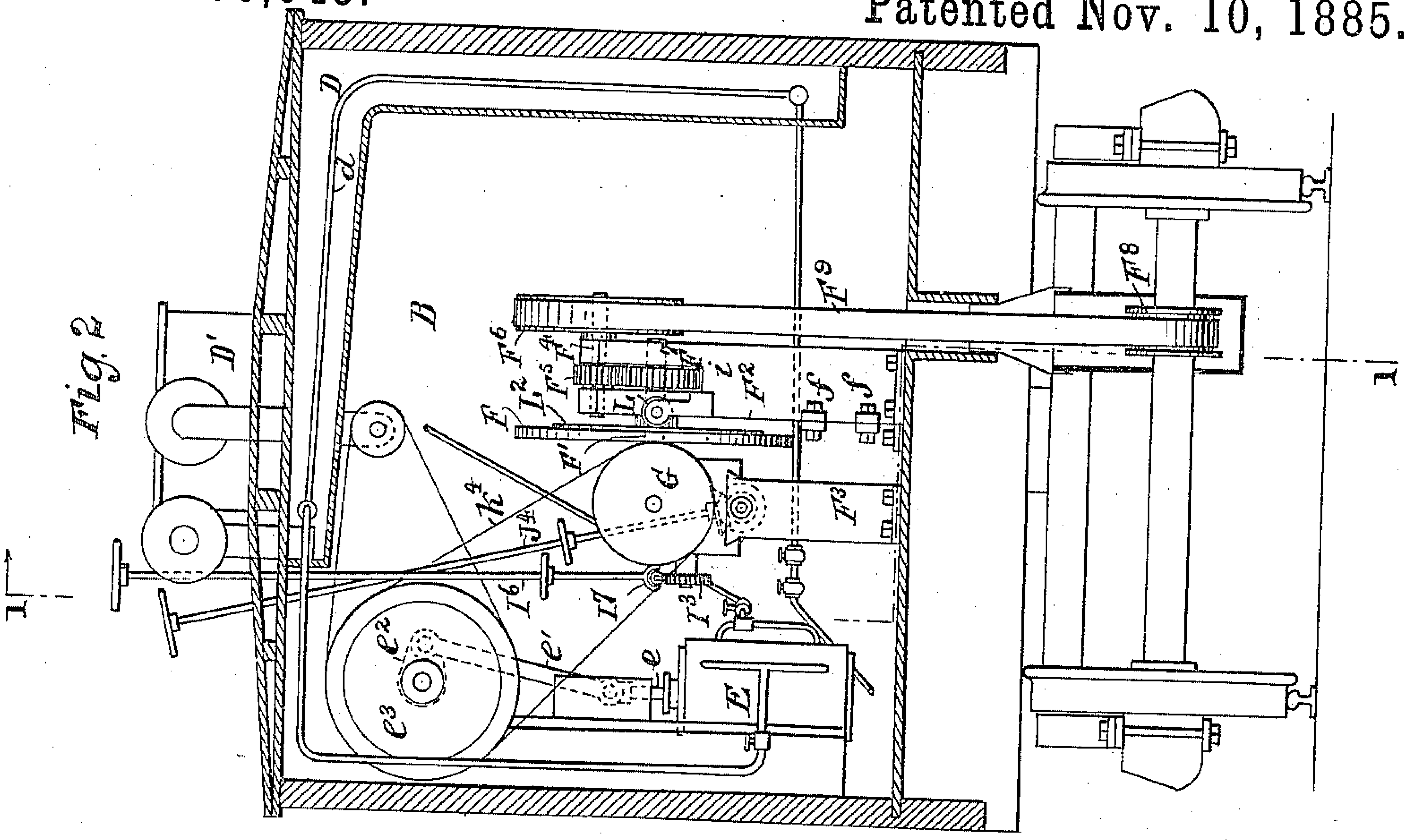
