(No Model.) 3 Sheets—Sheet 1.

J. H. WHITNEY.

ELASTIC TREADLE FOR SEWING MACHINES.

No. 372,281. Patented Oct. 25, 1887.

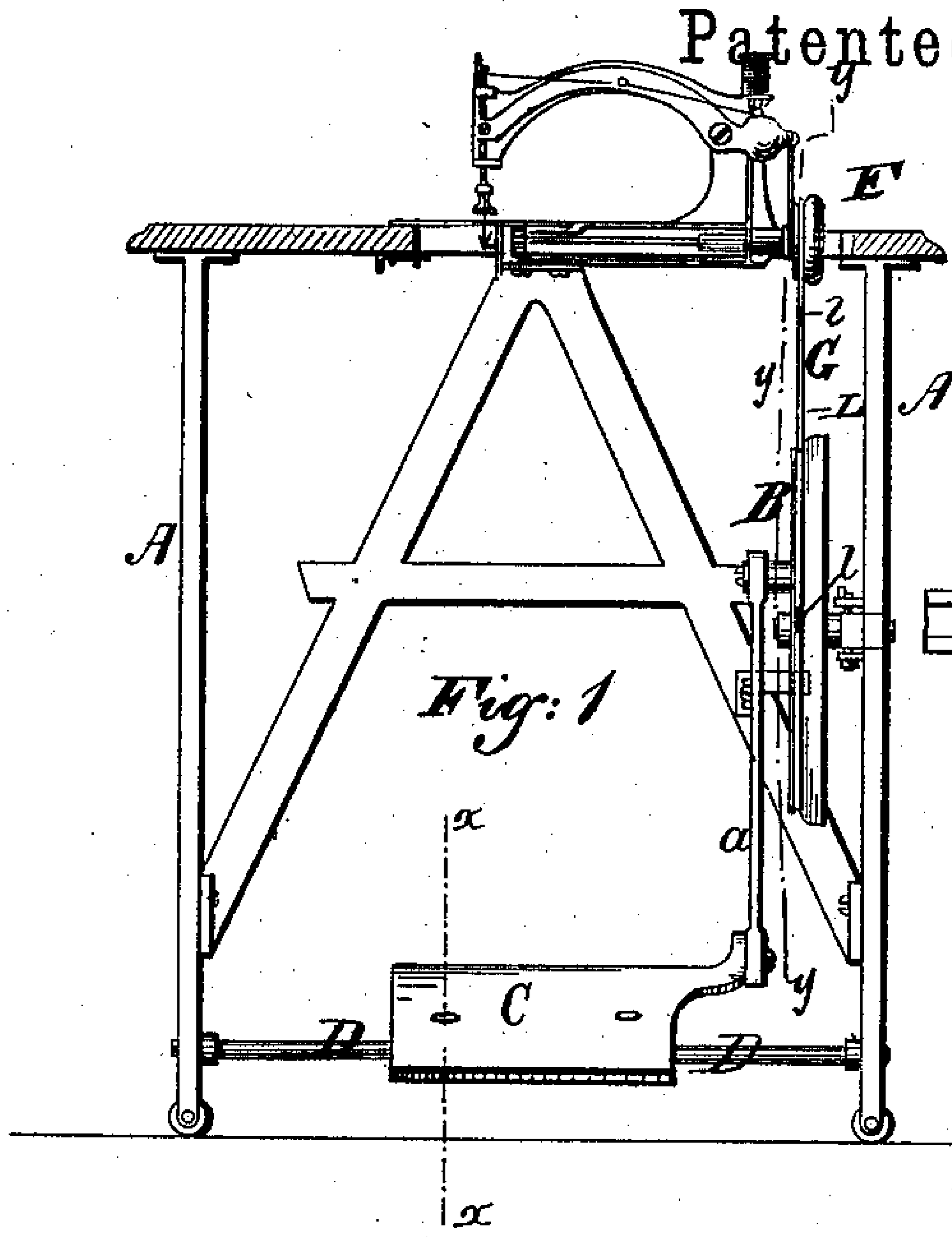


Fig: 1

Fig. 4.

