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C. DE L. RICE.

STARTING AND STOPPING MECHANISM.

No. 575,810. Patented Jan. 26, 1897.

Fig. 1.

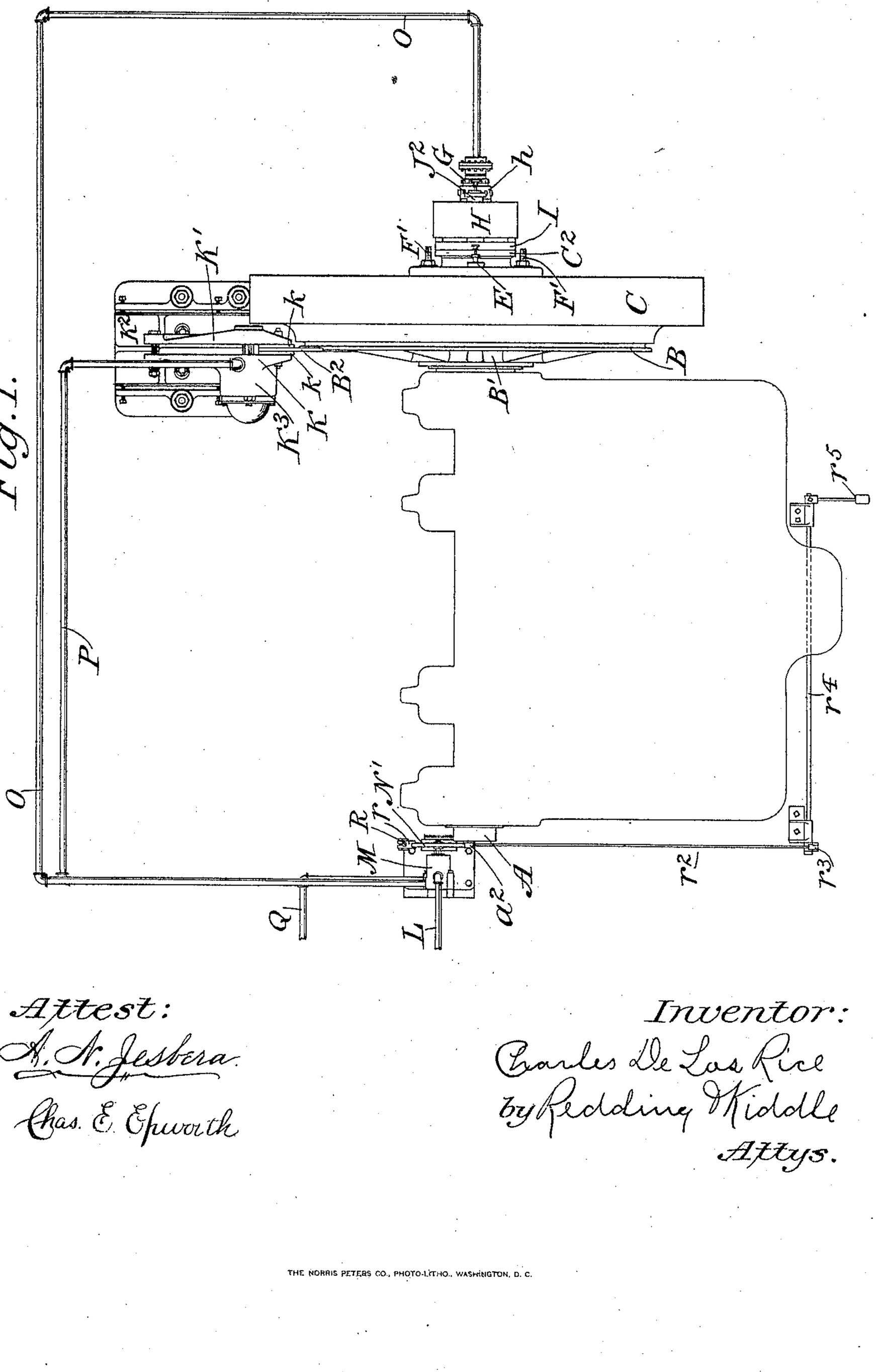

