(No Model.)

G. W. RYMES.

DEVICE FOR BALANCING ROTATING PARTS.

No. 525,799. Patented Sept. 11, 1894.

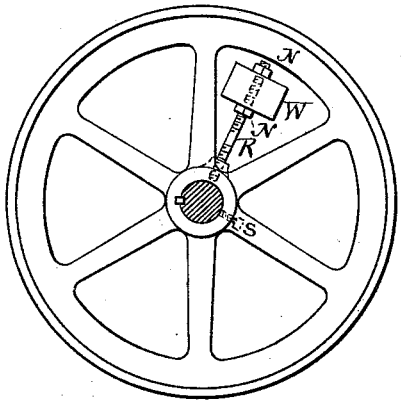

Fig. 1.

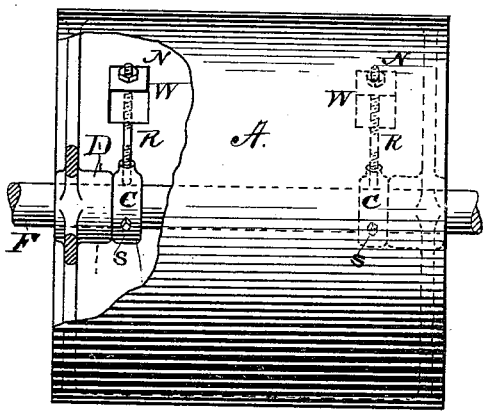

Fig. 2.

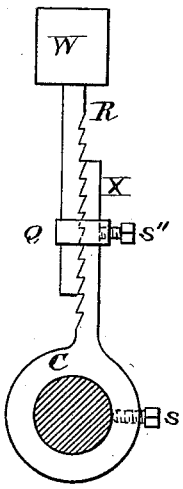

Fig. 4.

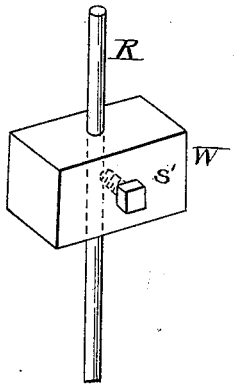

Fig. 3.

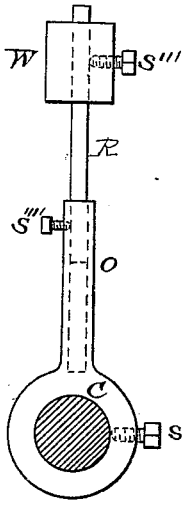

Fig. 5.

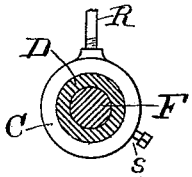

Fig. 6.

WITNESSES.

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DEVICE FOR BALANCING ROTATING PARTS.

SPECIFICATION forming part of Letters Patent No. 525,799, dated September 11, 1894.

Application filed April 26, 1892. Serial No. 430,748. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. RYMES, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful devices for balancing cylinders, wheels, pulleys, and other parts of machinery, especially the cylinders of carding-machines, which are designed to have a rotary motion, of which the following is a specification.

My invention relates to devices for balancing parts of which the mass is not evenly distributed about the axis of rotation, and in which by reason of the excess of centrifugal force on the heavier side there is a tendency to strain in the cylinder or part, or in the shaft, or in which, by reason of the excess of weight on one side, there is a tendency to sag, or assume and remain in a position in which the heavier side is underneath. These tendencies are often objectionable, the first causing frequently jarring of the machinery, distortion from the true course of rotation, or interfering with uniformity of rotation, while the second may even reverse the direction just before the moving part comes to rest after being cut off from power.

These effects have heretofore been imperfectly obviated by affixing immovable weights to the lighter side of the part to be balanced. In this method it is difficult and inconvenient to secure the counterweights in the correct position in the absence of means for ready and complete adjustment, and to determine the amount of weight required with exactness.

In cylinders for carding machinery and for cotton beating machinery the counterweights have usually been affixed to the interior surface of the cylinder, which is generally comparatively thin, and by their centrifugal force and concentration in a small area they have, by springing or bending the material in the immediate vicinity where they have been applied, produced distortions or bulges on the outer surface, sometimes permanent and sometimes continuing and varying during rotation which could only be remedied by making the cylinder heavier than it should be.

