

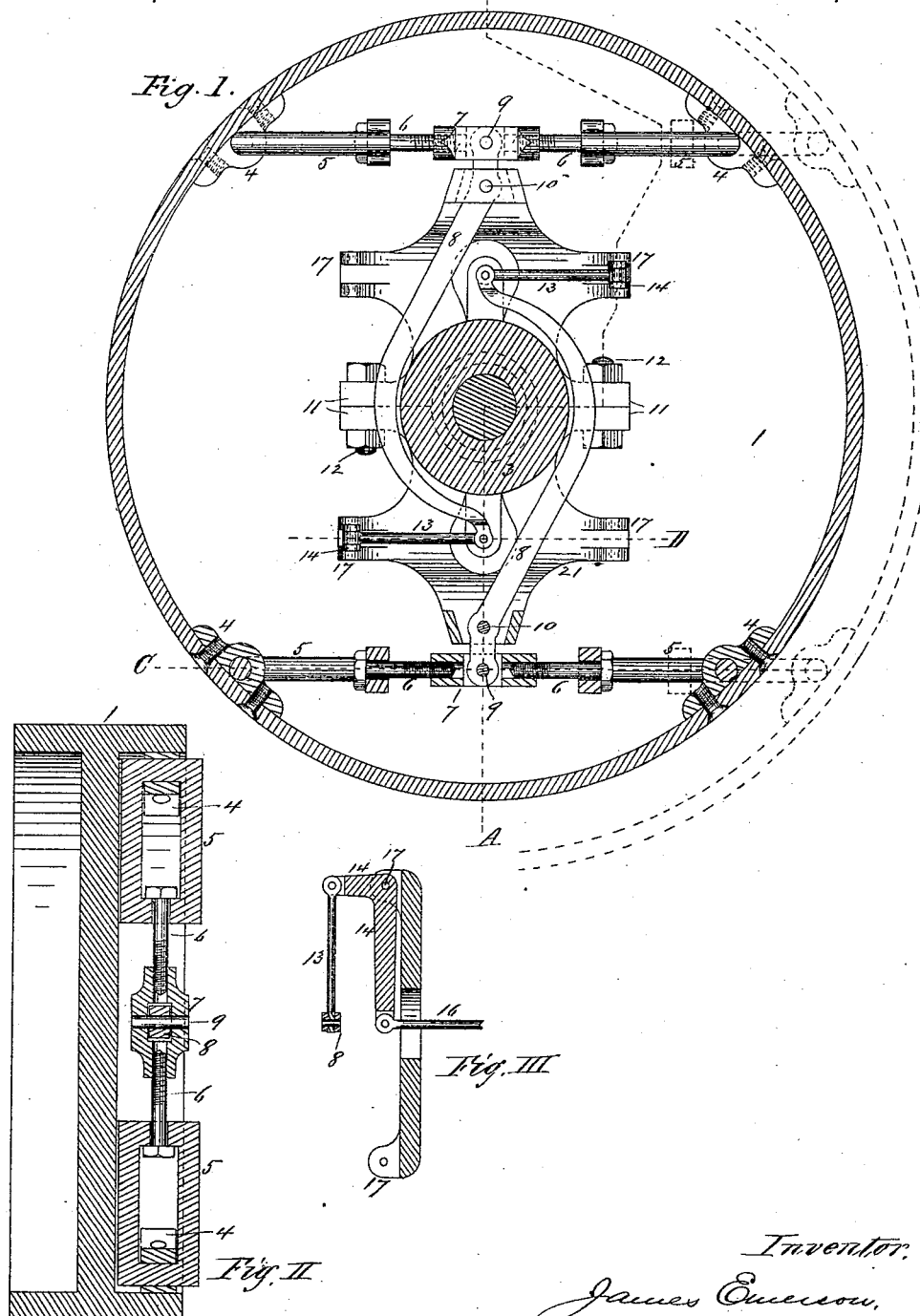
(No Model.)

2 Sheets—Sheet 1.

J. EMERSON.
POWER SCALE.

No. 266,119.

Patented Oct. 17, 1882.