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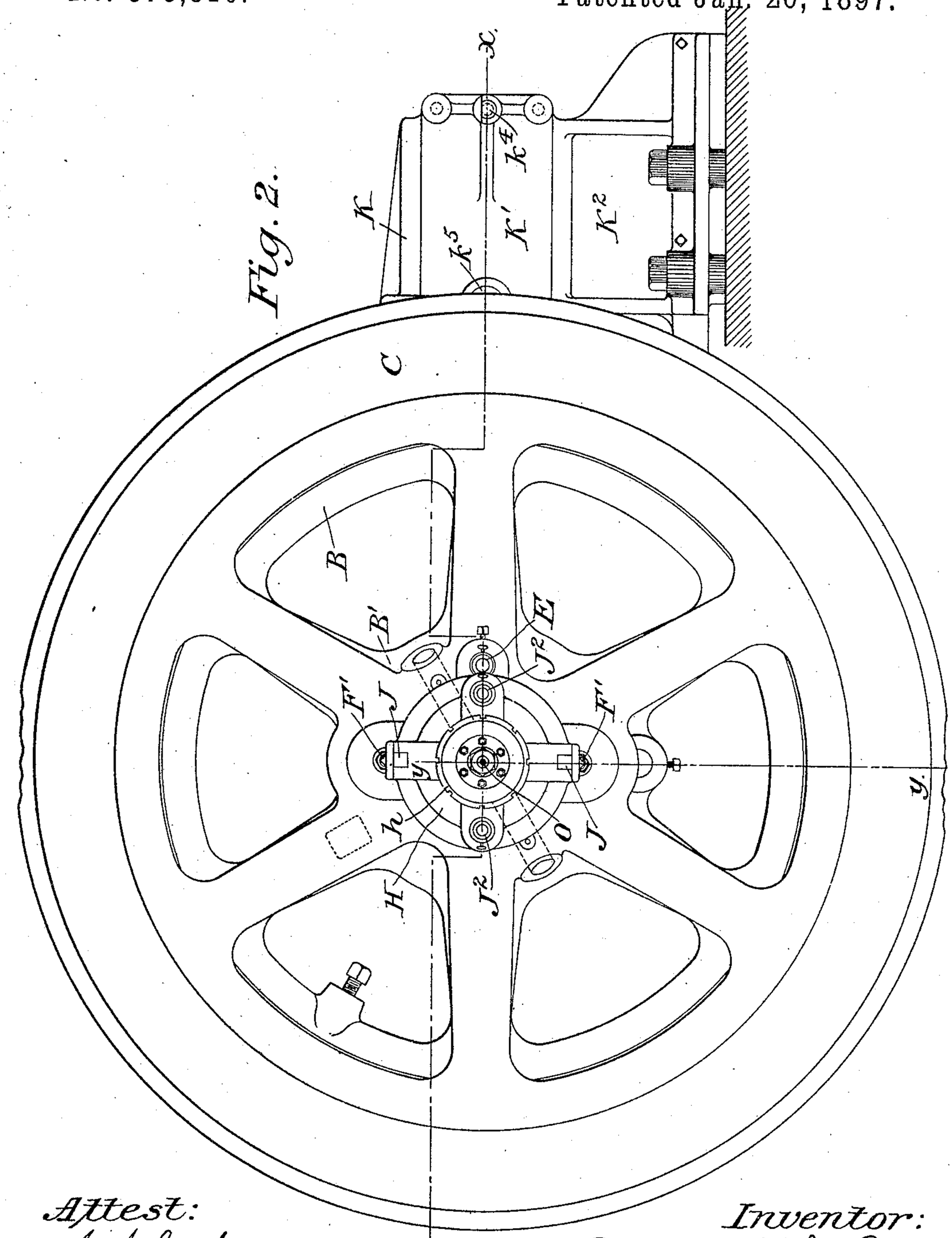
Fig. 2.



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STARTING AND STOPPING MECHANISM.

No. 575,810. Patented Jan. 26, 1897.

