(No Model.) 2 Sheets—Sheet 1.

J. M. HETHERINGTON.

APPARATUS FOR CONTROLLING THE GRINDING OF CARDING ENGINE FLATS.

No. 409,462. Patented Aug. 20, 1889.

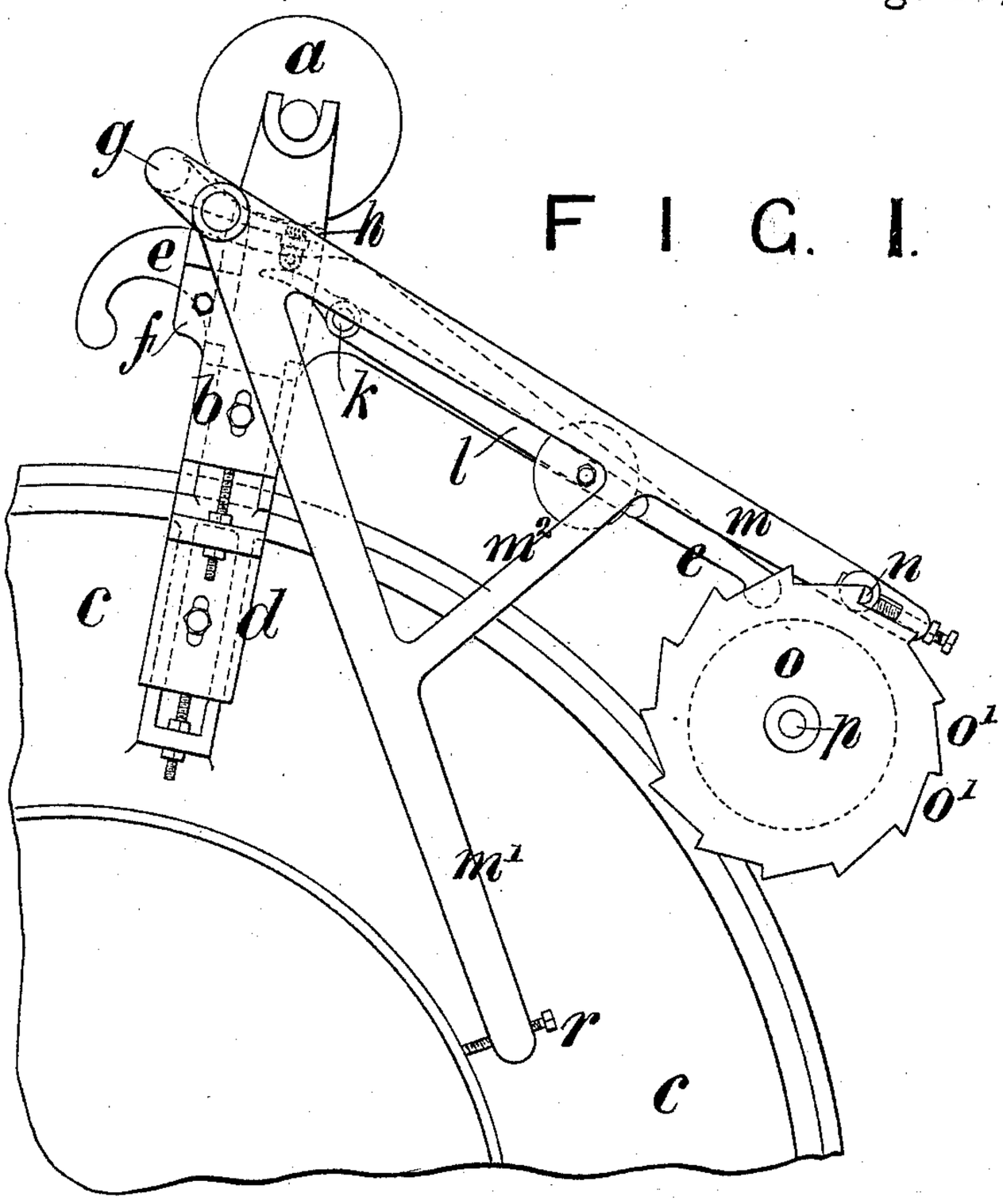

FIG. 1.