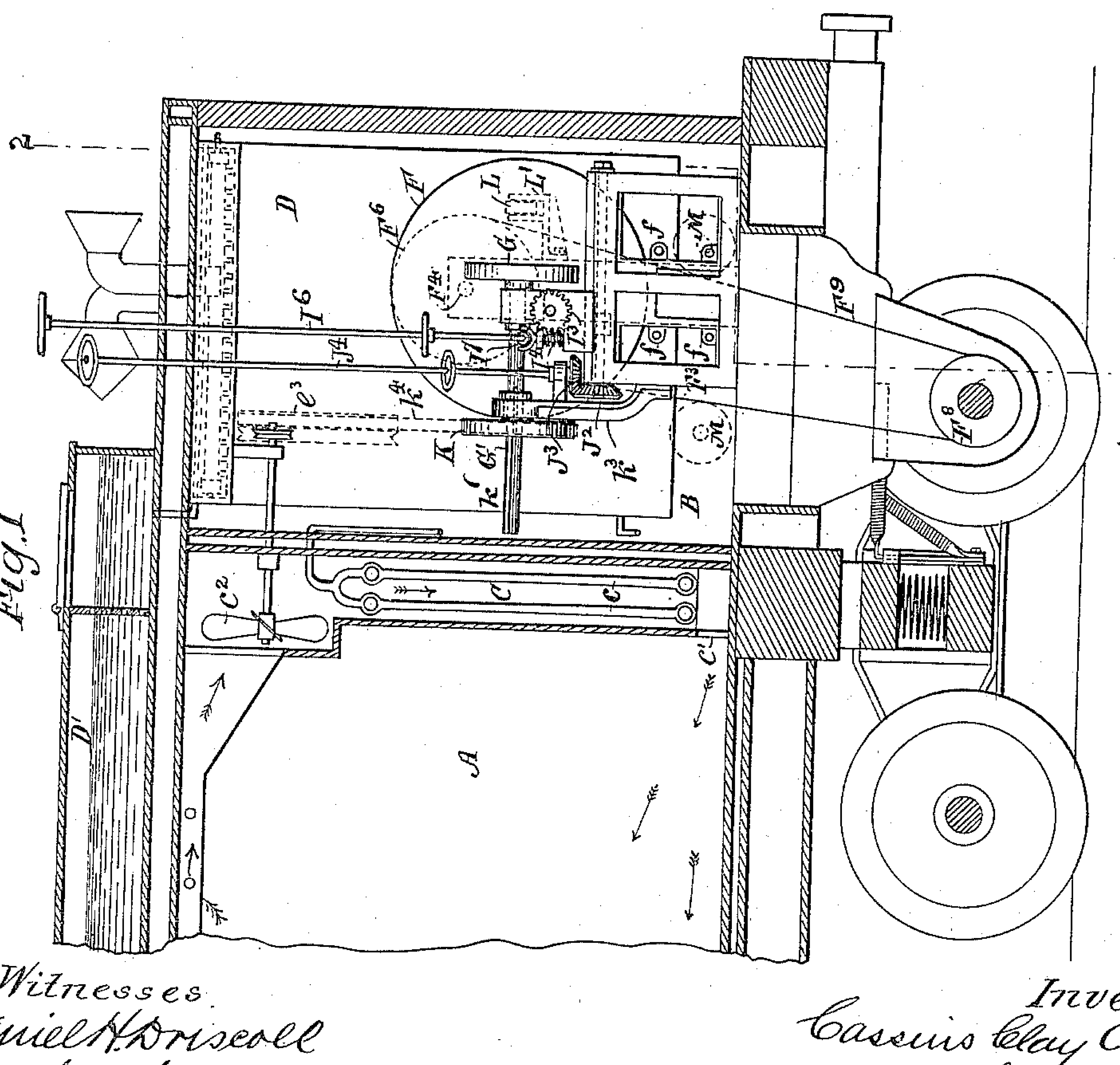