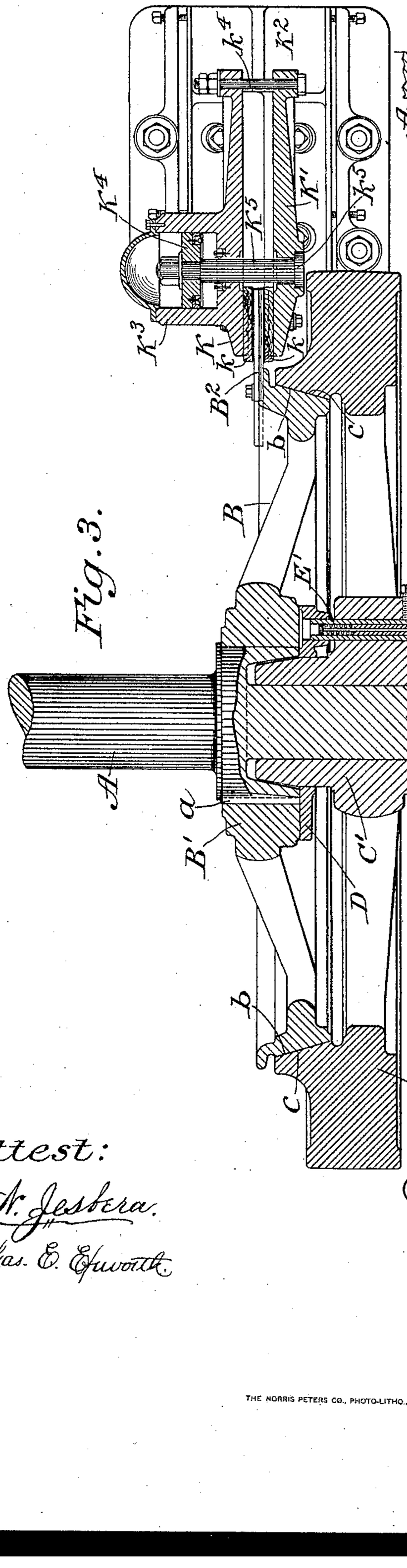

Fig. 3.

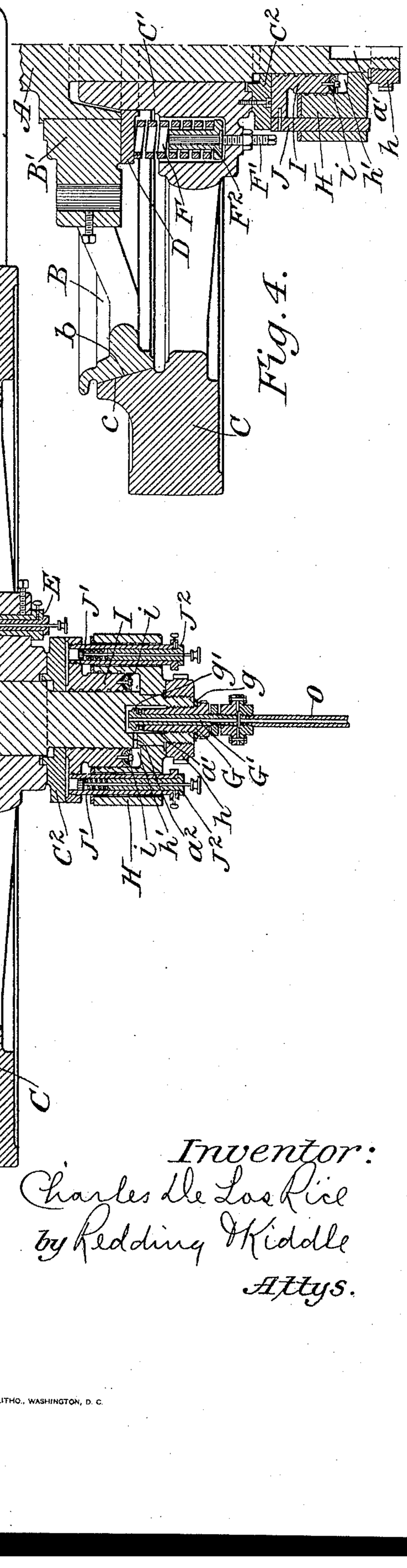

Fig. 4.

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STARTING AND STOPPING MECHANISM.

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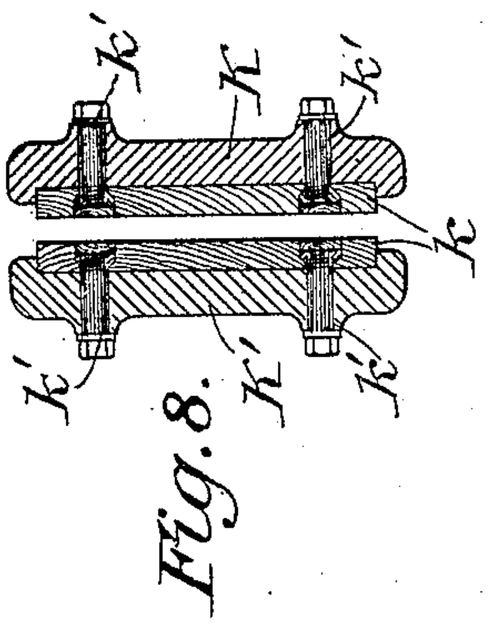

Fig. 8.

