(No Model.) 2 Sheets—Sheet 1.

W. L. GODDARD.

COILED SPRING COMPRESSOR.

No. 377,803. Patented Feb. 14, 1888.

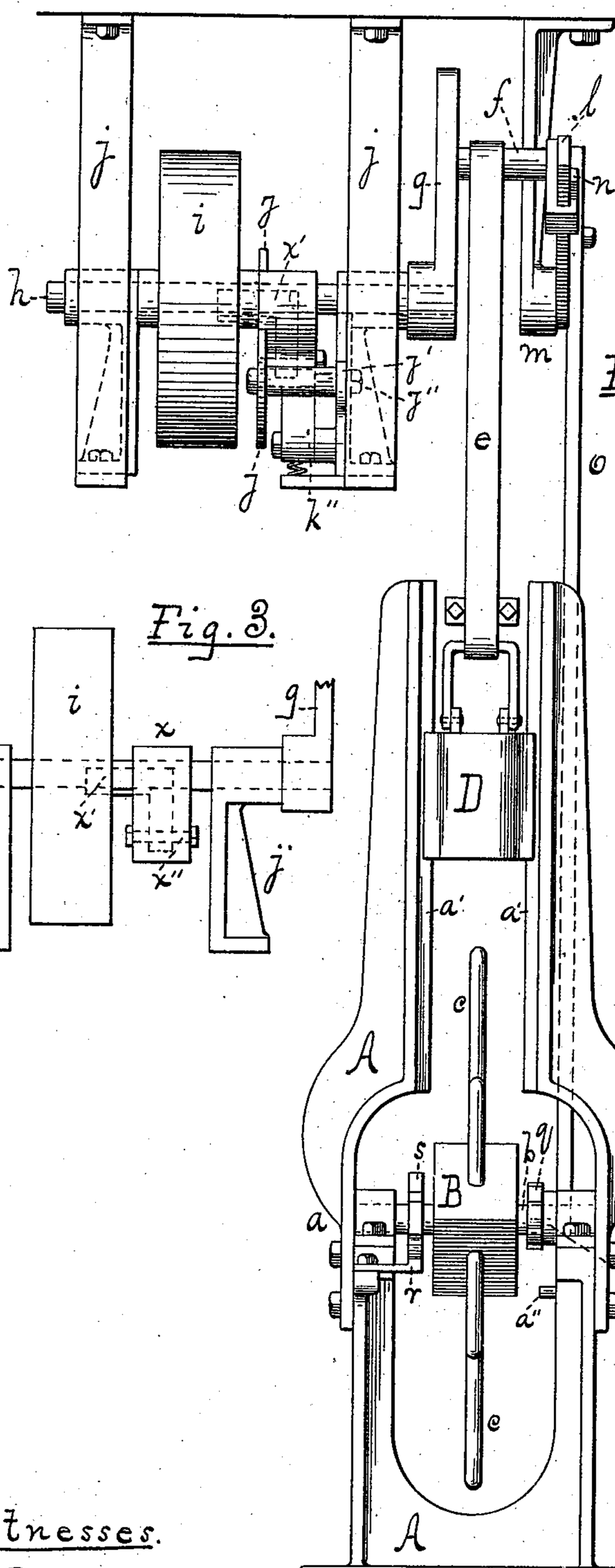

Fig. 1.

Fig. 3.

