(No Model.)

E. J. ARMSTRONG.

ROCK ARM FOR HORIZONTAL ENGINES.

No. 500,840. Patented July 4, 1893.

Fig. 1.

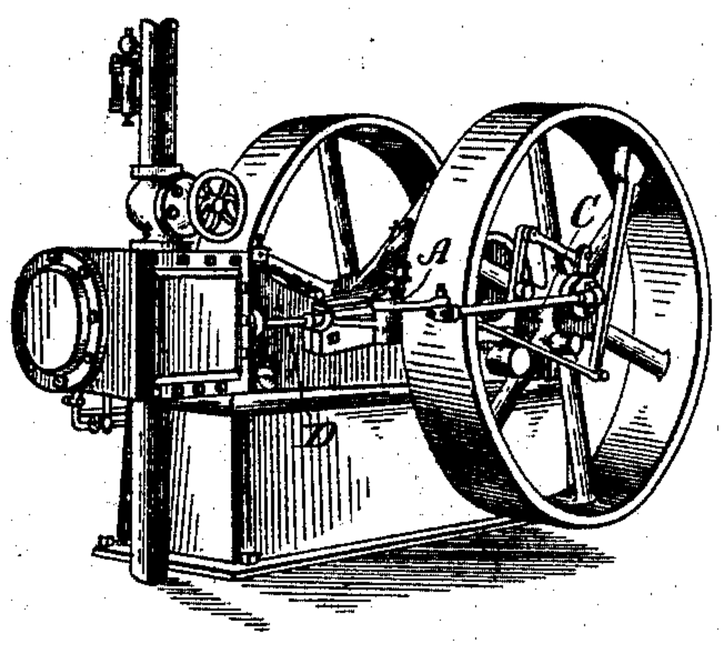

Fig. 2.