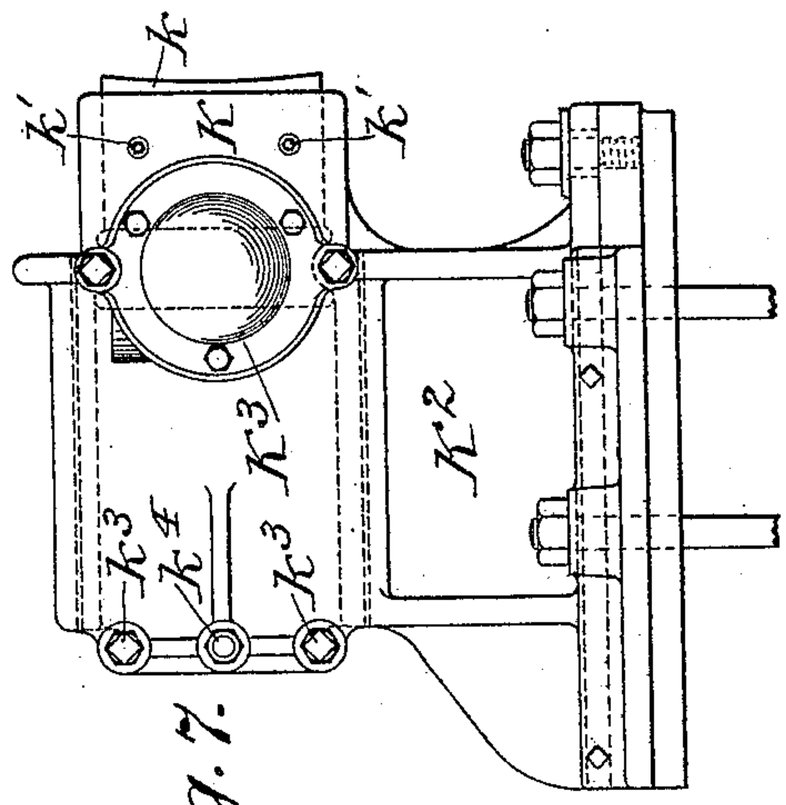

Fig. 7.

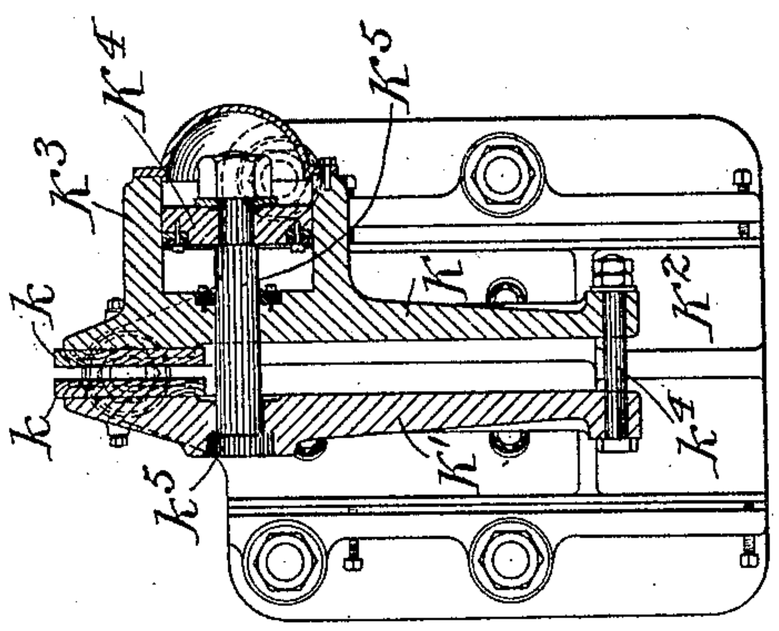

Fig. 5.

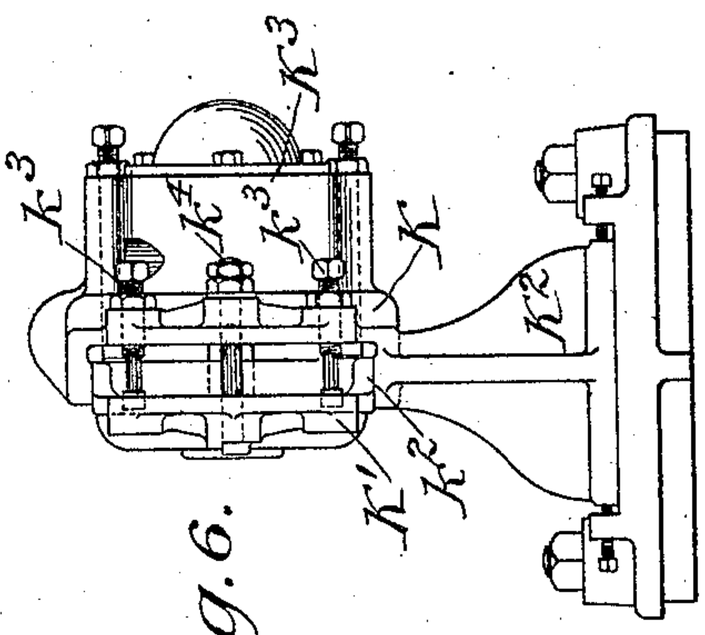

Fig. 6.