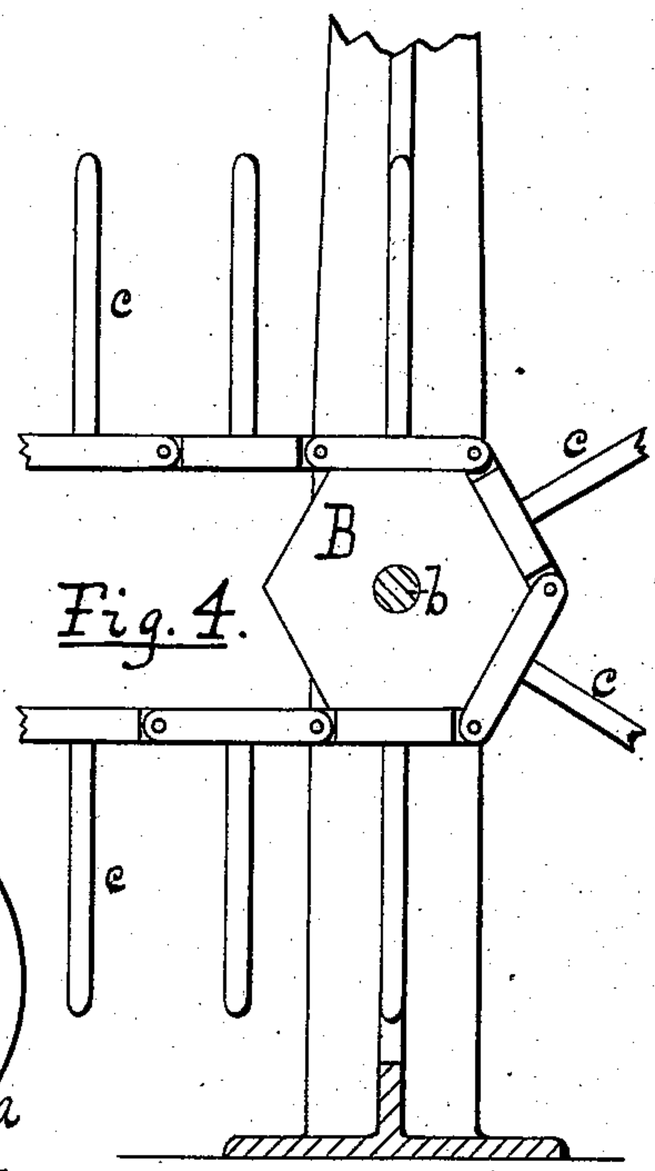

Fig. 4.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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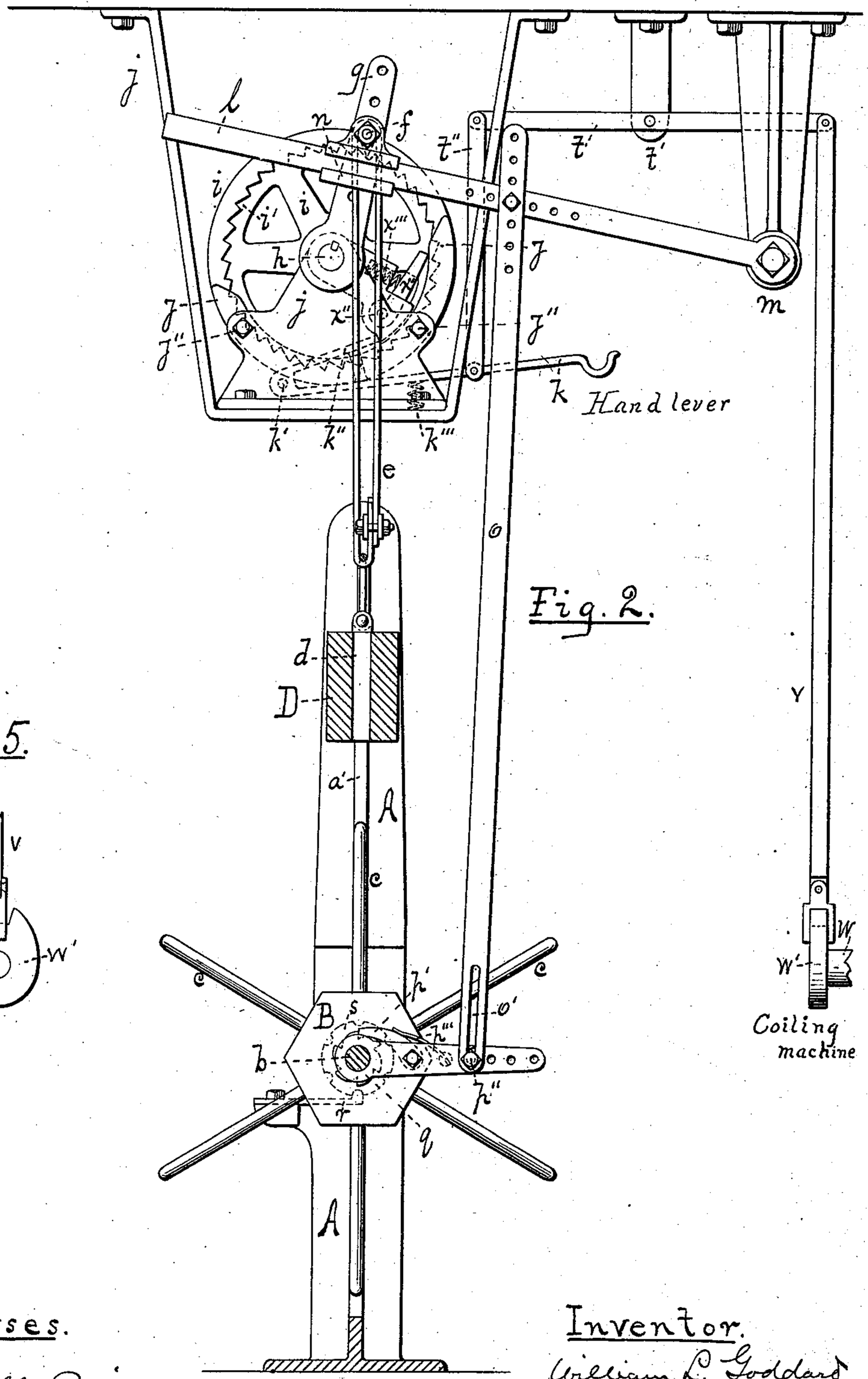
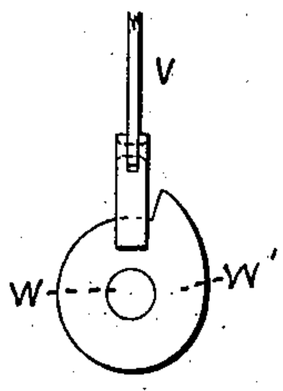