Fig. 1



Witnesses.
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Fig. 4.

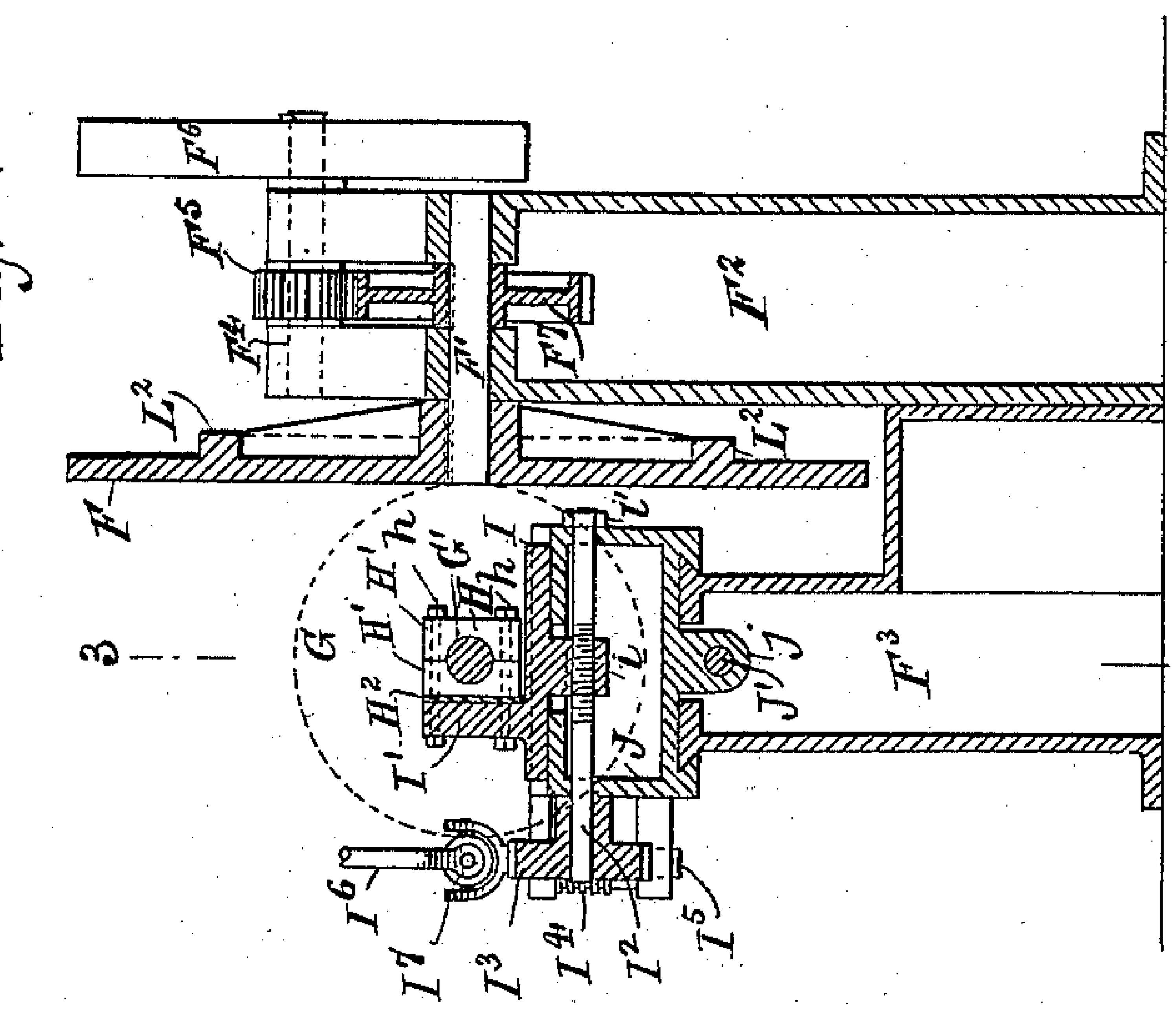
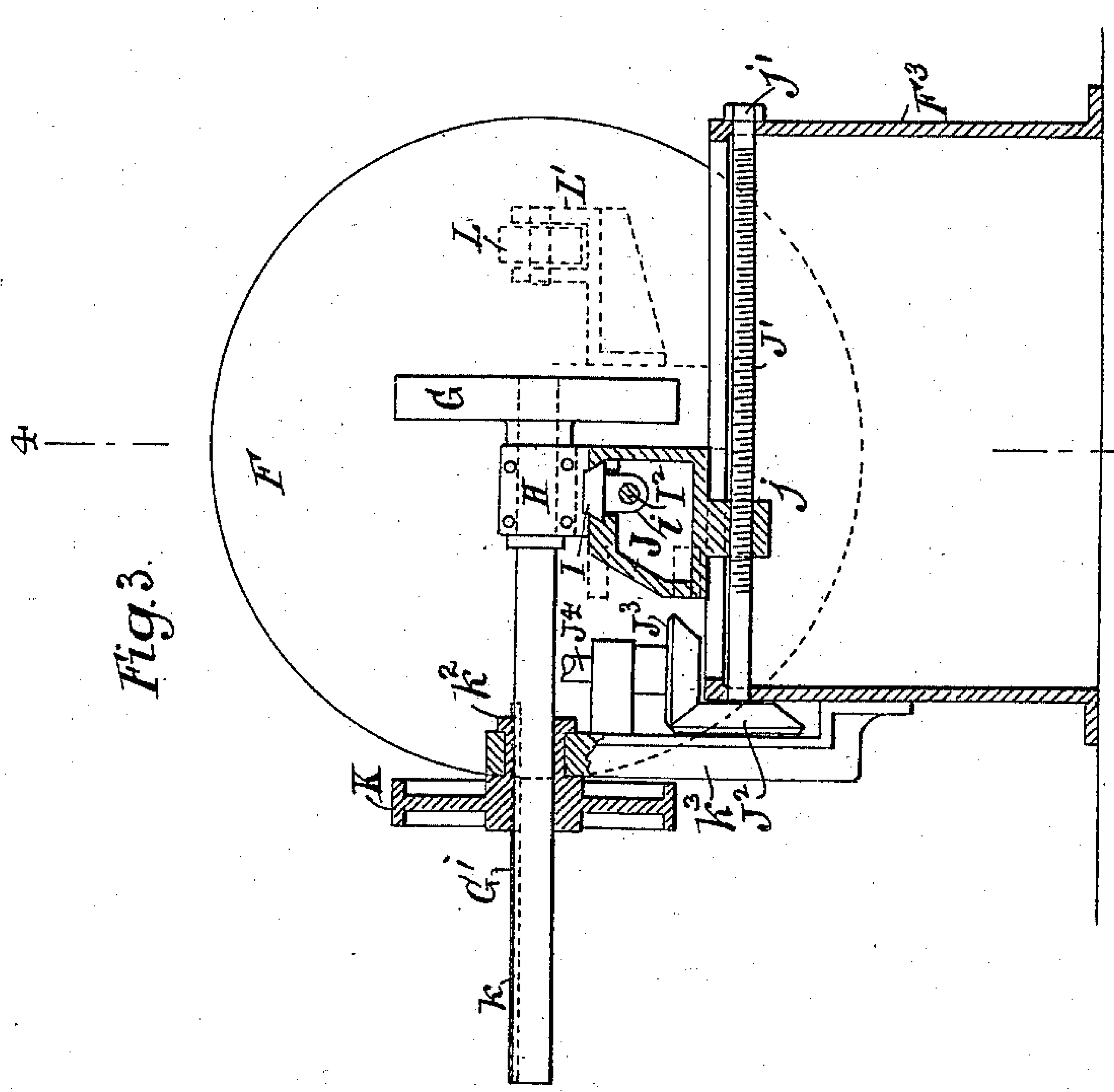


