(No Model.)

T. JAMES.

APPARATUS FOR ROTATING CRANES.

No. 453,007. Patented May 26, 1891.

Fig. 1.

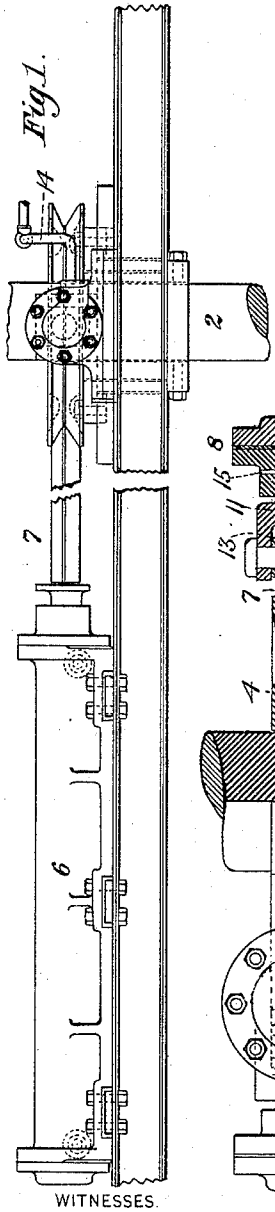


Fig. 3.

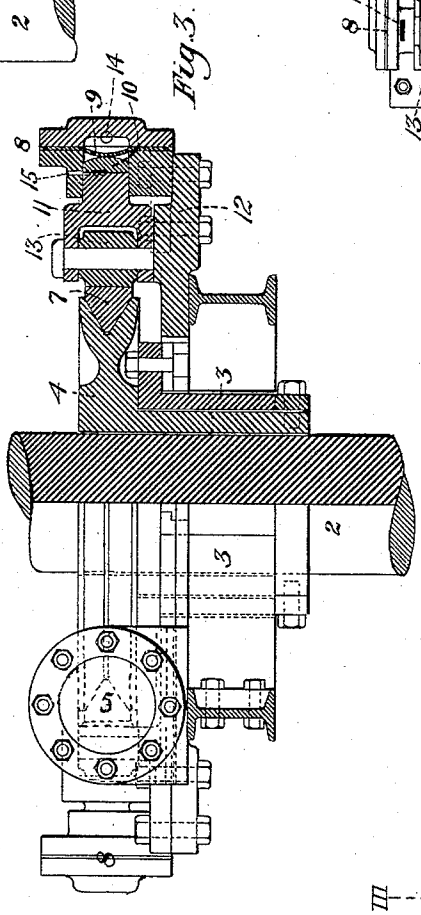
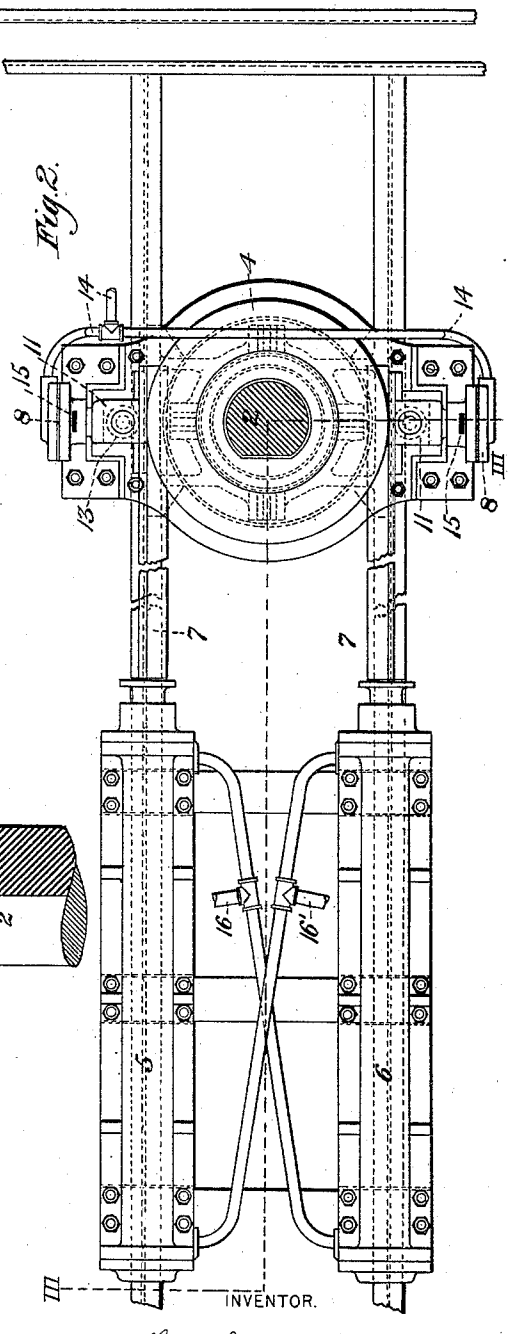


Fig. 2.