Fig. 2.

Fig. 5.



Witnesses.

F. Eslette Briggs

Geo. C. Braidberd.

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William L. Goddard

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UNITED STATES PATENT OFFICE.

WILLIAM L. GODDARD, OF BROOKLYN, ASSIGNOR TO PETER SCHNEIDER SONS & CO., OF NEW YORK, N. Y.

COILED-SPRING COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 377,803, dated February 14, 1888.

Application filed February 17, 1887. Serial No. 228,010. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. GODDARD, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Coiled-Spring Compressor, of which the following is a specification.

A coiled spring, whether formed by power machinery or by hand, and whether by being wound upon blocks or by being forced against a deflecting-surface, requires longitudinal compression after being wound in order to give it consistency. To produce the best result it is necessary, especially with upholstery-springs, that this compression should be applied directly in the line of the length of the spring evenly upon all sides of it and simultaneously upon all sides—*i. e.*, without allowing one side to be under pressure at any moment except when every other side is under pressure, in order to prevent any bending or twisting of the spring in the line of its longitudinal axis.

The main object of my invention is to supply a machine by which this may be done by power as fast as the springs can be made.

In the accompanying drawings, in which the same letters indicate like parts, Figure 1 is a front elevation of the entire machine. Fig. 2 is a side elevation of the same with one side of the frame cut away, showing also an attachment for operating the compressor from a coiling-machine. Fig. 3 is a detailed view of certain parts by which the regular action of the compressing-weight is controlled. Fig. 4 is an alternative form of the drum, and Fig. 5 is a view of a cam to operate the compressor from the coiler.

These drawings are made with special reference to a machine for the compressing of upholstery-springs; but the same principles can be applied in the compressing of any kind of coiled-wire springs.

A is an upright frame having bearings at *a*, in which turn the two ends of the axle *b* of a drum, B. This drum may have four, five, six, or any convenient number of flat faces, in the center of each face being firmly fixed a spoke, *c*, to receive in succession the springs to be compressed.

D is a weight with flat under surface moving up and down in the frame A, guided therein by the perpendicular flanges *a'* upon the frame, which fit into corresponding grooves in the weight. The weight has a hole, *d*, into which the spokes *c* pass when it descends.

D is held up by means of a strap, *e*, hanging from a crank-pin, *f*. The crank-arm *g* is rigidly attached to a shaft, *h*, which revolves in bearings in a frame, *j*, depending from the ceiling. D is designed to descend by its own weight upon the uncompressed springs presented to it in rotation upon the spokes *c* and to be raised by power operated through the pulley *i* in a manner to be hereinafter described.