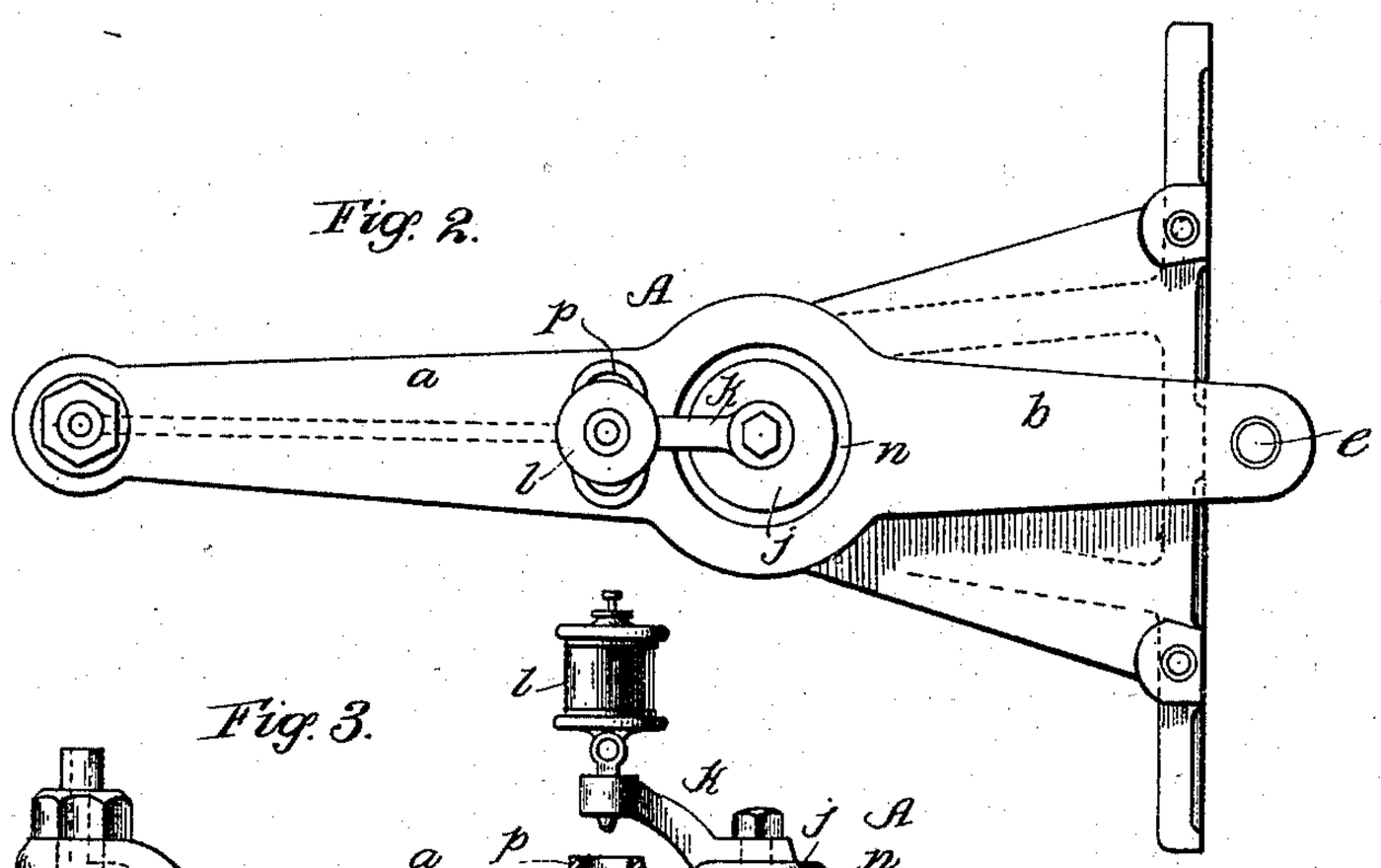

Fig. 3.