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Fig. 10.

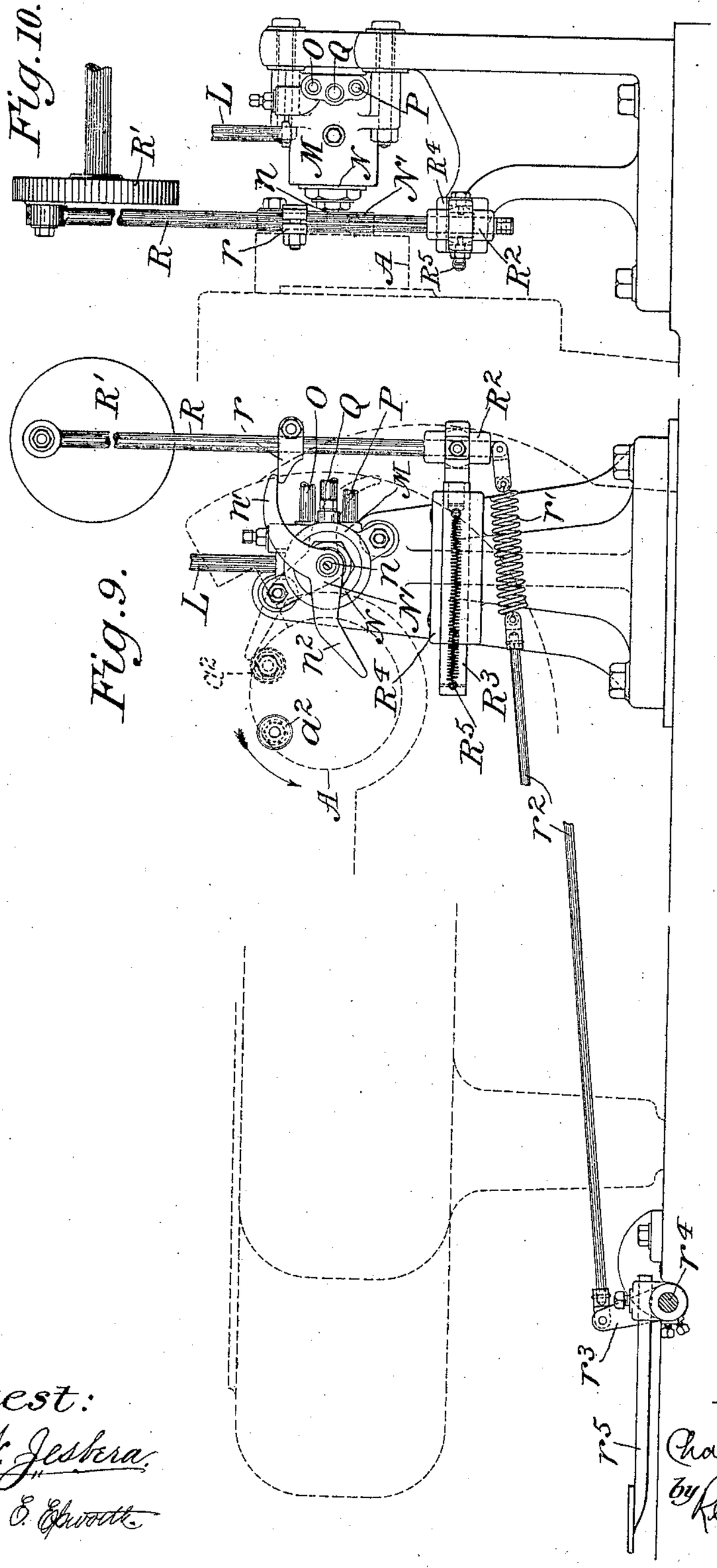

Fig. 9.

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UNITED STATES PATENT OFFICE.

CHARLES DE LOS RICE, OF HARTFORD, CONNECTICUT.