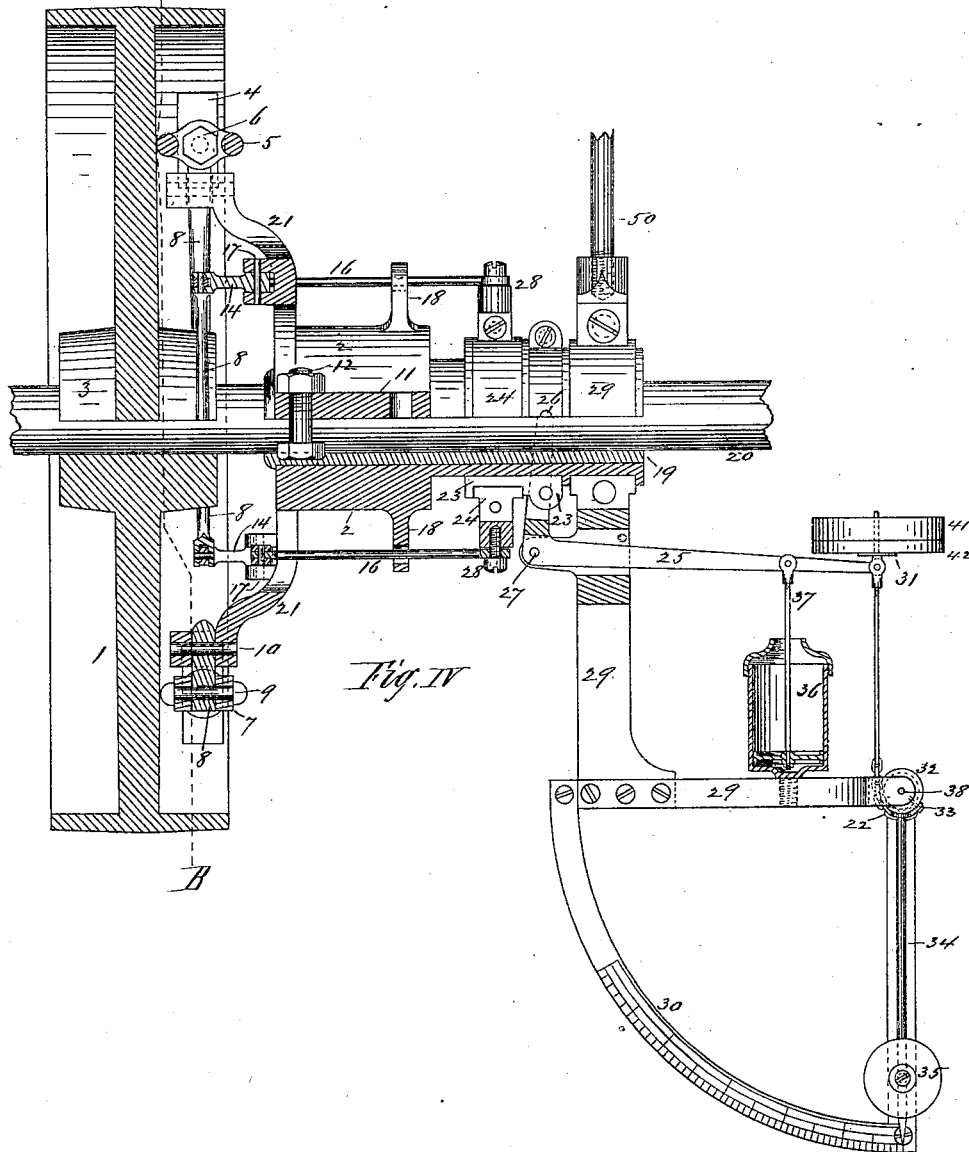
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UNITED STATES PATENT OFFICE.

JAMES EMERSON, OF WILLIMANSETT, ASSIGNOR OF ONE-HALF TO WILLIAM A. CHACE, OF HOLYOKE, MASSACHUSETTS.

POWER-SCALE.

SPECIFICATION forming part of Letters Patent No. 266,119, dated October 17, 1882.

Application filed July 10, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES EMERSON, of Willimansett, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Power-Scales or Dynamometers, of which the following is a specification and description.

The object of my invention is to provide an instrument for weighing the power required to drive mills and machinery, and which is adapted to be permanently attached to such machinery or to its driving shaft and pulley, whereby the power required to drive such machinery is accurately indicated or weighed, and I accomplish this by the mechanism substantially as hereinafter described and illustrated in the accompanying drawings, in which—

Figure I is a sectional view of my invention at line B of Fig. IV. Fig. II is a horizontal section through the pulley at line C of Fig. I. Fig. III is a horizontal section through the spider at line D of Fig. I; and Fig. IV is a sectional view at line A of Fig. I, showing a sectional view of the pulley, a half section and half side view of the spider, and a side view of the scale-beam and scale of the weighing apparatus.