To turn the drum B, after the weight has been raised, the following automatic mechanism is provided:

l is a rod pivoted to some stationary point *m* and sliding at its other end in a block, *n*, which is pivoted upon the crank-pin *f*. To the rod *l* is pivoted another rod, *o*, between the sliding block *n* and the pivot *m*. *o* has a short longitudinal slot, *o'*, at its lower end, in which runs a pin, *p''*, fixed upon a lever, *p*. The other end of the lever *p* turns loosely upon the drum-axle *b*, and a pawl, *p'*, pivoted upon *p*, engages with a circular rack, *q*, affixed to the axle *b* of the drum B, the number of teeth in the rack being the same as the number of faces on the drum. A spring, *p'''*, is to keep the pawl in engagement with the rack. Another circular rack, *s*, is affixed to the axle *b* upon the opposite side of the drum. (See Figs. 1 and 2.) This rack has rounded cavities corresponding in number and positions to the spokes *c*, into which fits the rounded head of a flat spring, *r*, whose other end is bolted to the frame A. The purpose of this is to stop and hold the drum in position with its spokes directly under the hole *d* in the weight.

The weight is raised by the following automatic mechanism: The pulley *i*, which connects by belt with the power, is loose upon the shaft *h* and is turning thereon continuously. It has an interior circular rack, *i'*. The pawl *x'*, which is connected by intermediate parts to the weight D, engages with this rack during the half-revolution necessary to raise the weight. It is pivoted, at *x''*, upon the lower end of an arm, *x*, which is itself rigidly attached to the shaft *h*, thus making a continuous connection between the pawl *x'* and

the weight. A spiral spring, x''', within a cavity of the arm x bears against x' to press it outward. The relative relations of the shaft h, pulley i, arm x, with its pawl x', and crank-arm g are shown in Fig. 3, from which all the other parts are omitted.

The mechanism by which connection between the rack i' and pawl x' is made and broken consists of a stationary semicircular piece, y, securely bolted, by means of arms y', to the frame j at y''. During half of the revolution the end of the pawl x' rests against this piece y, the interior surface of which extends inward just sufficiently to clear the teeth of the rack i' and so keep x' out of engagement with i'. y has beveled ends, Fig. 2, and its length and position are calculated, so that the pawl x' shall in its revolution reach the right-hand end and be released from the rack just after the crank-pin f, which supports the weight, has reached its highest position and shall reach the left-hand end of y and again engage with the rack just as f reaches its lowest position.

To start and stop the machine there is provided a bent lever, k, pivoted at k' to the frame j. The end of its shorter arm, k'', just reaches to the lower end of the arm x, and holds that arm and also the weight in the position shown in Fig. 2 after the pawl x' has been disengaged from its rack. A coiled spring, k''', bearing against the frame, presses k upward.

The operation of the parts already described is as follows: A spring to be compressed being upon the spoke immediately under the weight D, and all the parts being in the position shown in the drawings, the operator depresses the bent lever k. This releases x from the shorter arm of k, and the weight then descends by gravity upon the spring, it being hung a little off the center for that purpose. The descent of the weight has carried with it the arm x and the pawl x', which, upon reaching the end of the semicircular piece y, springs outward into engagement with i', and the power thereupon operates for a little over half a revolution, raising the weight and becoming disconnected therefrom by the pawl x' striking the other end of y. After the passage of x the spring k''' presses k'' upward into its former position, and after the pawl x' has been released from the rack i' the parts drop a short distance back into the original position shown in Fig. 2. In the descent of the weight the sliding block n has been carried down also, and thus, through the rods l and o, the outer end of p has been depressed until the pawl p' comes into engagement with a succeeding tooth upon q, and when the weight ascends the drum B is rotated the distance between two spokes, and the head of the spring r snaps into a succeeding notch upon the rack s. The engagement of r and s holds the drum in position against accidental movements while the lever p is descending; but they are so fitted as to be easily snapped out of connection by the rotation of the drum. The slot o' upon the lower end of the rod o is to allow the weight to rise clear of each spoke before the drum begins to rotate. The parts should be so adjusted that the pin p'' is at the upper end of the slot o' when the weight is down, and in the upward movement traverses the slot during the time that the weight is rising clear of the spoke.

a'', Fig. 1, is a stop attached to the frame A, to limit the movement of the lever p and prevent its descending so far as to skip one tooth of its rack. During the interval when the drum is at rest the operator has had time to put a spring upon the next spoke, and when the weight has risen he depresses k again to repeat the operation. The series of holes shown in the crank-arm g are to allow of adjustment of the weight at different heights for different kinds of springs to be compressed, and adjustment there necessitates adjustment in the connection of the rods l and o and the lever p, for which purpose the series of holes shown in those parts are provided.

Fig. 4 represents a variation of construction in the drum, in which the spokes c, instead of being affixed to the faces of the drum, are affixed to successive plates, which are hinged together and form an endless belt, revolving with the drum. All the other parts are used with this construction in the same manner as with the other form of drum.