STARTING OR STOPPING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 575,810, dated January 26, 1897.

Application filed February 5, 1896. Serial No. 578,089. (No model.)

To all whom it may concern:

Be it known that I, CHARLES DE LOS RICE, a citizen of the United States, residing in the city and county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Starting or Stopping Mechanism, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention has relation to means for effecting the coupling and uncoupling of machinery to and from the driver therefor and for bringing the driven machinery to rest in a predetermined position. The improved means which are herein set forth are capable of application, as will be readily apparent, to machinery of varying character and intended for widely different uses, but the mechanism which is herein described as an embodiment of the invention is specially adapted for use with machinery of a ponderous character in which, by reason of the friction developed, it is desirable to provide mechanical devices to assist and supplement the efforts of the attendant in starting and stopping the machine.

The mechanism shown has been specially devised with relation to its use with the forging-machine which is fully described in another application for Letters Patent of the United States which was filed in the United States Patent Office on or about the 11th day of December, 1895, and is serially numbered 571,760, in which it is desirable to provide for the connection and disconnection of a ponderous driving-wheel with and from the main shaft of the machine which actuates the movable dies. On account of the great weight of the moving parts and of the great friction developed it would be practically impossible to accomplish the connection or disconnection of the parts by manual strength alone, and it is therefore my present object to provide improved means for effecting the coupling and uncoupling that can be controlled by one attendant without difficulty. It will be understood, however, that it is not intended to limit the invention to the special application thereof herein referred to, nor to the specific construction and arrangement of the mechanism herein shown and described as an embodiment of the invention.

In the drawings, Figure 1 is a plan view showing mechanism which embodies the invention applied to a machine of the character of that shown in the application for Letters Patent of the United States, Serial No. 571,760, hereinbefore referred to, the outline merely of the machine being shown. Fig. 2 is an elevation of the fly-wheel and clutch with the brake mechanism. Fig. 3 is an irregular section on the planes indicated by the line x x of Fig. 2. Fig. 4 is a detail vertical section of the fly-wheel and clutch, taken on the line y y of Fig. 2. Fig. 5 is a detail view of the brake mechanism similar to the corresponding portion of Fig. 3, but representing the jaws of the brake as drawn together to effect the stopping of the machine. Fig. 6 is an end elevation of the parts shown in Fig. 4. Fig. 7 is a side elevation thereof. Fig. 8 is a transverse section through the jaws of the brake, the scale being somewhat larger than that of Figs. 5, 6, and 7. Fig. 9 is an end elevation of the hydraulic valve mechanism for operating the clutch and brake, some parts being broken out to save space and all being represented as if seen from a point of view within the machine, the relative positions of the main shaft and other parts of the machine being indicated by dotted lines. Fig. 10 is a side elevation of the same, the position of the main shaft being also indicated by dotted lines.

Referring first to Figs. 1, 2, 3, and 4, it will be seen that the shaft A, which represents the machine to be driven, has rigidly secured thereto, as by a key a, a clutch member or spider or wheel B, which has a tapered working face b for coöperation with the corresponding face c of the driving and fly wheel C, which is continuously rotated by a belt or otherwise, the driving of the shaft A being effected by the working engagement of the faces b and c. The driving-wheel C is mounted to rotate upon the shaft A, having a hub C′, adapted for the purpose, and can be moved longitudinally upon the shaft enough to cause the faces b and c to stand in or out of working contact.

For the purpose of thrusting the driver C normally away from the spider or wheel B, in order to separate the working faces b and c, I prefer to interpose between the hub C′ of the driver and the hub B′ of the spider B a bearing-ring D, which rests against the face of

the hub B′ and is compelled to rotate with the hub C′ by the engagement therewith of the tube or shell E′ of a grease-cup E, which is fixed in the hub C′. One or more springs F are seated in the hub C′ and bear upon the ring D, an adjusting-screw F′ and sleeve F^2 being arranged to regulate the tension of the spring.

