G. Hopson.

Testing Springs.

No. 97,510. Patented Dec. 7, 1869.

Fig. 1.

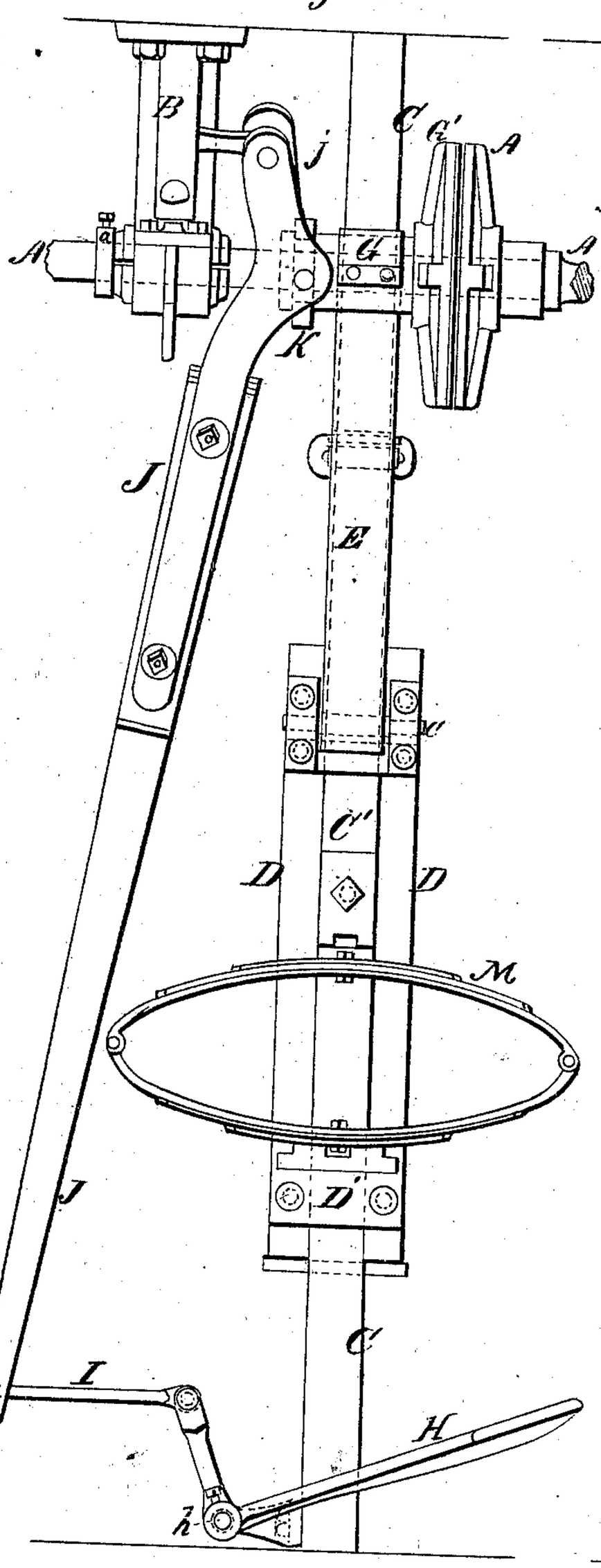
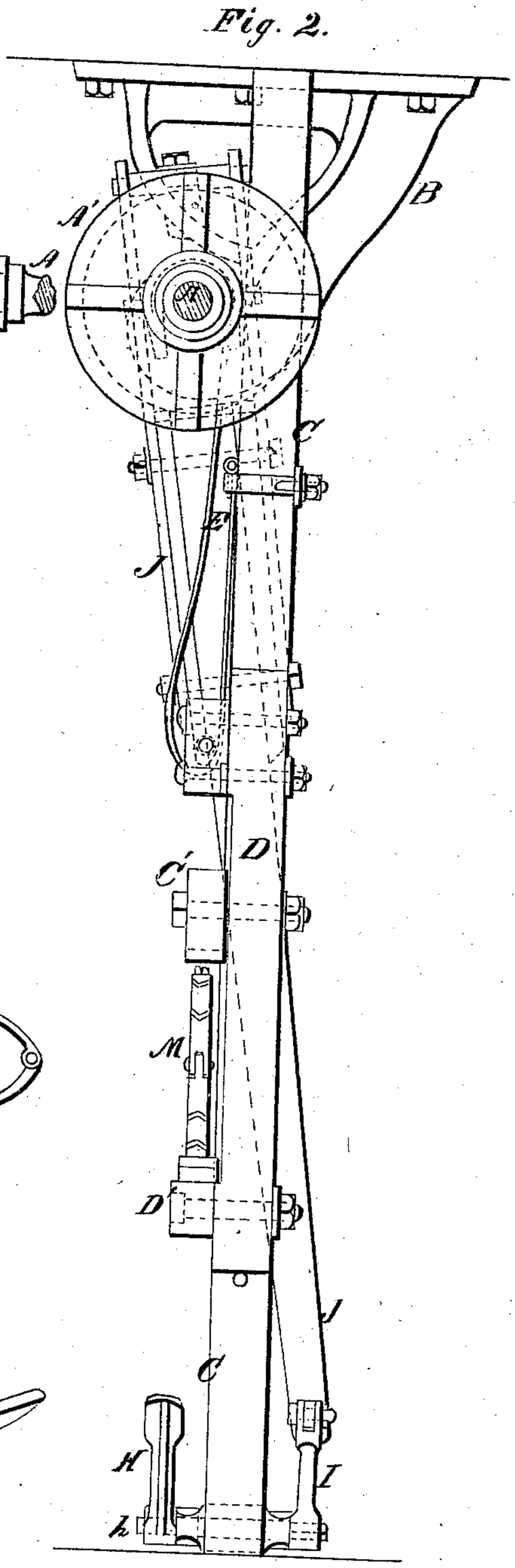