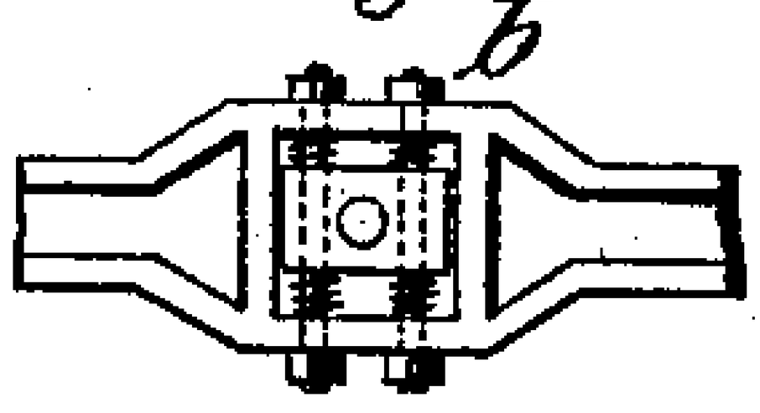


Fig. 2.

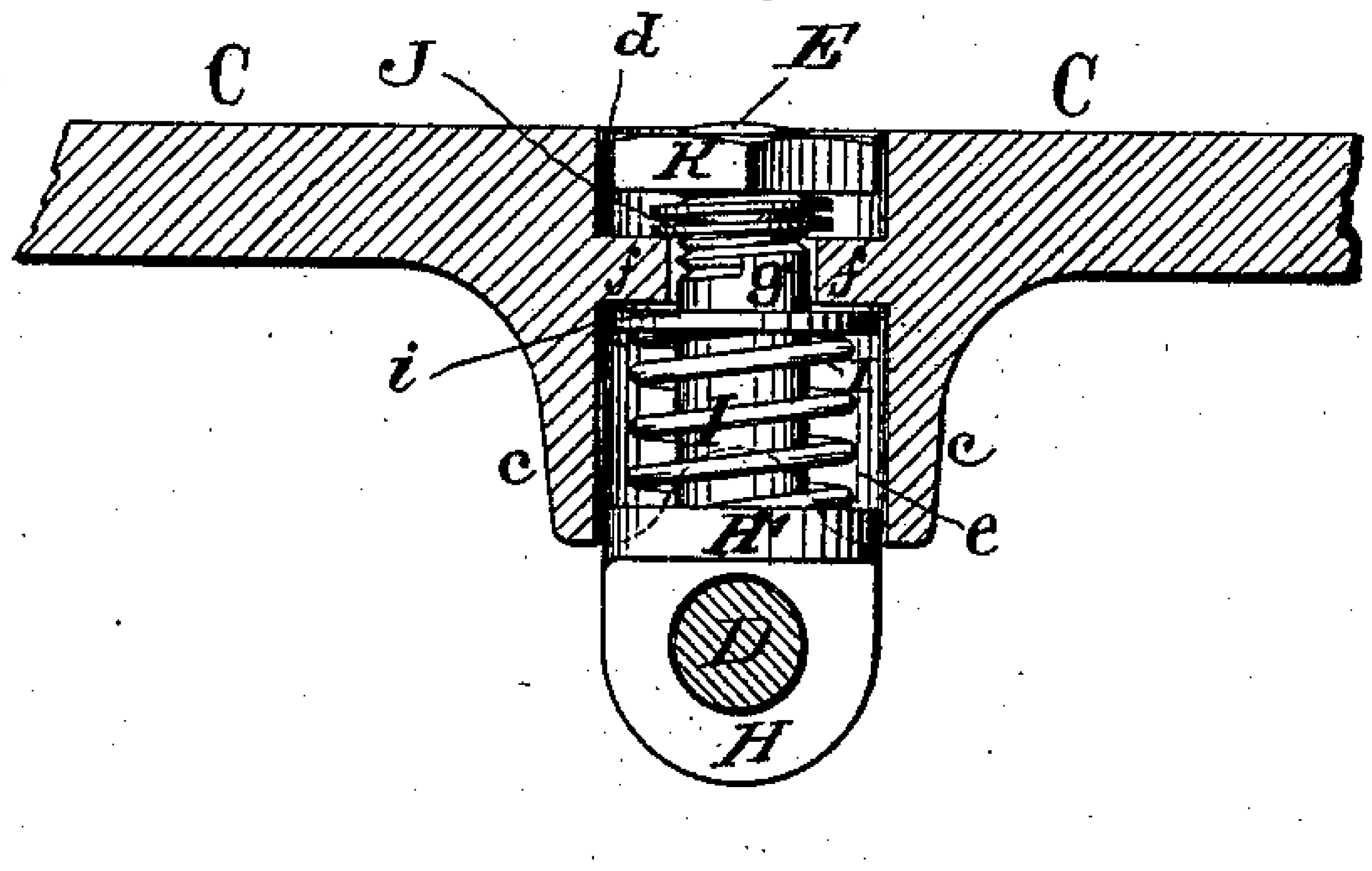