For the purpose of crowding the driver C into working contact with the spider B, I have provided a hydraulic device which is so constructed and arranged as to obtain the maximum of pressure with the minimum of friction between the operating parts. The end of the shaft A is chambered, as at a', and screw-threaded to receive a sleeve G, which is secured in position by a lock-nut g and serves as a bearing and packing sleeve for a stationary tube G′. The latter has within the chamber a' a flange g', between which and the end of the sleeve G is interposed suitable bearing and packing material, so that the sleeve G may turn freely with the shaft A about the stationary tube G′. Upon the end of the shaft A is formed or secured, as by a jam-nut h, a hub H, between which and the shaft A is formed an annular space h', which communicates with the chamber a' through a port a^2. An annular piston I fits within the space h', being provided at its end with a suitable packing i. The piston I is preferably caused to rotate with the hub H by a keeper J, which slides freely through the hub H and is secured to the flange of the piston I. The tube or cylinder J′ of a grease-cup J^2 may also be secured to the flange of the cylinder I and slide through the hub H, as represented. The piston I bears against a bearing-ring c^2, which is carried with the driver C. The tube G′ is connected to any suitable source of pressure through suitable controlling devices, such as are described hereinafter, whereby the application of pressure will force the piston I forward upon the shaft and the driver C into driving contact with the spider B. As soon as the pressure is released the springs F^2 will force the driver back out of driving contact with the spider, permitting the former to continue its revolutions, while the latter is brought to rest.

As it is desirable in the machine to which reference has been made to bring the shaft A to rest in a predetermined position I have provided a brake which is adapted to coöperate with the shaft, preferably through the spider B, and may also be controlled by the same devices which control the clutch already described. To the spider B, parallel with the plane of rotation, is secured a segmental plate of metal B^2, which is knife-edged at its forward or leading end, as indicated in Fig. 3. With this plate B^2 are adapted to coöperate two brake-jaws K and K′, which are preferably faced with wood or other suitable friction material k.

The construction and arrangement of the brake-jaws are clearly shown in Figs. 3 and 5 to 8, inclusive. As represented in Fig. 8 the friction-plates or brake-shoes k k are carried by screws k', the distance between the plates k k being preferably somewhat less than the thickness of the plate B^2 on the spider B. The jaw K is supported by a rigid standard K^2, while the jaw K′ is movable with respect to the jaw K, being supported in part upon a shoulder k^2, Fig. 6, of the standard K^2 and being attached at its rear end to the jaw K by squaring-bolts k^3 k^4. The jaw K′ is not so rigidly held by the bolts k^3 k^4 but that at its forward end it may be moved slightly toward or from the jaw K, so as to decrease or increase the distance between the friction-plates k k. Upon or with the jaw K is formed or secured a cylinder K^3, which is connected to a suitable source of pressure. Within the cylinder K^3 is fitted a piston K^4, to which is secured a piston-rod K^5. The latter passes through the jaw K, in the rear of the friction-plates k k, and engages the jaw K′, as indicated at k^5. When the pressure is applied to the piston K^4, the jaw K′ is drawn toward the jaw K, diminishing the distance between the friction-plates k k, so that as the plate B^2 enters between said plates k k it shall be subjected to such friction as to bring the spider B and the shaft A to rest.

The means for controlling the application of pressure to the piston I of the clutch and to the piston K^4 of the brake are so arranged as to cause the release of the clutch and the application of the brake at the same time, and vice versa, so that either the clutch or the brake is in operation all the time. The means devised for this purpose and the connections from such means to the clutch and brake are shown clearly in Figs. 1, 9, and 10. The hydraulic pressure is supplied from any suitable source by a feed-pipe L through an ordinary three-way valve having a shell M and a core N, capable of oscillating within the shell in the usual manner. From the valve pipes O and P lead, respectively, to the pipe G′ and the cylinder K^3. The valve may also be provided with an exhaust-pipe Q. The ports of the valve are so arranged that when the core of the valve is in position to connect the pipe O with the feed L the pipe P will be in communication with the exhaust Q, and vice versa.

The valve-stem n has secured at its outer end a cam-lever N′, having two arms n' and n^2, the former of which is adapted to be engaged by a lug r, which is carried by a rod R. The rod R is connected at its upper end to a crank-disk R′, and at its lower end, through a spring r' and a connecting-rod r^2, to one arm r^3 of a rock-shaft r^4, to which a treadle r^5 is affixed at a convenient point. The rod R slides freely through a sleeve R^2, which is loosely hung in the end of a bar R^3, the latter being free to slide in a guide R^4, which is carried by the supporting-standard, and being forced normally outward by a spring R^5 to swing the lug r on the rod R away from the arm n' of the cam-lever N′. The arm n^2 of the cam-lever N′ stands in the plane of move-