Fig. 3.



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UNITED STATES PATENT OFFICE.

CASSIUS CLAY PALMER, OF NEW YORK, N. Y.

MECHANISM FOR TRANSFERRING POWER FROM THE AXLES OF RAILWAY-CARS TO REFRIGERATOR-CARS.

SPECIFICATION forming part of Letters Patent No. 330,045, dated November 10, 1885.

Application filed July 6, 1885. Serial No. 170,835. (No model.)

To all whom it may concern:

Be it known that I, CASSIUS CLAY PALMER, of the city, county, and State of New York, have invented a new and useful improvement in mechanism for transferring and utilizing power derived from the axle of a railroad-car, and which improvement is designed to be applied more especially to a refrigerator-car, of which the following is a specification.

In Letters Patent of the United States granted to me on the 18th day of December, 1883, and numbered 290,600, is described a refrigerator-car composed of two sets of mechanisms—first, a set of mechanism for transferring power from the axle of the car and storing it, and for providing for a regular application of the same, and, second, mechanism for compressing the volatile fluid used as a refrigerant, cooling and expanding it, and conducting the air to be cooled into such proximity to it that the heat of the air will be absorbed.

My present invention relates to the set of mechanism first mentioned, and has for its object an economy of power and an economy in cost of first construction. I make no change in the other set of mechanism or apparatus, save in so far as a proper application of my present improvement to it will render necessary.

In the drawings, Figure 1 represents a longitudinal section of the car, taken through the line 1 1, Fig. 2, and extended far enough to show a portion of the interior of the refrigerating-chamber. Fig. 2 is a transverse section taken through the line 2 2, Fig. 1. Figs. 3 and 4 are views showing, on an enlarged scale, my present improvement, Fig. 3 being a section through the plane of the line 3 3, Fig. 4, and Fig. 4 a section through line 4 4, Fig. 3.

I will first describe, generally, the parts of the mechanisms here shown which are also shown in my patent above mentioned, referring to it for a more particular description, in order that the relation and application of my present improvement with reference to such parts will be more clearly understood, and I will then describe more particularly the mechanism embodying my present improvement.

A is the provision-chamber.

B is a compartment of the car, preferably at one end thereof, in which the operating mechanism is placed.

C is the refrigerating-chamber, extending transversely across the car, in which the air drawn from the chill-room at the top is caused to pass in contact with a series of tubes or pipes, *c*, containing the refrigerant, extending transversely across the car and out at the bottom into the chill-room of the car at *c'*. The circulation of the air to be cooled may be assisted by the fan-blower c^2, if desired.

D is the condenser, and is an L-shaped compartment, (made so for economy of space,) as shown, in which are placed the pipes or tubes *d*, containing the refrigerant in a liquid condition, and where it it is cooled by water from a water-tank, D', at the top of the car, coming in contact with the tubes.

E is a gas-compression cylinder. The piston *e* of this cylinder is driven by the pitman *e'* and crank e^2 of the pulley e^3. Suppose the compression-cylinder to be in operation from any source of power whatever. Then the operation of the apparatus will be as follows: The volatile fluid upon being compressed in the gas-compression cylinder will flow into the tubes of the condenser D, where it will be cooled, and thence along to the refrigerating-chamber C, where it will be expanded in a partial vacuum, and where the air circulating through chamber C will be cooled, and thence the gas passes back again into the compression-cylinders to again undergo the same treatment.

In mechanism located on a railroad-car and driven by power derived from the car-axle it is desirable that the power shall be governed in such a manner that the irregularities of speed to which the axle is liable by reason of the variations of speed at which the car is run may be neutralized at the point of application of the power and the power be delivered with uniformity and regularity.

On lines of railroad where variations of speed are of frequent and uncertain occurrence it is desirable that means for automatically regulating the power at the point of application should be employed, and such means I have described in my Letters Patent above referred to; but on a line of railroad where certain distances are traveled at a uniform and predetermined or known speed means for regulating the power at the point of application by hand may be economically employed, and such means I will now describe.

F is a friction-disk of metal or other suitable material and about forty-eight inches in diameter. The shaft F′, upon which this disk is mounted, has its bearings in a frame preferably cast in two parts, F^2 and F^3, and bolted together at *f*. The portion F^2 of this frame in which the disk F has its bearings extends some distance higher than the portion F^3 and affords a bearing for the shaft F^4, upon which is mounted the gear-wheel F^5 and the driving-pulley F^6.

Upon the shaft F′ of the friction-disk F is mounted a gear-wheel, F^7, in such a position as to be driven by the gear-wheel F^5. In the drawings I have shown the gear-wheel F^5 with one-third the number of teeth with which gear-wheel F^7 is provided, so that the speed of the disk F is reduced to one-third. The number of teeth upon these gears may of course be varied according to the rate of speed required. The pulley F^6 is driven by power derived from the pulley F^8, on the axle of the car, through the medium of the belt F^9.