Fig. 2.



Witnesses:

A. Hoermann.

W. C. Dupuy.

Inventor:

Geo. Hopson.

by his attorney T. D. Stetson

United States Patent Office.

GEORGE HOPSEN, OF BRIDGEPORT, CONNECTICUT.

Letters Patent No. 97,510, *dated December* 7, 1869.

IMPROVED MACHINE FOR TESTING SPRINGS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE HOPSEN, of Bridgeport, in the county of Fairfield, in the State of Connecticut, have invented certain new and useful Improvements in Machines for Testing Springs; and I do hereby declare that the following is a full and exact description thereof.

The springs which my machine is more particularly intended to test, are of the kind known as steel springs, of the various kinds and sizes used in carriages and wagons for business and pleasure-purposes.

It is found necessary, in order to test these springs thoroughly, to compress them many times, and allow them to expand again between each compression. The means for effecting this, heretofore, have been open to objection, on account both of the labor of operating, and the difficulty of controlling the amount of compression.

It is desirable to compress the springs slightly at first, and to carry the compression further and further, either by gradually increasing each compression, or by varying the compression at different stages, according to the judgment of the operator; and it is particularly desirable that the pressure shall be so applied, that in case of one leaf of the spring breaking, the whole pressure will not be concentrated on the remaining leaves, so as to break the whole, but the amount of the compression of the spring will not be materially increased by the sudden diminution of resistance due to the fracture. It is also desirable, in such case, to relieve the spring immediately after such breakage, and allow it to become again expanded, after which the spring may be removed from the machine, and the broken leaf replaced by a sound one.

My invention accomplishes these ends, by very simple and convenient mechanism.

I will first describe what I consider the best means of carrying out my invention, and will afterward designate the points which I believe to be new.

The accompanying drawings form a part of this specification.

Figure 1 is a front elevation, and

Figure 2 is an edge view.

Similar letters of reference indicate like parts in both the figures.

Tints are employed merely to aid in distinguishing parts, and do not necessarily imply differences in material.

The material may be iron and wood.

A is a portion of the shafting of the factory.

It is turned continuously by a steam-engine, or other suitable power, not represented, and is supported at intervals by a hanger, B.

A collar, *a*, adjustable on the shafting A, bears against the ends of the brasses in the hanger, and controls the position of the shafting endwise, so that no amount of force applied by my machine can force the shaft endwise so as to displace it.

A′ is a broad face-plate, or extended flange, fixed firmly on the shaft A, so as to turn therewith. My mechanism receives motion through friction against the face of this flange A′, as will presently appear.

C is a square post of wood, firmly supported at the upper and lower ends, and extending close to the shaft A.

C′ is a block, firmly bolted on front face of the post C, and recessed on its lower side, to receive the nut or bolt-head, which is set in the centre of each half spring. The springs are tested by being pressed up from below against the end face of this fixed block C′.

D D are movable pieces of wood, tied together at their upper and lower ends by ties which loosely embrace or surround the post C, so that the whole is free to slip or slide up and down on the post.

The entire movable frame, of which these are a part, I will call D.

It is supported, when at its lowest position, by the transverse pin *c*, which is fixed on the post C.

Its front face carries a stout block, D′, which is adapted to match against the lower side of the spring which is to be tested. The action of the mechanism moves the frame D and the front block D′ forcibly upward, to compress the spring, and yields downward, to allow the spring to expand again.