ment of a stud or roller or other projection a^2, which may be fixed eccentrically on the end of the shaft A and is indicated in its proper relative position by dotted lines in Fig. 9. The crank-disk R′ is driven continuously from any suitable source, and the rod R therefore receives a continuous reciprocation in a vertical direction. Normally, as hereinbefore stated, the rod R is held away from the cam-lever on the valve-stem and the treadle r^5 is held in its relative position by the action of the spring R^5 upon the sliding bar R^3. If the treadle is depressed, the rod R will be drawn toward the cam-lever N′, and if this action takes place during the downward movement of the rod R the spring r' will permit the parts to yield and the lug r to slip past the end of the arm n' of the cam-lever N′, the said cam-lever being then in the position represented by dotted lines in Fig. 9, in which position it causes the clutch members B and C to be held out of operative contact, the brake at the same time being closed. As the rod R moves upward the lug r engages the arm n' and throws it into the position represented in full lines in Fig. 9, thereby shifting the valve and causing the brake to be opened and the clutch to be closed. The machine therefore starts, and as the shaft A completes its revolution the roller a^2 thereon strikes the arm n^2 of the cam-lever N′ and shifts the valve to its original position, thereby opening the clutch and closing the brake and bringing the machine to rest.

It will be apparent that the attendant is required to use no more force than is necessary to overcome the resistance of the spring R^5 and to swing the rod R. The continuously-rotating crank-disk R′ thereupon effects the desired movement of the valve in one direction and the movement of the machine itself effects the movement of the valve in the opposite direction at the moment required for the stopping of the machine.

It will be understood that in practice the brake is set before the segmental plate B^2 reaches it, as otherwise the movement of the brake would not be quick enough, on account of the great speed and weight of the spider B.

The mode of operation of the several parts of the improved starting and stopping mechanism has been fully set forth in connection with the description of the construction thereof and no further explanation is necessary. It will be obvious that the details of construction and arrangement may be varied from what has been described and shown herein without departing from the spirit of my invention.

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

1. In a clutch mechanism, the combination with a driven part and a driver movable into or out of working contact, a brake for said driven part, a hydraulic piston and cylinder for operating said brake, a hydraulic piston and cylinder to press said driver and driven part into working contact, a single valve and independent connections to said cylinders, and means to actuate said valve whereby pressure may be applied to one or the other of said pistons, substantially as shown and described.

2. In a clutch mechanism, the combination with a driven part and a driver movable into or out of working contact, a brake for said driven part, a hydraulic piston and cylinder for operating said brake, a hydraulic piston and cylinder to press said driver and driven part into working contact, a single valve and independent connections to said cylinders, a lever for shifting said valve to admit pressure to one or the other of said cylinders and means actuated by said driven part to shift said lever, substantially as shown and described.

3. The combination with a shaft, a hydraulic piston and cylinder to control the movement of said shaft, a valve and connections to control the application of pressure to said piston, a lever connected to said valve to shift the same and an eccentric projection carried by said shaft and adapted to shift said lever as the shaft is rotated, substantially as shown and described.

4. The combination with a valve having a shifting lever connected thereto, of a longitudinally-reciprocating rod free to swing and having a projection to engage said lever and means to swing said rod into or out of proximity to said lever, substantially as shown and described.

5. The combination with a valve having a shifting lever connected thereto, of a longitudinally-reciprocating rod free to swing and having a projection to engage said lever, a slide to which said rod is connected, a spring connected to said slide to swing said rod away from said lever, and means to swing said rod toward said lever, substantially as shown and described.

6. The combination with a valve having a shifting lever connected thereto, of a longitudinally-reciprocating rod free to swing and having a projection to engage said lever, a treadle and connections to swing said rod toward said lever, and a spring interposed in said connections whereby said rod is permitted to yield, substantially as shown and described.

7. The combination with a wheel mounted to rotate and a relatively short plate secured thereto parallel with the plane of rotation, of brake-jaws arranged on opposite sides of the path of said plate and means to force said jaws together to clamp said plate between them, substantially as shown and described.

8. The combination with a wheel mounted to rotate and a plate secured thereto parallel with the plane of rotation, of brake-jaws arranged on opposite sides of the path of said plate, a hydraulic cylinder carried by one of said jaws and a piston and connection to the

other of said jaws whereby said jaws may be forced together to clamp said plate between them, substantially as shown and described.

9. The combination with a wheel mounted to rotate and a plate secured thereto parallel with the plane of rotation, of a standard fixed in proximity to said wheel, a brake-jaw rigidly supported by said standard, a movable brake-jaw supported by said standard, said brake-jaws being adapted to clamp said plate between them, a cylinder carried with said rigid brake-jaw, and a piston for said cylinder connected to said movable jaw, substantially as shown and described.

This specification signed and witnessed this 29th day of January, A. D. 1896.

CHARLES DE LOS RICE.

In presence of—
HERMANN F. CUNTZ,
FELTON PARKER.