WITNESSES.

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APPARATUS FOR ROTATING CRANES.

SPECIFICATION forming part of Letters Patent No. 453,007, dated May 26, 1891.

Application filed September 15, 1890. Serial No. 364,963. (No model.)

To all whom it may concern:

Be it known that I, THOMAS JAMES, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Rotating Cranes, of which the following is a full, clear, and exact description.

The mechanism heretofore commonly employed for rotating cranes has been rack-and-pinion gearing or other positively-acting devices in gear with the crane-mast. For some purposes such prior mechanism is inconvenient, principally because it is permanently connected with the crane and the crane can only be rotated by means of it, and also because the rotation of the crane in either direction is restricted to the limit of stroke which the rotating mechanism possesses.

For the purpose of obviating the difficulties above mentioned and other difficulties with which those skilled in the art will be familiar, I have devised my present improvement, which consists in combining with a crane rotating mechanism so constructed and connected with the crane as to turn it by frictional contact. The advantage of such construction is that it is less likely to break and is more durable than positively-acting gearing. It can be disconnected easily from the crane, so as to leave the crane free to be rotated by manual labor or otherwise, and it has other advantages, some of which will be referred to in the course of the following specification.

The mechanism which I illustrate in the drawings of this application I deem to be the most serviceable and the best fitted for performing the work of turning the crane, and I therefore intend to claim it specifically herein; but I wish it to be understood that the broad claims of this application are not limited strictly to mechanism of this form, but are intended to cover the use with the crane of frictionally-acting rotating mechanism of any variety, in combination with mechanism for increasing or diminishing the frictional contact. Several different mechanical appliances will be suggested to the skilled mechanic as available for such use.

I shall now describe my invention, so that others may make and use it, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of my improved crane-turning mechanism. Fig. 2 is a plan view thereof, the top journal of the crane being shown in horizontal section. Fig. 3 is an end view, partly in section, on the line III III of Fig. 2.

In the drawings I show my improved rotating device applied to the top journal of the crane, the mechanism being supported by the girders of the building in which the crane is situate. This is a good arrangement, and is desirable for many reasons; but I do not limit my invention thereto, intending to cover it broadly as applied to the crane, whether it be at the base or at the top.

In the drawings, 2 represents the journal of the crane-mast, which revolves in a suitable steadiment or bearing 3.

4 is a wheel, which is fixed to the journal and may be provided with a peripheral groove, as shown. It is to this wheel that power is applied for rotating the crane.

5 6 are power-cylinders, preferably operated hydraulically, having bars 7, which project therefrom and fit against the wheel 4 on opposite points of its periphery. These bars are preferably shaped in cross-section to conform to the peripheral outline of the wheel. As the faces of the bars and the periphery of the wheel are not toothed, the wheel will not be rotated if the bars be simply moved in contact with the same unless they be held against its periphery with sufficient firmness to create the necessary friction. For the purpose of creating such pressure I employ the mechanism shown most clearly in section in Fig. 3. On the outer side of each bar is a hydraulic motor adapted to press the bar against the wheel. This motor consists, preferably, of a small single-acting hydraulic cylinder 8, provided with a transverse diaphragm 9 of the proper degree of flexibility, in advance of which is a false or dummy plunger 10, bearing against a frame or carrier 11, which slides on the supporting frame or casting 12 and carries an anti-friction roller 13, which bears against the rear side of the bar. The two cylinders 8 are preferably operated by a common water supply and exhaust pipe

14, so that pressure may be applied to and relieved from both cylinders simultaneously. It will be apparent that the cylinders need only a very short stroke to perform their work of pressing the bars against the wheel with sufficient force to create the necessary friction, and it is this which enables me to use the diaphragms 9.

To regulate the length to which the rollers 13 will be projected by an operation of the cylinders, I provide each of the latter with a lateral slot 15 in advance of the diaphragm and make the required adjustment by inserting liners through this slot between the dummy plunger and the end of the carrier 11.

It is desirable that the bars 7 should be operated simultaneously in opposite directions. For this purpose I may connect the front end of each cylinder 5 6 with the rear end of the other by a common supply and exhaust pipe 16 16′, so that when water is admitted to or exhausted from the front end of one cylinder it will be admitted or exhausted simultaneously from the rear end of the other, and will cause the bars 7 to move simultaneously in opposite directions.