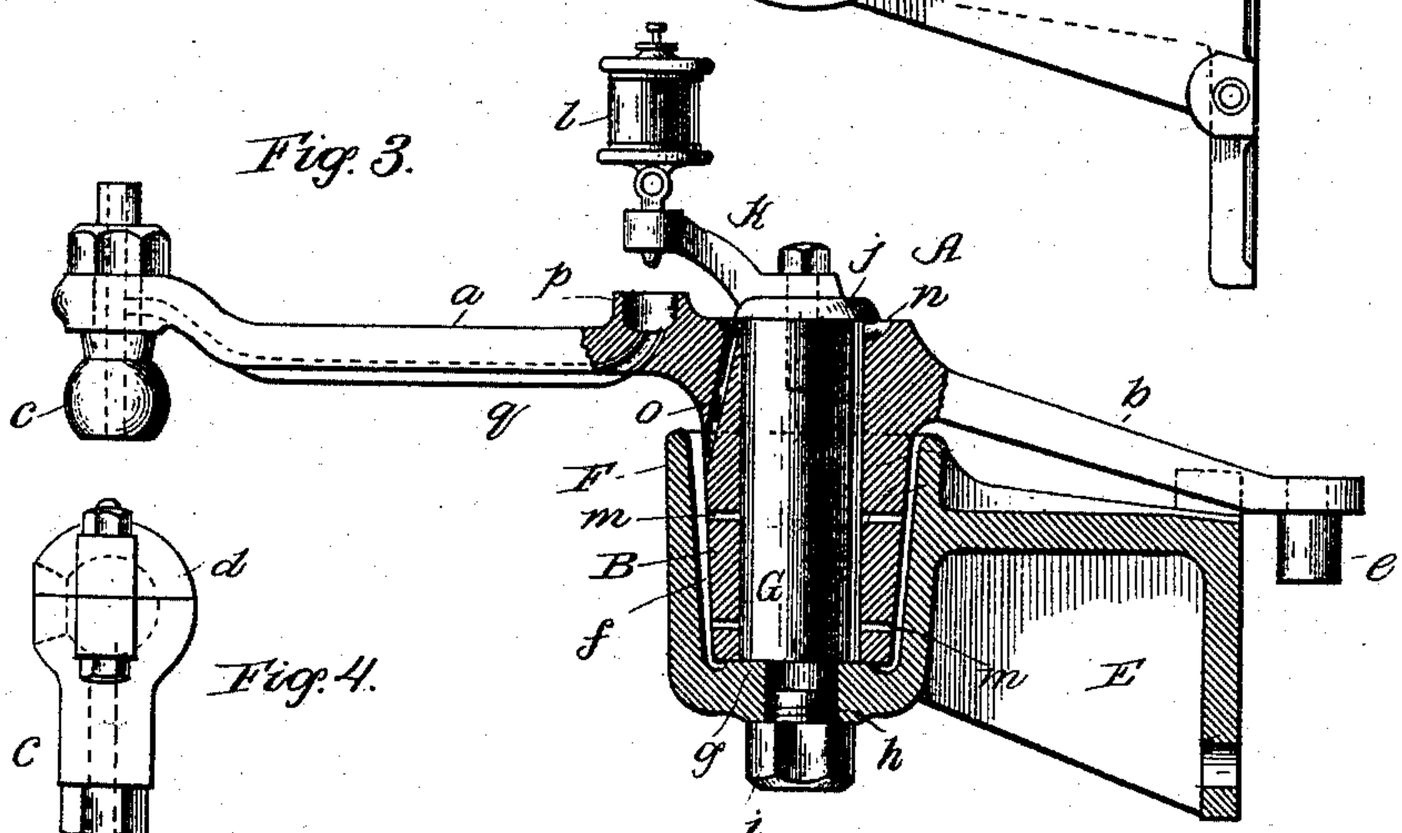

Fig. 4.

Witnesses.
Victor J. Evans.
J. F. Beale.

Inventor.
Edwin J. Armstrong
By W. A. Redmond
Attorney.

UNITED STATES PATENT OFFICE.

EDWIN J. ARMSTRONG, OF OSWEGO, NEW YORK, ASSIGNOR TO THE AMES IRON WORKS, OF SAME PLACE.

ROCK-ARM FOR HORIZONTAL ENGINES.

SPECIFICATION forming part of Letters Patent No. 500,840, dated July 4, 1893.

Application filed February 28, 1893. Serial No. 464,097. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. ARMSTRONG, a citizen of the United States, residing at Oswego, in the county of Oswego and State of New York, have invented certain new and useful Improvements in Rock-Arms for Horizontal Steam-Engines; and I 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 rock arms for horizontal steam engines of that class having a double disk crank and fly wheel governor and in which the eccentric rod for communicating motion from the eccentric to the rock arm is placed outside the governor wheel, it being usual in this type of engine, to connect the eccentric to the valve rod by a rock arm having a horizontal axis.

The object of this invention is to provide a rock arm of simpler form and cheaper construction than the usual type and to provide more reliable means of lubrication than are possible with the more complicated forms of rock arms hitherto used, as well as to obviate the twisting strain common to rock arms having a horizontal axis, and the invention consists of the parts and combinations of parts hereinafter described and claimed.

In the accompanying drawings forming a part of this specification—Figure 1 is a perspective view of a horizontal engine showing my improved rock arm thereon; Fig. 2 an enlarged plan view of the rock arm; Fig. 3 a partly sectional side elevation of the same; and Fig. 4 a side elevation of the eccentric rod.

Similar letters refer to similar parts throughout the several views.

The rock arm A is formed with a downwardly extending hollow hub B which is, preferably, slightly tapering in form, and from opposite sides of the upper end of which the arms *a* and *b* extend, said arms connecting with the eccentric rod C and valve rod D, respectively, the arm *a* carrying a ball bearing *c* to which the socket box *d* of the eccentric rod C couples, and the arm *b* being provided with a pin *e* to which the valve rod D is connected in the usual or any desired manner. The rock arm is supported by a bracket E which is secured to the frame of the engine and is cast or provided with a cup F to receive the hub B of the rock arm. The interior diameter of the cup F is sufficiently greater than the diameter of the hub to provide or form an annular chamber, as at *f*, around the hub into which the lubricant is poured, and the hub is held vertically in the cup by means of the pin G. The hub rests partly on an annular shoulder or boss *g* formed at the bottom of the cup as does also the pin G, the latter having its lower end reduced and screw-threaded and extending through an opening *h* in the bottom of the cup to receive a nut *i* in order to secure the pin rigidly in place.