This motion is effected by means of a leather strap, E, which is wound and unwound upon a sleeve, G, carrying a broad face or flange, G′, which corresponds to the face-plate A′, before described.

When the face-plate G′ is pressed forcibly against the face-plate A′, it receives motion therefrom, and slowly winds up the belt E, thus raising the frame D, and pressing the spring M. When the pressure of the face-plate G′ against the continually-revolving plate A′ is released, the frame D will descend by its gravity, and by the extension of the spring M, thus turning the sleeve G and the face-plate G′ backward to its original position.

A very slight movement of the sleeve G endwise on the shaft A, is sufficient to change the action of the machine at will, and determine whether the spring shall be further compressed or released.

I effect the movement of sleeve G and plate G′ by means of the treadle or bell-crank lever H, turning on the fixed centre *h*, the link I, and the lever J, which turns on a fixed centre at *j*.

This lever J is divided near its upper end, and supports, in suitable bearings, the ring-shaped, or partially ring-shaped collar K, which fits in a corresponding groove provided in the sleeve G, as indicated in the drawings.

When the lever is depressed by the foot of the attendant, or otherwise, the sleeve G and broad flange or face-plate G′ are pressed against the face-plate A′, and the strap E being wound up on the sleeve G, the spring is slightly compressed. There is very little elasticity in the connections, and the breaking of a leaf in the spring induces no appreciable increase in the compression of the spring.

The extent of the compression of the spring will continue to slowly increase thereafter, by the further winding up of the belt E, providing the pressure on the lever H is continued; but in practice, the attendant immediately releases the lever when a leaf breaks, thus allowing the face-plate G′ to move a little away from the continuously-revolving face-plate A′, and in this condition the face-plate G′ may turn in the opposite direction, and the spring may thus be liberated by the slackening of the strap E and the descent of the block D′.

The whole surfaces of the face-plates G′ and A′ may be made available to rub together and act on each other by friction, if desired, but I prefer to use only a narrow space near the periphery. To obtain the best action, I face one of the plates with leather. In the machine with which I have experimented, I made the face-plates twenty inches in diameter, and applied a strap of leather about three inches wide.

In the construction which I have made, and which is represented in the drawings, the lower end of the strap E is not attached directly to the frame D, or to any part thereof, but is simply passed around a pulley in the upper part of said frame, and is made fast on the front of the post C, near the shaft A. The belt thus acts only half as fast, and the compression of the spring is correspondingly slower. The reduction of speed in this manner may be carried still further, by introducing ropes and pulleys, if desired, or it may be dispensed with, and the strap may be attached directly, as may be found necessary in any particular case.

It is desirable, in practice, to avoid relaxing the pressure upon the lever H too suddenly, in case the flanges or face-plates G′ and A′ are operated rapidly. When a stout spring is compressed to its fullest extent, the action of the spring may throw the frame D down so rapidly, and consequently the sleeve G may be turned backward so violently, as to do mischief.

I am experimenting on means to guard against such evil, which may be made the subject of a future patent.

Although I have represented the spring as elliptic, and described the invention as intended more particularly for testing elliptic springs, I do not mean to confine it to such springs. The invention is applicable to the testing of other springs which require to be compressed, and allowed to extend a number of times, and to vary the extent of the compression at will. One of the important qualities of the machine—that of the capacity for arresting the compression at any moment—would not be of much importance in testing a spiral spring, or any other form in which the material is all in one piece or one plate; but it is of very great importance in testing elliptic springs, or half elliptic, or any other form in which several plates are piled upon so as to reinforce or assist each other.

The lower seat of the spring may be stationary, and the upper block may be caused to descend, thus compressing the spring downward instead of upward, if preferred. This modification, and various others, such as providing for testing by a horizontal or oblique motion instead of a vertical, may be readily made by any good mechanic.

To test a platform-spring, I use a table, or two rests, to support the ends of the springs, and the movable block acts against the middle.

I can modify the mechanism by which the force is applied, so as, instead of the flexible strap represented, to substitute a rack and pinion, or other ordinary-acting mechanism.

What I claim as new, is—

The spring-testing machine herein described, having means for inducing and continuing the action of the rapidly-moving surface A′ on its counter-surface G′, a slowly-moving block, D′, and connecting-mechanism, arranged as specified, so as to allow the spring to be strained to various degrees between the blocks C′ and D′, or their equivalents, and the operation to be conveniently repeated and controlled all substantially in the manner herein set forth.

In testimony whereof, I have hereunto set my name, in presence of two subscribing witnesses.

GEO. HOPSEN.

Witnesses:

C. C. BULLOCK,

L. BULLOCK.