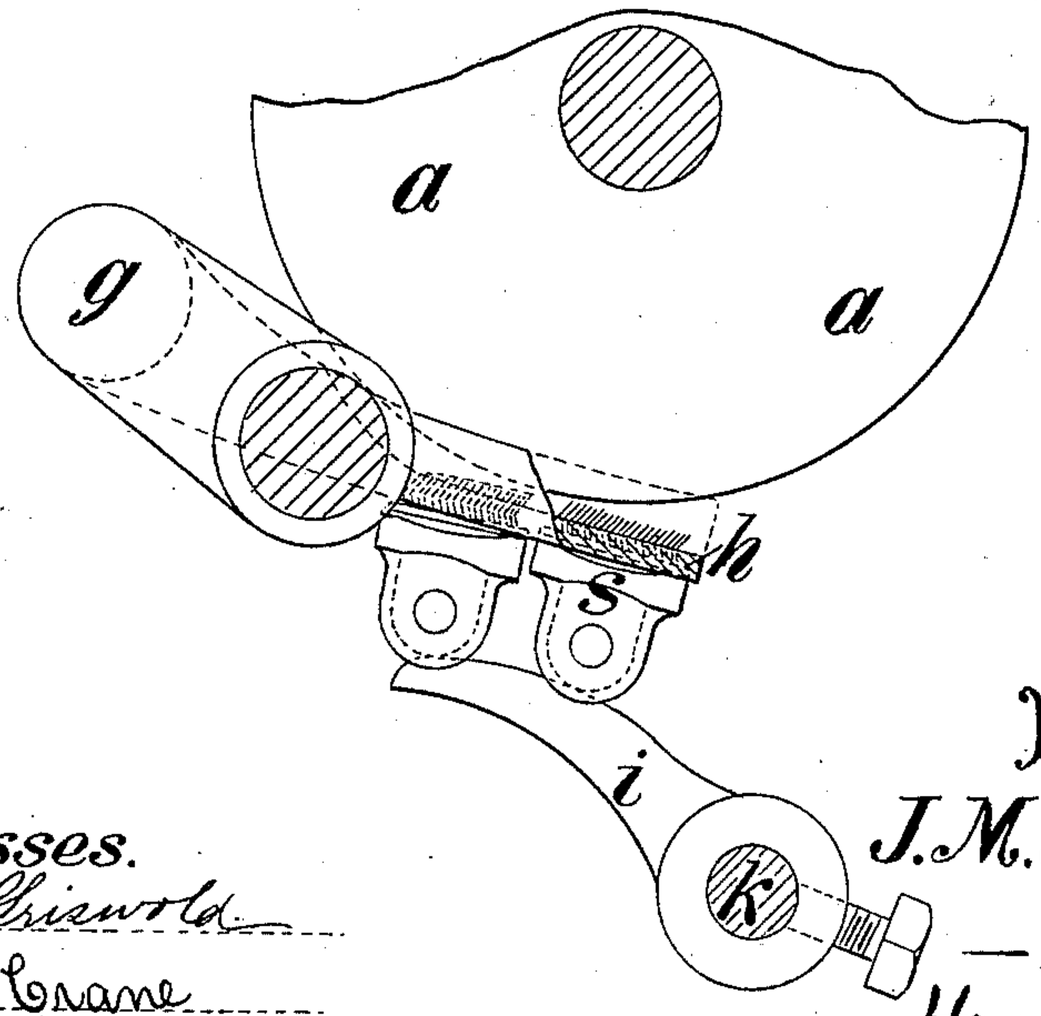

FIG. 2.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

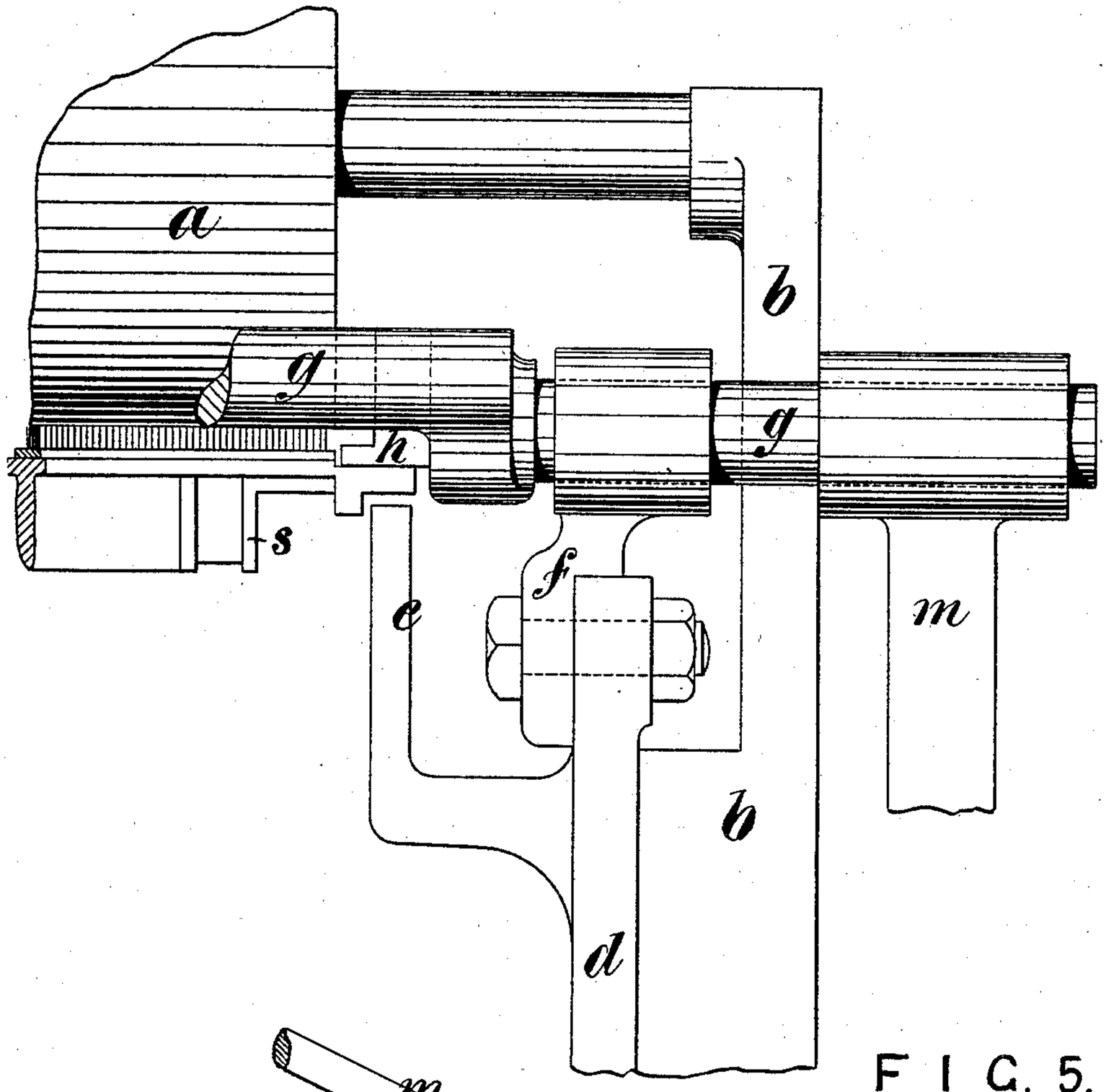