The compressor herein described can be connected with and operated by a machine for the coiling of springs—such, for instance, as the coiling-machine described in the patent issued to me with James C. Goddard and Henry C. Willis, dated February 8, 1887, and numbered 357,380. Such connection is shown in Fig. 2.

t is a lever pivoted to some stationary point at t', connecting at one end by the arm t'' with the bent lever k, and at the other end connected by the arm v eccentrically with a shaft, w, upon the coiling-machine. The cam w' upon the shaft w, as w revolves, operates to elevate the rod v and thereby set the compressor in operation at regular intervals in the same manner as the hand of the operator, and if the coiling-machine is so arranged that one revolution of w represents the making of one spring it is evident that the two machines will work in the same time. They can be so adjusted, by adjusting the position of w' upon the shaft w, that each spring can be put upon the compressor as it leaves the coiler.

The mechanism shown to drop and lift the weight taken by itself is not my invention, and I make no claim for it. It constitutes one of the common forms of drop-hammer lifter, and there are other well-known drop-hammer lifters which might be substituted for the one here described to perform the same function in combination with the other elements of this compressor. In Fig. 3 and the corresponding part of Fig. 1 the drop-hammer devices are for the sake of clearness shown

in less compact form than they would have in practice.

There are two main objects subserved by my invention: first, compression directly in the line of the length of the spring and evenly and simultaneously upon all sides of it by means of a weight falling by gravity upon the uncompressed spring, and, second, faster compression than has been heretofore attained—for example, as fast as the springs can be formed upon the coiling-machine hereinbefore referred to. To this latter object—fast compression—all the parts co-operate, especially the rotating drum, the parts which rotate it automatically, the drop-hammer-lifter devices which release and raise the weight, and the device to operate the compressor by power from the coiling-machine.

I know that other compressors have been made with a compressing-head moved by power and moving against the spring directly in the line of its length, and therefore I do not claim all machines operating upon that principle. I know, also, that it is not new as a principle to operate a coiling-machine and a compressor by the same power, so that they run together.

There is a special advantage in the use of gravity as the compressing force, and I know of no prior use of it. The short sharp blow of a heavy weight yields better results than a force applied in any other way, especially with upholstery-springs. With regard to this feature of my invention, the parts shown above the frame A are not essential to the principle. Thus, if the weight were lifted and dropped by hand alone or through a lever operated by hand, an advantage would still exist; but there is of course an added advantage in operating the weight by power through any convenient drop-hammer-lifter devices. A revolving drum with spokes to hold the springs has been used in compressors heretofore, but never to my knowledge a drum having an intermittent movement to present the springs to a moving compressing-head, or in combination with a compressing-head whose surface lay at right angles to the line of the length of the spring.

I do not claim a revolving drum alone as a means of holding springs while being compressed aside from some form of mechanism to give it intermittent motion.

I claim as my invention as follows:

1. In a coiled-spring compressor, a rotating drum having a series of spoke-bearing faces as a means of presenting successive springs to the compressing-head, in combination with a weight acting by gravity alone as such compressing-head and mechanism, substantially as described, to drop and lift it.

2. In a coiled-spring compressor consisting of a compressing-head and spoke-bearing rotating drum, substantially as described, the combination of crank *g*, sliding block *n*, rods *l* and *o*, lever *p*, pawl *p'*, and rack *q*, substantially as and for the purpose described.

3. A coiled-spring compressor consisting of the special combination of parts shown—viz., frame A, drum B, spokes *c*, weight D, strap *e*, frame *j*, crank *g*, shaft *h*, loose pulley *i*, having rack *i'*, arm *x*, pawl *x'*, stationary piece *y*, lever *k*, sliding block *n*, rods *l* and *o*, lever *p*, pawl *p'*, rack *q*, spring *r*, and rack *s*, substantially as and for the purpose described.

4. In combination with a coiled-spring compressor in which the compressing-head is propelled against the spring directly in the line of its length, substantially as described, the lever *t*, arms *t''* and *v*, and cam *w'*, affixed to a shaft of a coiling-machine to operate the compressor automatically by the coiling-machine.

In witness whereof I have hereunto set my name, this 16th day of February, 1887, in the presence of two witnesses.

WILLIAM L. GODDARD.

Witnesses:
GEO. F. ALBRECHT,
F. ESTELLE BRIGGS.