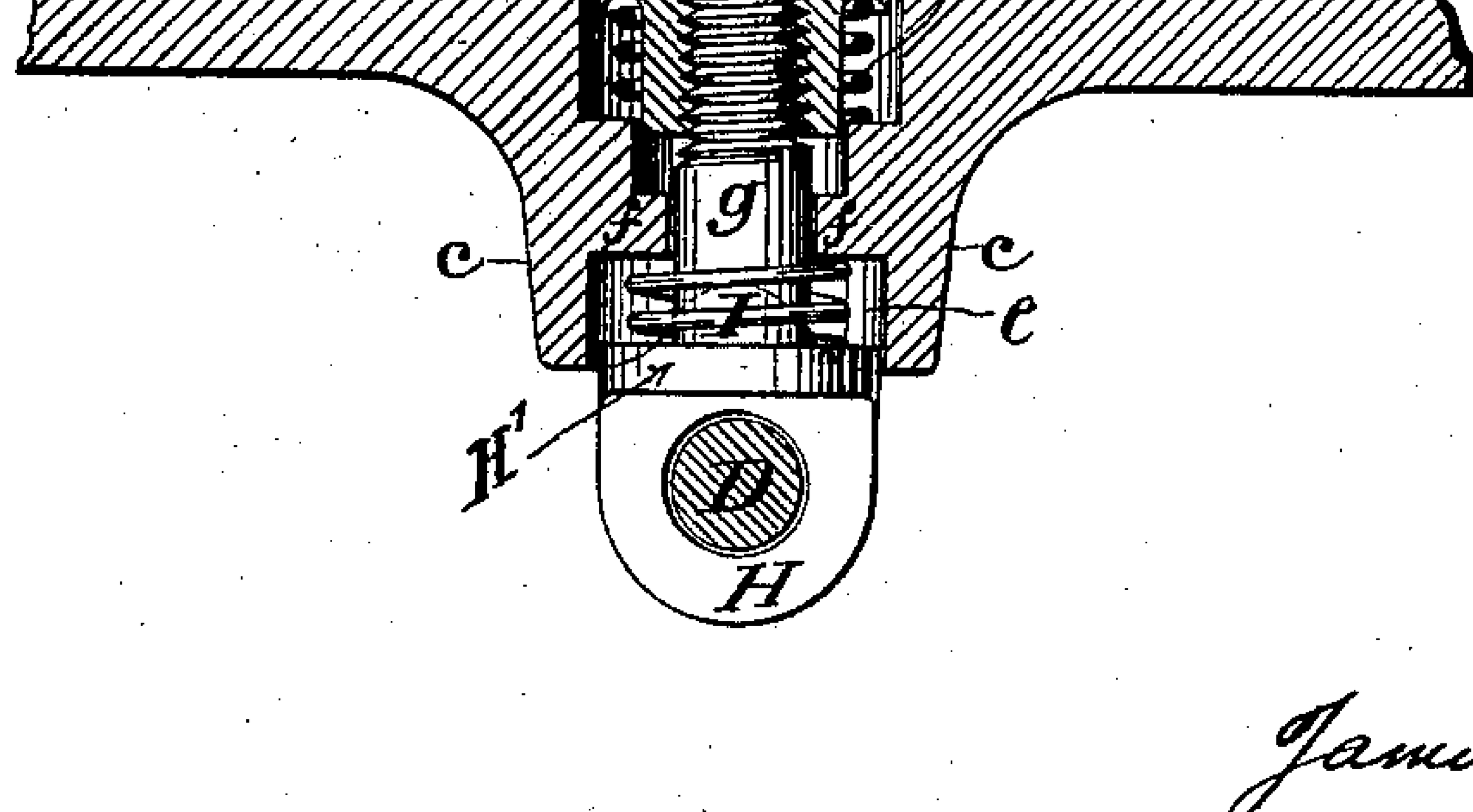


Fig. 3.