G is a friction-disk of leather, metal, or other suitable material and about twelve inches in diameter. The disk G bears against the face of the disk F, from which, by frictional contact, it receives its motion. The disk G is mounted on a shaft, G′, having its bearings in a bearing-box, H, bolted to an upward extension, I′, of the sliding carriage I. This bearing-box is composed of the split bushing H′ H′ and the elastic piece H^2. The bolts *h* secure the bushings and elastic piece to the piece I′. The form of this bearing, it will be seen, is well adapted to permit of a slightly yielding contact between the friction-disks F and G, which is very desirable.

I is the sliding carriage, which affords the bearing for the disk G. I is V-shaped on its under surface, which is of a sufficient length to insure a broad bearing-surface. The V-shaped projection of carriage I dovetails into a corresponding recess on the top of a carriage, J, hereinafter to be described. The top of carriage J forms the sliding bed for carriage I. A lug, *i*, extends from the under surface of the carriage I at its center. This lug *i* is threaded to receive a screw-shaft, I^2, which is prevented from longitudinal movement by the tightening-nut *i′* and hub of worm-wheel I^3, bearing one upon each side of the portion of the carriage J through which the screw-shaft passes. On the end of the screw-shaft I^2 farthest from the disk F is mounted a worm-wheel, I^3, which gears with a worm, I^4, on the shaft I^5. The shaft I^5 at its bottom has a step-bearing in a lateral extension of the carriage J, and at its upper portion has a bearing also in a lateral extension of the carriage J. Any rotation of the worm-shaft I^5 will rotate the worm-wheel I^3 and screw-shaft I^2 and cause the carriage I and disk G to advance or recede from the face of disk F, according to the direction in which worm-shaft I^5 is turned. The object of the sliding carriage I being principally to carry the disk G to and from the disk F, so as to start and stop the machine, the extent of travel which it may possess need not exceed a quarter of an inch; but as the carriage I is also subject to a motion across the face of the disk, and which may at times amount to twelve inches, it is necessary to provide a connection between the hand-wheel shaft I^6, through which the worm-shaft is operated, of such a nature that some one of them may adjust itself to any position which the other may be forced to take. As it would be inconvenient to make the worm-shaft adjustable, I make it stationary and provide a universal joint, as shown at I^7, Figs. 1, 2, and 4, between the hand-wheel shaft and the worm-shaft, of such a form that the hand-wheel shaft may take a position at any angle to the worm-shaft, but that when rotated it will rotate the worm-shaft and cause carriage I to advance or recede, according to the direction in which it is turned.

The carriage J, already mentioned, is for the purpose of carrying the disk G across the face of the disk F, and its plane of movement is at right angles to the plane of movement of carriage I, sliding upon it. The carriage J has a sliding connection with the bed-plate upon which it is mounted, formed by the V-shaped top of the frame F^3 dovetailing with the V-shaped recess of the bottom of the carriage J. On the bottom of the carriage J, at its center, is a lug, *j*, screw-threaded to receive the screw-shaft J. The screw-shaft J is prevented from longitudinal movement by the tightening-nut *j′*, placed on the outside of the portion of the frame F^3 in which J′ has one of its bearings, and the hub of the bevel-wheel J^2, bearing against the outside of the frame F^3 at the other end, as shown. On one end of the screw-shaft J′ is mounted a bevel-pinion, J^2. This bevel-pinion engages with a bevel-pinion, J^3, at the bottom of the hand-wheel shaft J^4, the rotation of which causes the rotation of the screw-shaft J′, and hence the travel of the carriage J and disk G across the face of the disk F.

K is a pulley mounted on the shaft G′ in such manner as to rotate with it, but not to be affected by the longitudinal movement which it possesses by reason of its connection with carriage I. This is accomplished by the spline *k* on the shaft G′ fitting into a groove on the interior of the hub of the pulley K. As a further precaution against the pulley K being affected by the sliding movement of shaft G′, I form the hub of the pulley with a sleeve, k^2, surrounding shaft G′. This sleeve is flanged at its outer end, as shown, and the space between the hub of the pulley and this flange is made the bearing-surface between the pulley and its supporting-frame k^3. The pulley K is connected by belt k^4 with pulley e^3 of the compression-cylinder.

L is a small friction-disk for the purpose of counteracting the pressure of the friction-disk

G on the disk F when the disk G is bearing on disk F near the outer surface of the latter. The disk L has its bearings in a frame, L′, projecting from the frame F^3, as shown, and bears against the annular flange L^2, cast upon one face of the disk F.