My invention is illustrated by the accompanying drawings which shows its application to a carding cylinder, and sundry alternate forms.

In the drawings Figure 1 shows the cylinder of a carding machine in end elevation, the part known as the spider being keyed onto the shaft, and the whole counterbalanced by my improved devices. Fig. 2 shows a side elevation of the same with its surface broken away enough to show one of my balancing devices attached, another being indicated, which is often necessary. Fig. 3 shows in perspective an alternate method of attaching an adjustable counterweight to its rod by a set screw. Figs. 4 and 5 are elevations showing alternate means of attaching an adjustable counterweight to a collar by a rod. Fig. 6 is a sectional detail.

Similar letters in the views refer to similar parts.

A is the cylinder.

C, C, are collars bored and tapped to receive the set screws S. S. In the arrangement shown in Figs. 1 and 2 the collars C, C, are also bored and tapped to receive the threaded ends of the rods R, R.

W. W. are counterweights of suitable size, in Figs. 1 and 2, tapped and bored to screw upon the free end of the rods R. R threaded to receive them.

N. N. N. N. are lock nuts which fix the weights in place upon the rods when adjusted.

The set screws S. S fix the collars in position upon the shaft F when adjusted.

Fig. 3 shows a variation in the mode of attaching the counterweight W. which is bored to fit and slide on the rod R and is secured in varying positions thereon by the set screw S′, the mode not essentially differing from that shown in Figs. 1 and 2.

Other alternate methods, not differing, in essential principle, from the foregoing, by which the counterweight is adjustably attached to the collar at different distances therefrom, are shown in Figs. 4 and 5.

In Fig. 4 the counterweight is attached to, or may form part of the rod R which has a series of notches or indentations, into which fit corresponding projections on arm X attached to, or forming part of the collar C, the notches and projections being indiscriminately in either of the parts X and R. The rod R is

moved along the arm X until the counterweight W is in proper position, one or more of the indentations of the one part being entered by one or more of the projections of the other, when the rod is secured to the arm by means of the strap Q held in place by the set screw S''. Obviously the counterweight may be thus adjusted and fixed at varying distances from the shaft.

In Fig. 5. W is the counterweight attached to and movable upon the rod R, and fastened in different positions thereon by the set screw S''', the rod R fitting loosely in a sleeve O attached to, or forming part of the collar C and adjustably fastened in different positions therein by the set screw S''. The adjustment from the axis may be made by moving the counterweight on the rod or the rod in the sleeve. Obviously like adjustment may be had by threading the rod entering the sleeve and tapping the sleeve, so that the rod may be screwed into the sleeve.

It is obvious that the angular adjustability of the collars to which the weights are attached renders it easy to place and fix the weights in proper position opposite the center of gravity of the excess of weight on one side of the cylinder; and also that as the counterweights are moved from or toward the axis of rotation, their leverage, and consequent effectiveness in balancing such excess of weight upon the opposite side of the cylinder, will increase or diminish, and may readily be made exactly equal to the requirements, while the amount of weight used need be only approximately determined. This arrangement which leaves the counterweights independent of the surface of the cylinder, obviates the springing or bending of its contour hereinbefore referred to, while their ready adjustability removes the difficulty heretofore experienced, of fixing them in proper position.

Obviously the advantage of angular adjustment on the axis for a counterweight is not confined to cases where the counterweight has adjustability at different distances from the axis but it accrues generally where a counterweight is used with a rotating part.

The counterweight in operation is attached to and rotates in unison with the part to be balanced. This attachment may be made directly to such part or by means of an intervening piece or, when the shaft on which the part rotates is attached to it and rotates with it, attachment to the shaft constitutes attachment to the part but not when the shaft does not rotate with it. In the latter case the counterweight must be attached to the part directly or by some intervening connection. Thus Fig. 6 shows a section of the shaft F and hub D of the cylinder taken through the line *z*—*z* Fig. 2 having a collar C adjustable on the hub D and fastened thereto in any angular position required by the set screws S, and carrying the counterweight attached to it by the rod R on which it is adjustably fastened at different distances from the axis of rotation in the manner shown in Fig. 2. This mode of attachment is equally useful when the shaft does rotate with the part to be balanced and when it does not. This part may of course be supported for rotation by a shaft which does or does not rotate or by projections on opposite sides working in bearings in the usual way, the attachment shown in Fig. 6 being useful in either case. When the collar is attached to the rotating shaft the advantage accrues that the counterweight may be moved longitudinally of the shaft for adjustment relative to the center of gravity of the part to be balanced.