In the drawings, 1 represents a pulley, ordinarily secured permanently to a shaft, as 20, and having the ordinary face to carry a belt, by which the pulley and the machinery to which it is attached is driven. To any convenient part of this pulley, as to the interior of its rim, I secure the eyes, as 4, preferably by bolts or screws, and arranged in pairs, one opposite the other, and in each eye is pivoted a link, as 5, through one end of which is inserted a bolt, as 6, whose threaded end is turned into a threaded socket, as 7, the latter being threaded at both ends to receive the bolt from each eye and link, as shown clearly in Figs. I and II.

A spider, as 2, which, for convenience of attachment to shafts of mills and machinery already erected, I construct in two halves or parts, and provided with flanges, as 11, having holes therein through which to insert bolts, as 12, is placed upon the shaft, as 20, alongside the pulley, or is placed upon a bushing, as 19, surrounding said shaft, and is firmly secured by the bolts, as 12. Each part or half of the spider is provided with a flange, as 21, which

extends up by the side of the pulley, as 1, and the opposite end of each part of the spider extends along the shaft in the form of a half-tube, so that both parts, when secured in place, surround the shaft or its bushing 19 in the form of an elongated hub.

Two prime levers, as 8, are each pivoted to the spider at 10, and the short arm of each is pivoted in the socket, as 7, at 9, and the long arm extends preferably to the opposite side of the hub, and is jointed to one end of a bar, as 13, whose opposite end is jointed to the short arm of a bell-crank lever, as 14, which is pivoted one in each half of the spider, as at 17. The other arm of each bell-crank lever is pivoted to one end of a rod, as 16, each of which rods extends through a hole in an ear, as 18, projecting from the spider, and the other end of each rod is pivoted, as at 28, to a ring, as 24, which revolves with the shaft and spider in an external groove made in a stationary collar, as 23, clamped around the hub of the spider, but so that said hub may revolve freely within said collar, and the latter is free to slide to and fro along the hub of the spider.

A supporting-frame, as 29, is clamped or secured around the hub of the spider, so that the latter may revolve freely therein, and this frame is held in a stationary position by a rod, as 50, which may be secured in the floor above or to any fixed or stationary object, as may be most convenient, and a pendent arm, as 34, provided with a cylindrical head, as 32, is pivoted in said frame at 38, and a weight, as 35, adjusted to any desired point near the lower end of said arm.

A lever, as 25, is pivoted in the frame 29 at 27, the short forked arm of which lever strides the sliding collar, as 23, and is pivoted thereto on opposite sides, as at 26. This lever, as 25, I denominate the "scale-beam," and its long arm is connected by a chain, as 22, with the cylindrical head, as 32, said chain extending partially around said head and secured as at 33; and I make a flange or disk, as 31, around a vertical rod, just above and connected with the scale-beam, upon which to place weights, as 41, so that said weights may rest upon the long arm of the scale-beam 25 when desired in the operation of weighing. Any number of these weights may be used, each being of any

predetermined and standard weight, and the action of the power used in driving the machinery upon the scale-beam, as 25, and pendent arm is precisely like that of any commodity which is being weighed in any ordinary scales, the action of the scale-beam and weights being absolutely accurate and correct in indicating the pounds of power being used to drive the machinery, while the fraction indicated by the pendent arm on the graduated scale will not materially affect the general result if not absolutely accurate. For example, suppose, in weighing the power used in driving the machinery of a mill, the weights placed on the scale-beam, as at 41, should indicate ten thousand pounds of power being used, and the indicating-arm, as 34, should in its oscillating and variable movement along the scale 30 indicate from fifty to one hundred pounds on the scale, the proportion indicated by the pendent arm, and which is to be added to the amount indicated by the weights placed on the scale-beam, would be so small as compared with the total amount that any slight inaccuracy or variableness in the movement of the pendent arm would be immaterial, and would not affect the general result, the self-weighting or pendent arm being necessary to meet the sudden changes occasioned by throwing on or off of parts of the machinery or of sudden changes in feed.

A dash-pot consisting of a cylinder, as 36, secured to the frame, as 29, and filled with oil or other liquid, with a piston fitted therein, and its piston-rod, as 37, pivoted to the scale-beam, serves to prevent any sudden or violent movements of the scale-beam caused by any sudden changes in the power applied or in the work done by the machinery.