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J. H. WHITNEY.

ELASTIC TREADLE FOR SEWING MACHINES.

No. 372,281. Patented Oct. 25, 1887.

Fig: 4½

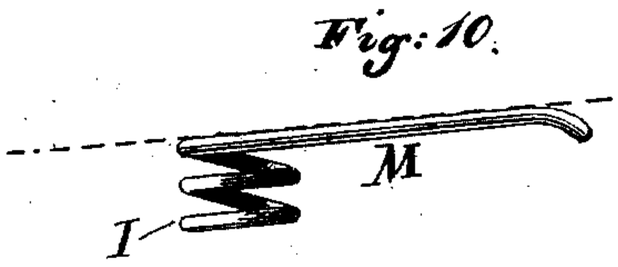
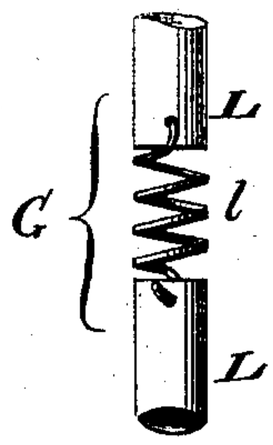


Fig: 10.

Fig: 5



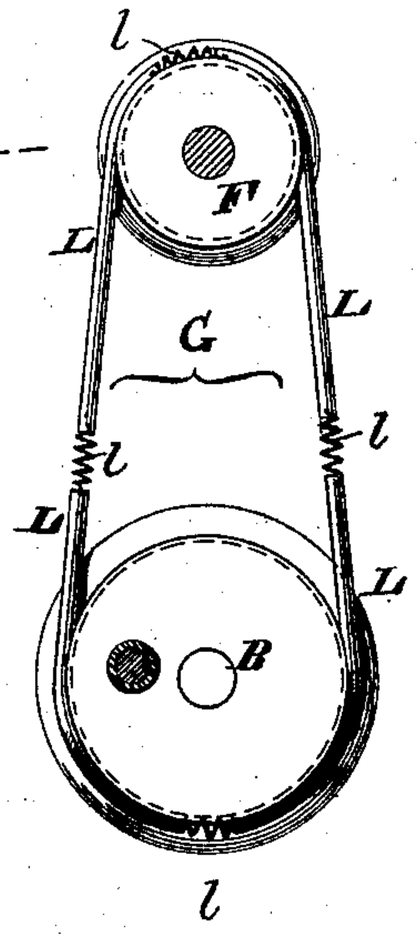


Fig: 6

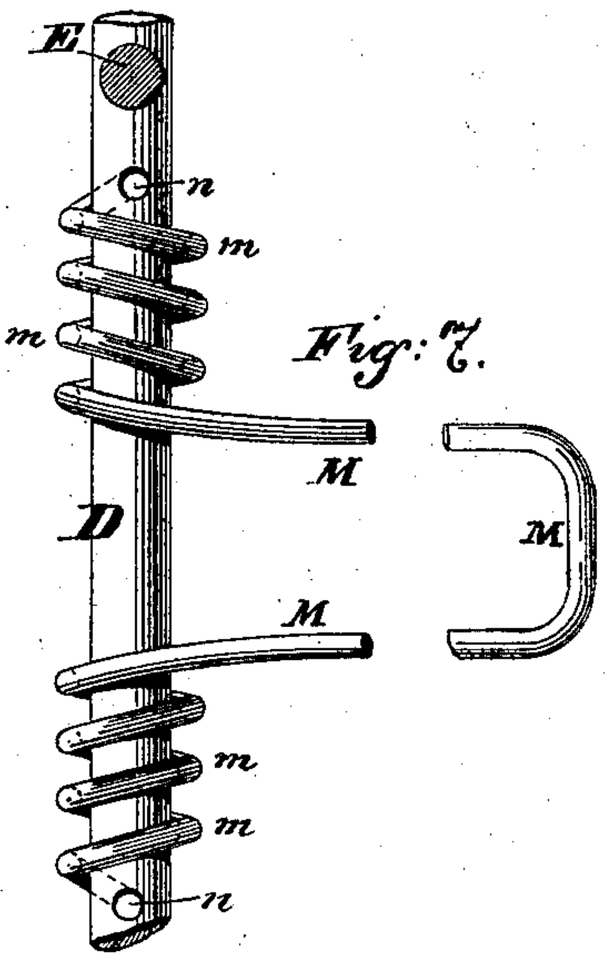


Fig: 7.

