

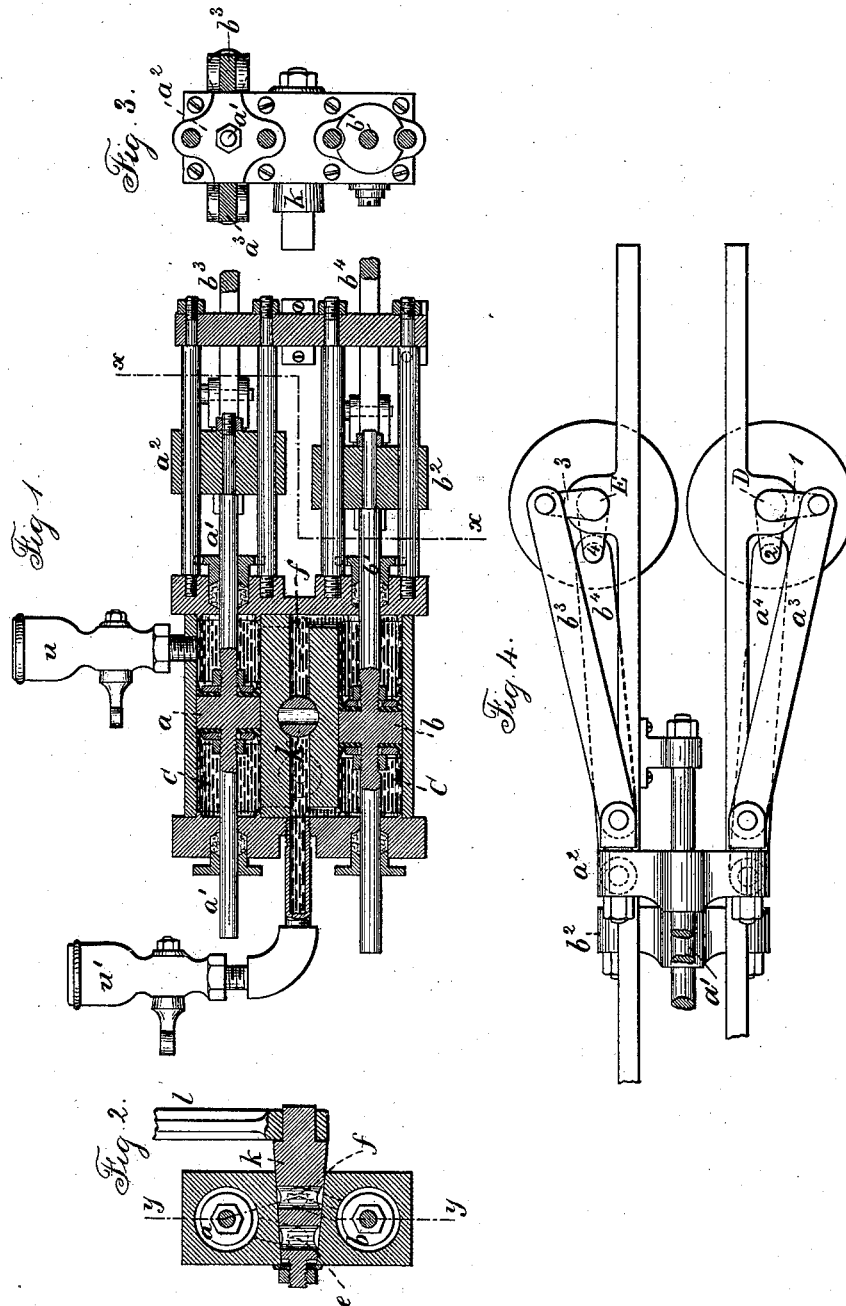
(No Model.)

J. H. PENDLETON.

## REGULATOR FOR REVOLVING SHAFTS.

No. 345,394.

Patented July 13, 1886.



Witnesses:  
J. Staub  
Chas. Schmidt

Inventor:  
John H. Pendleton  
per Lemuel W. Correll atty

# UNITED STATES PATENT OFFICE.

JOHN H. PENDLETON, OF BROOKLYN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HIMSELF, CORNELIUS TIERS, ALEXANDER H. TIERS, ROBERT I. SLOAN, AND LINCOLN MOSS, ALL OF NEW YORK, N. Y., AND THOMAS NAST, OF MORRISTOWN, NEW JERSEY.

## REGULATOR FOR REVOLVING SHAFTS.

SPECIFICATION forming part of Letters Patent No. 345,394, dated July 13, 1886.

Application filed December 16, 1885. Serial No. 185,826. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. PENDLETON, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Regulators for Revolving Shafts, of which the following is a specification.

Instances frequently arise in machinery where it is desirable to regulate the speed of one or more revolving shafts, or to hold the same firmly, so that they cannot be revolved, and in so doing control the action of mechanism with which the revolving shaft is connected. This is especially useful in hoisting and lowering machinery, and in the traction devices for cable and elevated railways.