FIG. 4.

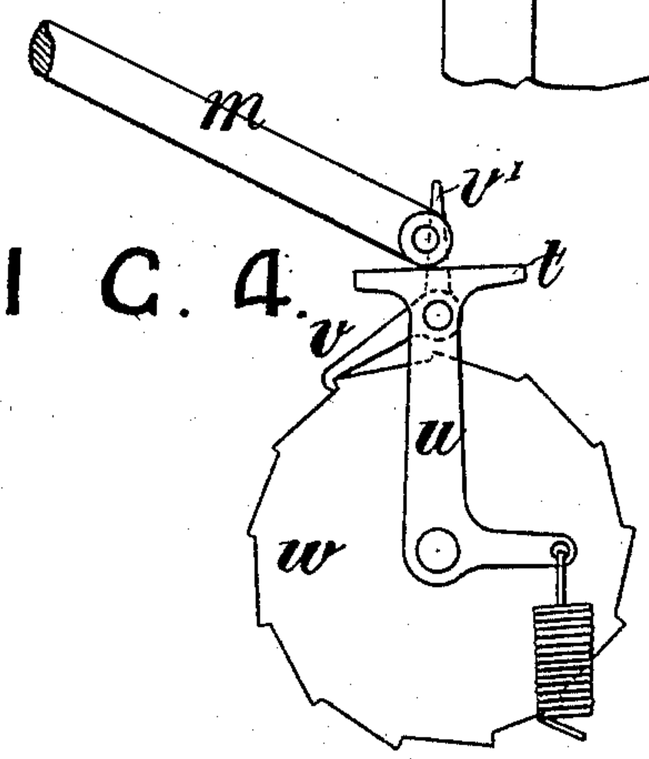
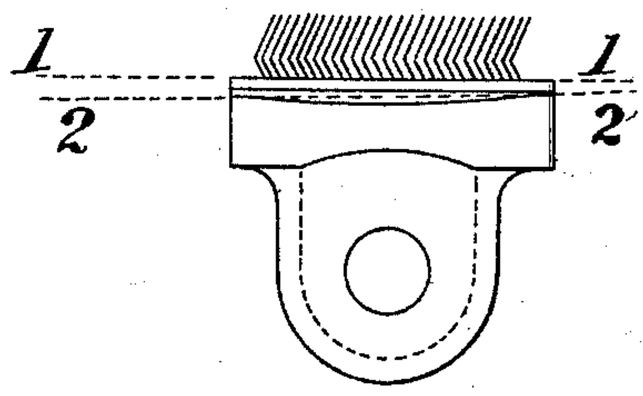


FIG. 5.