M are the rollers of a belt-tightening device, similar to that described in my patent already referred to. The means for preventing dust, &c., from entering the car at the place where the belt F^9 passes through from the car-axle are also similar to the means described in my patent already referred to.

I prefer to place upon each of the hand-wheel shafts two hand-wheels, one upon the portion of it within the car at such a height as to be within easy reach of the attendant, and the other on the portion of the shaft projecting beyond the roof the car, so that the machinery may be regulated from the top of the car.

In operating the mechanism which I have shown, whether in connection with the apparatus of a refrigerator-car or other machinery located on a railroad car, the attendant, by turning the hand-wheel on the hand-wheel shaft J^4 in one direction causes the carriage J and disk G to travel across the face of the disk F the distance which he deems necessary to secure the proper speed, and which distance he determines from a knowledge of the rate of speed at which the car is to travel, the machinery of the refrigerating apparatus requiring to be run practically at a uniform rate of speed. The attendant then turns the hand-wheel shaft I^6, which causes the carriage I and disk G to advance until the latter comes in contact with the disk F. Suppose the car now to start. The rotation of the axle will be communicated through pulley F^8, belt F^9, pulley F^6, and gears F^5 and F^7 to the disk F, the belt-tightener M insuring a constant tension of the belt F^9. The disk F communicates its motion to the disk G by frictional contact. The disk G communicates its motion to the shaft G, upon which it is mounted, and upon which the pulley K or other suitable pulleys are also mounted. From this pulley K the machinery or apparatus to be operated may be driven. As here shown, the refrigerating apparatus is driven from pulley K by belt k^4, running over pulley e^3 of the compression-pump. Suppose now that the car approaches a stretch of road where the speed is usually increased. Then the attendant turns the hand-wheel-shaft I^6, which causes the carriage I and disk G to recede from disk F. If the speed of the car is increased twice as much, then it will be necessary to move the carriage J and disk G across the face of the disk F toward its center a distance sufficient to reduce the amount of surface against which it bears about one-half. This is done by turning the hand-wheel shaft J^4 in the proper direction. If the speed of the car is decreased, the disk G would be caused, by turning the hand-wheel shaft J^4, to travel across the face of the disk F away from it center a sufficient distance to compensate for the decrease of speed of the axle of the car. The farther the disk G is advanced across the face of the disk F away from its center of course the greater will be the increase of speed communicated to G and through it to the operating mechanism. When G has been located with reference to F at a proper distance from its center, the attendant turns the hand-wheel shaft I^6 in an opposite direction from that in which he first turned it, causing G to come in contact with F, when the speed of G will be increased or decreased the desired amount.

I have described what I consider to be the best means of carrying out my improvement, but do not mean to limit myself to the precise details of construction shown.

It will be obvious to any mechanic that devices other than those specified herein may be employed to accomplish the movements of the disk G necessary for starting and stopping the machinery to be operated, and for causing it to travel across the face of the disk F to regulate its speed of rotation, and such means I deem to be within the scope of my present invention.

The motion of the pulley F^6 may be communicated to disk F by belting and suitable pulleys, and this I consider to be an equivalent of the gears shown.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a railroad-car, the combination of a pulley located on the car-axle, a pulley located on the car and receiving motion from the pulley located on the car-axle, a friction-disk receiving motion from said pulleys, a second friction-disk bearing against said first-mentioned friction-disk and operated by it, and means whereby the motion of said second friction-disk is transferred to the point of application, substantially as described.

2. In a railroad-car, the combination of a pulley located on the car-axle and a pulley located on the car and receiving motion from the pulley on the car-axle, a friction-disk receiving motion from said pulleys through multiplying gear-wheels, a second friction-disk bearing against said first-mentioned friction-disk and receiving motion from it, and means whereby the motion of said second friction-disk is transferred to the point of application, substantially as described.