The instrument may be permanently applied and used to test machinery and mills as follows: The eyes, as 4, are secured to the pulley which drives the machinery, as above described, whether the rim of the pulley be larger or smaller, the bolts, as 6, turned into the sockets, as 7, and the two parts of the spider are clamped to the shaft by the bolts, as 12; or, if the shaft is of smaller diameter than the bore of the spider, then a bushing, as 19, may be keyed to the shaft and the spider be clamped to the bushing, as shown in Fig. IV, and the parts pivoted and otherwise secured in place, as above described. The pulley, as 1, is made to revolve loosely upon the shaft by removing the keys or withdrawing the set-screw, and the pulley may be driven by its belt ordinarily used to drive the machinery. As the pulley is loose upon the shaft, the first impulse of the belt will be to turn the pulley independently of the shaft and spider; but this slight rotary movement of the pulley actuates the prime levers, as 8, which, through the medium of the bell-crank levers and rods pivoted thereto, causes the collar, as 23, to slide upon the shaft toward the pulley, which operates to throw up the long arm of the scale-beam, as 25, and through the medium of the chain, as

22, causes the pendent arm and weight, as 35, to move along the graduated scale, as 30, made on the lower part of the frame 29, and the number of pounds exerted by the belt to turn the machine will be indicated by the weights placed on the end of the scale-beam and by the numbers on the scale by the pointed end of the arm 34, which is beneath the pendent weight 35. The point where the short arm of each prime lever, as 8, is pivoted to its socket, as at 9, determines the length or distance of each revolution—that is to say, suppose these pivots, as 9, are at such a distance from the axes of the spider or from the axis of the shaft to which it is attached that the said pivots move a distance of ten feet at each revolution of the shaft, then, the number of revolutions of the shaft being known, the power may be easily computed. This distance of the pivots, as 9, in the short arm of each prime lever, whatever distance may be determined upon, may always remain the same, and all the parts of the instrument may be made alike and of one pattern, so that every entire instrument may be finished and completed at the manufactory where they are made, and when sent out for mills and factories may be adjusted permanently to shafts and pulleys of different sizes by any adjustable fittings to secure the prime levers of the pulleys, substantially as above described, the particular construction of these fittings being unimportant. If the fittings above described are used, if the pulley be small, it is only necessary to turn the swivel-bolts, as 6, farther into the sockets, as 7, than when the pulley is larger, the fitting being secured in precisely the same manner whether the pulley be large or small, as shown in Fig. I.

I make the spider in halves or parts only for convenience of attaching the instrument to shafts and pulleys of mills and machinery already erected; but when desired, as in attaching it to new mills and machinery, I make the spider in one piece or whole and attach it to the shaft or to a bushing thereon by the ordinary spline and key.

The long arms of the prime levers are extended partially around the hub of the pulley, to give an extended leverage and cause as much of the strain as possible to be in the plane of the rotation of the pulley, and, as all the movable parts of the instrument are supported upon the spider and its hub, all end thrust or pressure upon the shaft is obviated, the shaft has no tendency to work or move endwise, and none of the power exerted upon the instrument in its use is absorbed by the shaft.

Having thus described my invention, what I claim as new is—

1. The combination, in an improved power-scale, of a spider adapted to be secured to a shaft and forming a hub around said shaft, a sliding collar, and a stationary weighing-frame supported upon said hub, and two prime levers having their fulcrums in said spider, substantially as described.

2. In an improved power-scale, the combina-

tion of a spider adapted to be supported upon a shaft, prime levers having their fulcrums in said spider, with their long arms connected with and adapted to operate the weighing mechanism, and with their short arms pivoted in a socket or support and adapted to be secured to pulleys of different sizes, substantially as described.

3. In an improved power-scale, the combination of a stationary frame, a pivoted scale-beam whose short arm is connected with and is operated by a sliding collar, and whose long arm is adapted to receive fixed weights, a graduated scale, and an indicating-arm pendent from said frame and connected with said scale-beam, substantially as described.

4. In an improved power-scale, the combination of a stationary frame, a pivoted scale-beam having its short arm connected with and operated by a sliding collar, a graduated scale, an indicating-arm pendent from said frame, a cylinder closed at its lower end and secured to said frame, and provided with a piston connected by a rod with said scale-beam, substantially as and for the purpose set forth.

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