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UNITED STATES PATENT OFFICE.

JOHN MUIR HETHERINGTON, OF MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR CONTROLLING THE GRINDING OF CARDING-ENGINE FLATS.

SPECIFICATION forming part of Letters Patent No. 409,462, dated August 20, 1889.

Application filed May 28, 1888. Serial No. 275,277. (No model.) Patented in England February 21, 1887, No. 2,642.

To all whom it may concern:

Be it known that I, JOHN MUIR HETHERINGTON, machine-maker, a subject of the Queen of Great Britain and Ireland, of the Vulcan Works, Pollard Street, Manchester, county of Lancaster, England, have invented certain Improvements in Apparatus for Controlling the Grinding of Carding-Engine Flats, (for which I obtained a patent in Great Britain No. 2,642, dated February 21, 1887,) of which the following is a specification.

My invention relates to the grinding of the flats which are employed in carding-engines in the form of endless chains, as is well understood. In the carding operation these flats are guided by the sliding of surfaces formed on the flat upon curved guides or flexible bends, the said surfaces on each flat, sometimes termed the "working-faces," being inclined with respect to the card-surface. It is of importance that the relation of such working-faces and of the card-surface shall be exactly maintained during the grinding, and this is the object of my invention. I arrange for the working-faces to be kept in sliding contact with movable guide-rails during the grinding of the flat, and I move these guide-rails toward and from the grinder for the grinding of each flat.

My invention will be best understood when described with reference to the accompanying drawings.

Figure 1 is a side elevation of the grinding apparatus and exhibits so much of a carding-engine as is necessary to the proper illustration of the method of application of the apparatus. Fig. 2 shows a part of the apparatus drawn to a larger scale. Fig. 3 is a view of the same parts taken on a plane at right angles to that of Fig. 2, but on a larger scale. Fig. 4 shows a modification in the cam-action. Fig. 5 shows the relation of the card-surface to the working-face. In this figure 1 is the carding-surface and 2 is the working-face, which slides upon the bends.

The dotted lines indicate the angular relation of the carding-surface with respect to the working-face.

In Figs. 1, 2, and 3, *a* is an ordinary grinding-roller, *b* is a grinding-roller bracket, and *c* is part of the side frame or fixed bend of a carding-engine. The bracket *b* is secured to an adjustable carriage *d*, to which is fixed a rail *e*, upon which the flats travel when approaching and leaving the grinding-roller. To the same carriage is secured a bracket *f*, in which is formed a bearing for one end of a cranked shaft *g*, which extends across the engine and is mounted by its other end in a corresponding bracket on the other side of the engine. The shaft *g* is cranked back, as appears most clearly in Figs. 2 and 3, in order that it may clear the grinding-roller. Upon the said shaft are formed or fixed two short levers—one on each side of the engine—one of these levers appearing at *h*. The short levers act as guide-rails for the flats while they are being ground.

Upon the under side of each guide-rail *h* is formed a prepared face upon which the flats travel while being ground. The said face is carefully finished to have the same curve as the flexible bend upon which the flats travel, the same working-face upon the flat sliding upon the curved faces of the two parts—that is to say, of the guide-rail *h* and the flexible bend. As each flat while being ground is pressed into contact with the two guide-rails *h*, these parts determine the extent of the grinding of the flat and also the form of carding-surface resulting from the grinding. In the part of the rail *e* which is immediately below the guide-rail *h* a slight concave recess is formed, in order that the chain of flats may be deflected downward to some extent at this point. It will be seen that the tension of the chain tends to keep the chain in sliding contact with the curved face on the guide-rail *h*. To further insure the maintenance of this sliding contact during the grinding operation, each flat while being ground is pressed upward by means of two fingers *i*, which are fixed upon a shaft *k*, which crosses below the upper flats from one side of the engine to the other, and is mounted in bearings formed in the two rails *e*. Upon one end of the shaft is fixed a loaded lever *l*, which by tending to turn the said shaft causes the fingers *i* to press upward upon the back of the flat being ground. Upon the outer end of the cranked shaft *g* is fixed a long lever, which in the example is formed with two arms *m* and *m'*, connected together by means of a cross-piece m^2. The arm *m* is provided with a stud *n*, which rests upon a cam-wheel *o*, which is fixed upon the shaft *p* of the chain-wheels