The collar with its attached counterweight has a nice angular adjustment, on the axis, relatively to the portions of the part to be balanced which require to be counterbalanced, in each of the modes of attachment, which is secured by the partial rotation of either the collar or part on the axis, the one independently of the other while a means of fastening the collar to the part is provided when the counterweight is in the angular position required. The collar is such a part as will fit upon the part to which it is to be attached in the different angular positions required, and touch the same in points enough properly to sustain the counterweight in rotation. Thus if in Fig. 5 the collar had an interior diameter so great as not to touch the shaft but three set screws like set screw S were passed through the same one hundred and twenty degrees apart to contact with the shaft, the set screws and frame in which they were would constitute a collar and the tightening of one would attach the counterweight to the shaft.

When the double adjustment secured by variation of the counterweight in distance from the axis and angular position is required, the counterweight may be integral with the rod which is adjustably attached to the collar, as in Fig. 4, or a separate weight adjustable on the rod as in other figures, but when only the angular adjustment is required it may simply be a projection of the collar itself.

What I claim as my invention, and for which I pray Letters Patent, is—

1. A part to be balanced, a collar, and a counterweight attached to the collar, all arranged on an axial support to rotate upon the same axis, and to rotate thereon in unison when rigidly attached together, of which, when the part and collar are not fastened together, the one is supported and arranged to have a partial rotation upon the axis independent of the other whereby the counterweight may be brought in different angular positions on the axis, relative to the portions of said part to be balanced which require to be counterbalanced, to counterbalance the same, combined with means of fastening such part and collar together in each of said positions to compel them and the counterweight

to rotate in unison, all said parts being constructed and arranged substantially as described.

2. A part to be balanced, a collar, and a counterweight attached to the collar, all arranged on an axial support to rotate upon the same axis and to rotate thereon in unison when rigidly attached together, the counterweight having a means of attachment to the collar at different distances from the axis, of which, when the part and collar are not fastened together, the one is supported and arranged to have a partial rotation upon the axis independent of the other whereby the counterweight may be brought in different angular positions on the axis, relative to the portions of said part to be balanced which require to be counterbalanced, to counterbalance the same, combined with means of fastening such part and collar together in each of said positions to compel them and the counterweight to rotate in unison, all said parts being constructed and arranged substantially as described.

3. A carding cylinder combined with a collar having a counterweight attached to it, all arranged on an axial support to rotate upon the same axis in unison when fastened together, when, of the cylinder and collar, the one is arranged to have a partial rotation upon the axis independent of the other, when not fastened together, whereby the counterweight is brought into various angular positions on the axis relative to portions of the cylinder requiring to be counterbalanced, the collar and cylinder having means for fastening them together, all said parts being constructed and arranged substantially as described for the purposes described.

4. A carding cylinder combined with a collar having a counterweight attached to it, all arranged on an axial support to rotate upon the same axis in unison when fastened together, the counterweight having a means of attachment to the collar at different distances from the axis, when, of the cylinder and collar, the one is arranged to have a partial rotation upon the axis independent of the other when not fastened together, whereby the counterweight is brought into various angular positions on the axis relative to portions of the cylinder requiring to be counterbalanced, the collar and cylinder having means for fastening them together to compel rotation in unison, all said parts being constructed and arranged substantially as described for the purposes described.

5. The part to be balanced A, and collar C, each arranged to rotate on the shaft F and fastened together by the set screw S, combined with the counterweight W attached to the collar C, all said parts being constructed and arranged substantially as described.

6. The carding cylinder A and collar C, each arranged to rotate on the shaft F, and fastened together by the set screw S, combined with the counterweight W adjustably attached to the collar at different distances therefrom by the threaded rod R with means of fastening the counterweight at the desired distance from the axis, when screwed into such position by use of the thread.

March 10, A. D. 1892.

GEORGE W. RYMES.

In presence of—
SAMUEL B. READ,
JOHN J. WYETH.