At the upper end of the pin G a cap *j* is secured which projects over the upper end of the hub B of the rock arm and prevents the hub rising out of the cup during the operation of the engine. A bracket arm *k* is cast with the cap *j* and carries at its end an oil cup *l*. The body of the hub is formed with any desired number of perforations or oil ducts *m* which extend radially throughout its wall, and an annular groove *n* is formed in the upper end of the hub from which a downwardly and outwardly inclined oil duct *o* leads to a point on the surface of the hub below the rim of the cup F. On the arm *a* of the rock arm or oval shaped oil cup *p* is formed from the bottom of which leads a tube *q* which conveys the oil from cup *p* to the ball bearing *c* and from the latter the surplus oil finds its way through the eccentric rod, which is hollow, to that end of the rod which connects with the eccentric. The oil cup *l* it will be observed, is stationary during the operation of the rock arm and may therefore be easily filled and regulated while the engine is in motion and as the oil cup *p* is oval in shape the oil from cup *l* will drop therein no matter what the position of the rock arm may be. The rapid vibration of the rock arm throws the oil from cup *p* outward in tube *q* to the ball bearing *c* while the surplus oil from the said bearing is thrown by the vibration of the eccentric rod through the same to the end thereof which connects with the eccentric—experiments with the device having demon-

stated that the oil will flow toward the end of the vibrating part which covers the greater distance in its movement. This device provides a very effective method of oiling or lubricating both ends of the eccentric rod, while the advantages attending a stationary oil cup on engines which make long continuous runs are obvious. When the rock arm is vibrated in operation the oil in the chamber *f* of cup F is drawn into the ducts *m* in the hub and enters between it and the pin G and rises to the upper end of the pin and overflows into the groove *n* and from the latter returns to the chamber *f* through the duct *o* to be used again and again until worn out in lubricating the bearing surfaces of the hub and pin. Thus the lubrication of these surfaces is automatic and constant and the expenditure of lubricant reduced to a minimum. It will be noticed that arm *b* of the rock arm inclines from the horizontal toward its outer end, thus enabling a straight line to intersect the centers of all three of the bearings of the rock arm, and hence there can be no twisting strain on either of them, and the difficulty of maintaining properly working bearings is greatly lessened thereby if not altogether obviated—the metal, in this arrangement, being in stiffer form there is less springing between the eccentric and the valve than is usual in such other forms of connection between the eccentric rod and the valve rod as I am familiar with, and for the same reason there is less weight for the governor to set in motion, thus increasing the accuracy of the governing of the engine, as the smaller the inertia of the vibrating parts the better the governing.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a horizontal steam engine, of a bracket having a cup, and a rock arm having a vertical axis adapted to be supported in said cup, substantially as described.

2. The combination, in a horizontal steam engine, of a rock arm having a vertical axis, a stationary oil cup arranged adjacent said axis, and means for oiling the outer bearing of said rock arm from said oil cup, substantially as described.

3. The combination, in a horizontal steam engine, of a rock arm having a vertical axis, a cup for pivotally supporting said arm, and means for automatically oiling the bearing of said rock arm and for returning the oil to said cup to be used again, substantially as described.

4. In a horizontal steam engine, the combination of a rock arm having a vertical bearing hub, a cup for supporting said rock arm, a pin rigidly fixed in said cup, a cap secured to said pin and having an arm projecting therefrom, an oil cup mounted on said arm, an oval oil cup formed on the rock arm, and a tube for conducting the oil from said last named oil cup to the outer end of the rock arm, substantially as described.

5. The combination, in a horizontal engine, of a rock arm having a vertical axis, an oil cup formed in one arm of said rock arm, a tube leading from said cup to the outer bearing of said arm, and a hollow eccentric rod connected to said outer bearing, whereby both ends of said eccentric rod may be oiled from said cup, substantially as described.

6. The combination, in a horizontal engine, of a rock arm having a vertical bearing hub formed with radial oil ducts, a cup adapted to receive said hub, a pin for supporting said hub vertically in said cup, and an oil duct for returning the oil to said cup after it has been used to lubricate the pin, substantially as described.

7. The combination, in a horizontal steam engine, of a rock arm having a vertical bearing hub formed with lateral oil ducts, an annular groove in the top of said hub and an inclined oil duct leading from said groove, a cup within which said hub has its bearing, a removable pin for supporting said hub upright, and means for preventing said hub from rising out of the cup, substantially as described.

8. In a horizontal steam engine, the combination, with a suitable support, of a rock arm having a vertical bearing hub, an arm projecting horizontally from one side of said hub and an inclined arm projecting from the opposite side thereof, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN J. ARMSTRONG.

Witnesses:
JOHN P. PHELPS,
BERNARD GALLAGHER.