over which the chain of flats passes and which give motion to the same. The said cam-wheel is cut or formed with a number of faces o', which are flat or curved or otherwise shaped, according to the form to which the carding-surfaces of the flats are to be ground. The said faces correspond in number to the number of teeth or recesses in the wheels upon the shaft p, so that the said cam-wheel rotates to the extent of the distance between the centers of two adjacent faces o' o' during the time that the chain of flats travels a distance equal to the length of one of its links. As the cam-wheel rotates, the end of the lever-arm m is raised and lowered as each flat passes below the grinding-roller. The arm m' is provided with an adjustable stop-screw r, which, when the lever m drops, comes in contact with a fixed part of the engine-framing, and so determines the lowest position of the said lever, and, as a consequence, of the guide-rails h. The parts are so arranged and adjusted that the lever m is being raised during the time when a flat is being ground. On the stud n reaching the end of one of the faces it drops off the end and the flat is thereby slightly lowered by the guide-rails h h.

In Fig. 1 the parts are in the position assumed when the guide-rail has just dropped. This occurs just at the time when the grinding of a flat has been completed and the next flat is about coming into the range of action of the grinding-roller, the lowering of the flats which are in contact with the guide-rail h bringing the next flat into position for the grinding to be commenced. Supposing the parts to be in the positions as shown in Figs. 1 and 2, the flat s in the latter figure will pass below the grinding-roller and be ground; but it will be seen that if the guide-rails h h were stationary one edge only would be acted upon by the grinder, owing to the inclination of the working-faces on the flat-bars, as is well understood. In the apparatus the guide-rails h are slowly raised by the action of the cam-wheel upon the lever m, and if it be desired that the carding-face of the flat shall be ground flat and parallel with the face of the bar to which the card-flat is secured, the cam-wheel is so shaped that the rise of the guide-rails h just compensates for the inclination of the working-faces upon the flat-bar ends. When the flat has been ground, and just about the time that the next flat comes within the range of action of the grinder, the arm m is dropped, as aforesaid, and the lifting of the guide-rails immediately recommences. It will be seen that the grinding of the flats can be controlled so as to obtain any required form of carding-face by making the cam-wheel of suitable formation.

I do not confine myself to the precise curvature of the faces on the levers h, as described, as such curvature might not be considered to be necessary. The apparatus might be varied by substituting sliding parts for the short levers h and connecting such parts with the lever m, so that such parts would be raised and lowered at the required times and to a suitable extent. I might employ a vibrating incline or lifter to act upon the said lever. Such an arrangement is illustrated by Fig. 4. In this example an incline t, acting upon a bowl upon the lever m, is carried by a vibrating lever u. Upon this lever is mounted a catch or hook v, which engages with one of the teeth of a rotating ratchet-wheel w, so that the lever m is carried around with the said wheel so long as the catch remains engaged with the wheel, the incline acting upon the bowl to raise the lever m. At the time when the said lever is to be dropped the catch is released by reason of a tail v' upon the catch coming into contact with an adjustable stop, and the lever is drawn quickly back by means of a spring. These movements being repeated each time that a flat passes below the grinding-roller, a result is obtained corresponding to that obtained with the arrangement illustrated in Figs. 1, 2, and 3.

Having now described my invention, I declare that what I claim is—

1. In apparatus for grinding the traveling flats of carding-engines, the combination of a grinding-roll and movable guide-rails, against which the working-faces of the flats are pressed during the grinding, with a lever connected to and controlling the guide-rails, and a cam having faces to act on said lever to move each flat toward the grinding-roller while the flat is being ground and to quickly withdraw the flat when the grinding is finished, all substantially as set forth.

2. In apparatus for grinding the traveling flats of carding-engines, the combination of a grinding-roller and movable guide-rails, against which the flats are pressed at opposite sides of the engine, with a cross-bar connecting the guide-rails, a lever on said cross-bar, and a cam controlling the said lever, whereby the outer end of the latter is slowly lifted during the time the card is in contact with the grinder, and is dropped just before the next flat in the chain touches the grinder, all substantially as set forth.

3. In apparatus adapted for application to a carding-engine for grinding the traveling flats, the combination of a grinding-roll, and the movable guide-rails upon which the faces of the flats slide during the grinding, with a lever connected to and controlling said guide-rails, and a cam to act upon the lever to slowly move it during the grinding to compensate for the inclination of the working-face of the flat, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN MUIR HETHERINGTON.

Witnesses:

EDWARD K. DUTTON,

FREDK. DILLON.