I make use of one or more cylinders containing oil or other fluid, and there are passages extending from one end to the other of such cylinders, and in such passages there are valves or cocks that can be controlled by hand. The piston in this cylinder is connected by rods with a crank upon the shaft that is to be regulated, so that the revolution of the shaft causes the fluid in the cylinder to be expelled from one end and drawn into the other end through the ports or passages. When these are open, the shaft can be revolved with but little resistance. If the passage-ways are closed, the piston is held immovable by the liquid in the cylinder. When partially open, the valves obstruct the movement of the liquid to a greater or less extent, and so regulate the speed of the moving shaft or shafts.

I make use, by preference, of two cylinders and pistons and connecting rods, and cranks at right angles to each other on two adjacent shafts, so that the two shafts are simultaneously regulated in their movements, and the revolutions of the two shafts are in opposite directions and at the same speed, and one may be the motor-shaft and the other the shaft that is revolved.

In the drawings, Figure 1 is a section longitudinally of the cylinders at the line *yy* of Fig. 2, and an elevation of the connecting-rods and shaft. Fig. 2 is a cross-section through the cylinders and regulating-cock. Fig. 3 is a sectional elevation at the line *xx*, Fig. 1;

and Fig. 4 is a diagrammatic plan view of the shafts, cranks, and connections, so as to show the directions of motions.

The cylinders *C* are of suitable size and shape. It is preferable to use two cylinders, as shown. The pistons *a b* are provided with piston-rods *a' b'*, and these extend to the cross-heads *a'' b''*, and from these the connecting-rods *a' a'* and *b' b'* extend to the cranks 1 2 3 4 on the shafts *D* and *E*, respectively. These shafts *D* and *E* are of any desired character and used for any available purpose, and they are supported in suitable bearings.

The passage-ways or ports *ef* extend from end to end of the respective cylinders, and are provided with branches passing into such cylinders, and in each passage-way is a valve or cock of any desired construction for opening or closing such passage-way. I have shown the cock or plug *k* with two openings corresponding to the passage-ways *ef*, so that such passage-ways are opened or closed by turning the said cock by a handle or lever, *l*.

It is now to be understood that the liquid in the cylinders is churned back and forth from one end of each cylinder to the other by the movements of the pistons, and the speed of the pistons will be controlled by the size of the passage-way, because the pistons cannot move faster than the liquid is transferred from one end of the cylinder to the other, the cock or valve regulating the size of the passage-way.

Cups *u u'* should be provided, into which bubbles of air can escape from time to time, and through which oil or other liquid can be supplied to compensate waste; and in charging the cylinders and passage-ways the oil may be forced in at the lowest point to allow the air to be entirely displaced.

A single cylinder, piston, connecting-rod, and crank, with a cock or valve in the passage-way, may be used to regulate one shaft; but the motions of two shafts can be made very uniform, and the direction of rotation of the two shafts reversed by using the cross-heads, connecting-rods, and cranks, as shown. The cranks on the respective shafts being at right angles to each other, the movements are equal-

ized, because one crank is acting full while the other is passing the dead-center, and the cross-heads to which the respective pairs of connecting-rods to the cranks are connected transmit the motion from one shaft to the other, so that either shaft D or E can be the motor-shaft, and the other the shaft receiving motion, or both can be motor or moved shafts, and they must both move at the same speed, but always in opposite directions, because the pair of connecting-rods to one cross-head move back and forth together and always are at equal angles to a central plane passing midway between and parallel to the shafts.

Two shafts each having a crank, and one pair of connecting-rods, and one cross-head have been used, the two shafts revolving in opposite directions; but the shafts had to be geared together to insure equality of rotation, and two shafts with three or more cranks have been connected directly by rods between the cranks, but the two shafts revolved in the same direction. My improvements in the connections are available with the shafts revolving in opposite directions.

I claim as my invention—

1. The combination, with a revolving shaft, of a crank, connecting-rod, piston, and cylinder, having a passage extending from one end of the cylinder to the other, and a valve in such passage for regulating the transfer of a fluid from one end of the cylinder to the other,

and controlling the speed of movement or stopping the shaft, substantially as set forth.

2. The combination, with two shafts, and right-angled cranks on the respective shafts, of connecting-rods in pairs extending from the respective cranks, cross-heads to which the respective pairs of connecting-rods are pivoted, and means for guiding such cross-heads, substantially as set forth, for insuring uniformity in the motions of two shafts that are revolving in opposite directions, substantially as specified.

3. The combination, with two shafts, and right-angled cranks on the respective shafts, of connecting-rods in pairs extending from the respective cranks, cross-heads to which the respective pairs of connecting-rods are pivoted, piston-rods, pistons, and cylinders containing passage ways that connect the opposite ends of each cylinder, cocks or valves to regulate the openings of the passage-ways and the transfer of a fluid from one end to the other of each cylinder, and thereby control the movements of the shafts or stop the same, substantially as specified.

Signed by me this 12th day of December, A. D. 1885.

J. H. PENDLETON.

Witnesses:

GEO. T. PINCKNEY,  
WILLIAM G. MOTT.