As thus constructed the operation of my improved mechanism is as follows: When it is desired to rotate the crane, I admit motive fluid to the cylinders 8 through the pipe 14, and thereby I project the diaphragms 9 and the carriers 11 so as to force the bars 7 firmly against opposite points on the periphery of the wheel 4. I then admit fluid through one of the pipes 16 16′ and connect the other pipe with the exhaust, the effect of which is to cause the bars 7 to move longitudinally in opposite directions, so as to turn the wheel and to rotate the mast of the crane. The rotation of the mast in either direction may be produced accordingly as the pipe 16 or 16′ is connected with the pressure-supply. In mechanism for rotating cranes in which a toothed rack and a pinion are employed it is not possible to turn the crane in one direction further than the limit of stroke of the rack. This is sometimes an inconvenience in the operation of the crane and it does not occur in the use of my invention. If after projecting the bar 7 to its full extent it be desired to continue the rotation of the crane still farther in the same direction, the water-pressure may be removed from the cylinders 8, so as to relieve the bars 7 from pressure. These bars may be then moved longitudinally in the opposite direction, and after being again pressed against the wheel and moved longitudinally the desired result will be attained and the rotation of the crane will be continued. This operation may be repeated as often as may be wished. If it is desired at any time to turn the crane by manual labor and not to use the hydraulic rotating mechanism, the exhaust of pressure from the cylinders 8 will release the bars 7 from friction against the wheels 4 and will leave the crane disconnected from its rotating mechanism and free to be turned by hand.

Some of the advantages of my improvement have been indicated generally in the foregoing specification, and other advantages will be made apparent by use of the device.

One important advantage is that by dispensing with toothed gearing I obviate that liability to breakage of the turning mechanism which has occurred frequently when the chains connecting the burden to the crane break or become unfastened in any way.

I derive peculiar advantage from the use of two turning cylinders and bars, one bar for each side of the mast; but the mechanism may be used with but one turning cylinder and bar, if desired. It is also possible to dispense with the diaphragms in the pressure-cylinders 8 and to cause the fluid in such cylinders to act directly on plungers of usual construction, though this is not so desirable, because of the necessity which it entails of packing the cylinders in order to prevent the escape of the motive fluid.

I claim—

1. In apparatus for rotating cranes, the combination, with the rotary crane, of a smooth-faced wheel by which the rotary motion may be transmitted to the crane, a motor having a driven part adapted to bear frictionally on said wheel, and means for pressing said driven part into frictional contact with the wheel, substantially as and for the purposes described.

2. In apparatus for rotating cranes, the combination, with the crane, of a smooth-faced longitudinally-movable bar, a wheel, and mechanism for forcing the bar against the wheel, substantially as and for the purposes described.

3. In apparatus for rotating cranes, the combination, with the crane, of a smooth-faced longitudinally-movable bar, a wheel, and a power-cylinder 8, having a plunger bearing against the bar to move it against the wheel, substantially as and for the purposes described.

4. In apparatus for rotating cranes, the combination, with the crane, of a smooth-faced longitudinally-movable bar, a wheel, a power-cylinder 8, having a plunger bearing against the bar to move it against the wheel, and a roller which forms the bearing-face of the plunger, substantially as and for the purposes described.

5. In apparatus for rotating cranes, the combination, with the crane, of frictionally-acting mechanism for rotating said crane, a power-cylinder having a transverse diaphragm, and a plunger situated on the outside of the diaphragm and having a bearing against the frictionally-acting mechanism and adapted to apply pressure thereto to establish frictional contact, substantially as and for the purposes described.

6. In apparatus for rotating cranes, the combination, with the crane, of a wheel, power-cylinders 5 6, bars operated by the cylinders

and having opposite bearings on the wheel, and mechanism for applying pressure thereto to establish frictional contact between the bars and wheel, substantially as and for the purposes described.

7. In apparatus for rotating cranes, the combination, with the crane, of a wheel, power-cylinders 5 6, bars operated by the cylinders and having opposite bearings on the wheel, and mechanism for applying pressure thereto to establish frictional contact between the bars and wheel, the opposite ends of the respective cylinders having common fluid connections, substantially as and for the purposes described.

8. In apparatus for rotating cranes, the combination, with the crane, of a wheel, power-cylinders 5 6, bars operated by the cylinders and having opposite bearings on the wheel, and cylinders 8 8, acting on the bars to press them against the wheel, said last-named cylinders having a common water-supply passage, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 9th day of September, A. D. 1890.

THOMAS JAMES.

Witnesses:

THOMAS W. BAKEWELL,

W. B. CORWIN.