3. In a railroad-car, the combination of a pulley located on the car-axle, a pulley located on the car and receiving motion from the pulley on the car-axle, a friction-disk receiving motion from said pulleys, a second friction-disk receiving motion from said first-mentioned friction-disk, and means whereby it will be caused to travel across the face of first-mentioned friction-disk and its speed increased or decreased, and means whereby the power from said second friction-disk is transferred to the point of application, substantially as described.

4. In a railroad-car, the combination of a pulley located on the car-axle, a pulley located on the car and receiving motion from said pulley on the car-axle, a friction-disk receiving motion from said pulleys, a second friction-disk receiving motion from said first-mentioned friction-disk, and means whereby said second friction-disk may be moved to or from the face of the first mentioned friction-disk for the purpose of starting or stopping the machine, and means whereby said starting and stopping motion may be communicated at the point of application, substantially as described.

5. In a railroad-car, the combination of a pulley located on the car-axle, a pulley located on the car and receiving motion from the pulley on the car-axle, a friction-disk receiving motion from said pulleys, a second friction-disk receiving motion from said first-mentioned friction-disk, a third friction-disk so located with reference to said first-mentioned friction-disk as to counteract the thrust of the second friction-disk upon it, substantially as described.

6. In a railroad-car, the combination of a pulley located on the car-axle, a pulley located on the car and receiving motion from said pulley on the car-axle, a friction-disk receiving motion from said pulley, a second friction-disk receiving motion from said first-mentioned friction-disk, means whereby said second friction-disk may be advanced to and from the first-mentioned friction-disk to start and stop the machine, and means whereby it may be caused to travel across the face of the first-mentioned friction-disk to regulate the speed of rotation at which it travels, and means whereby the commencement, variation, or cessation of motion of said friction-disk may be communicated at the point of application, substantially as described.

7. In a railroad-car, the combination of a pulley located on the car-axle, a belt running from said pulley on the car-axle to a pulley located on the car, said pulley located on the car, a belt-tightening device for preserving the tension of said belt, a friction-disk receiving motions from said pulleys, a second friction-disk bearing against said first-mentioned friction-disk and operated by it, and means whereby the motion of said second friction-disk is transferred to the point of application, substantially as described.

8. In combination, the pulley F^8 on the car-axle, the pulley F^6, receiving motion from pulley F^8, belt F^9, friction-disk F, receiving motion through said pulleys F^8 and F^6, the friction-disk G, mounted upon the sliding carriage I, screw-shaft I^2, worm-wheel I^3, worm I^4, and hand-wheel shaft I^6, connected by a universal joint, I^7, to worm-shaft I^5, all substantially as and for the purpose set forth.

9. In combination, the pulley F^8, receiving motion from a car-axle, the pulley F^6, the friction-disk F, receiving motion through said pulleys F^8 and F^6 from the car-axle, the friction-disk G, the sliding carriage I, forming the bearing for disk G, the sliding carriage J, forming a bearing for carriage I, the carriage J, receiving its sliding motion through screw-shaft J', bevel-wheel J^2 on said screw-shaft J', bevel-wheel J^3, gearing with bevel-wheel J^2, and hand-wheel shaft J^4, connected with bevel-wheel J^3, all substantially as and for the purpose set forth.

10. In combination, the pulley F^8, receiving motion from the axle, the pulley F^6, the friction-disk F, receiving motion from pulleys F^8 and F^6, the friction-disk G, receiving motion from disk F, sliding shaft G', pulley K, mounted on sliding shaft G' in such manner that it will rotate with but not slide with shaft G', substantially as and for the purpose set forth.

11. The combination, in a refrigerator-car employing as a refrigerant a volatile fluid, of the chill-room for containing the articles to be preserved, the gas-compression cylinder, the condenser wherein the compressed gas is cooled, the refrigerator communicating with the condenser wherein the air to be employed is cooled by contact with tubes wherein the volatile fluid from the condenser is expanded in a vacuum, substantially as described, the compression-cylinder being operated by power derived from the car-axle through the medium of pulley F^8, located on the axle-belt F^9, running over said pulley F^8 to a pulley, F^6, located on the car, which latter pulley communicates its motion to friction-disks F and G, substantially as described, the disk G communicates its motion to the pulley e^3, operating the piston e of the compression-cylinder through shaft G, pulley K, and belt k^4, all substantially as described.

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Witnesses:

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