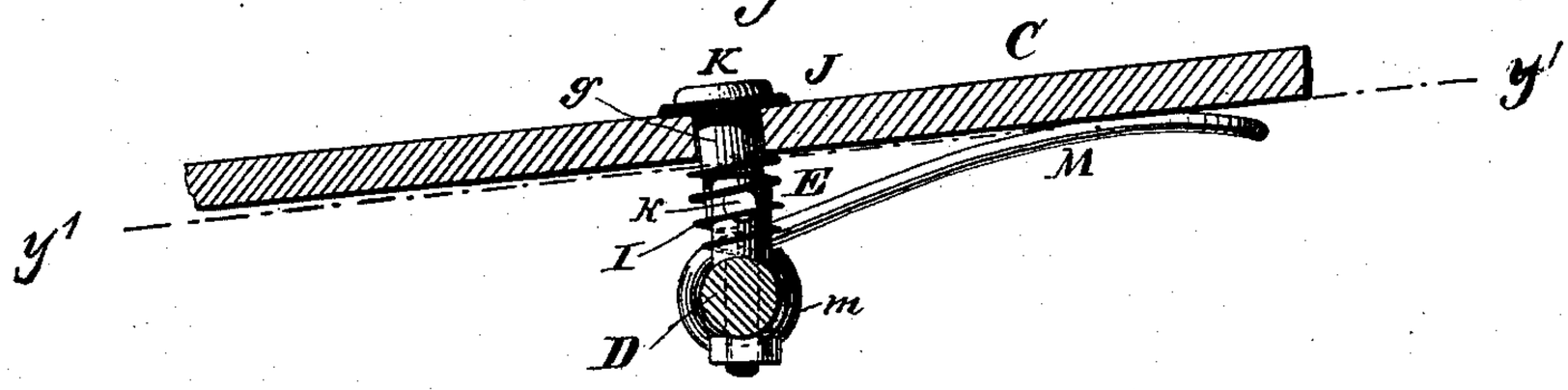
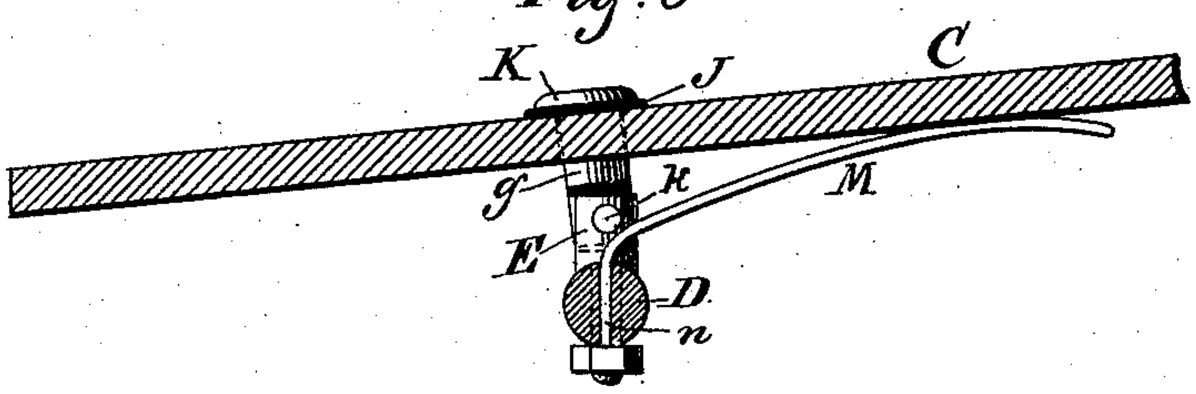


Fig: 8



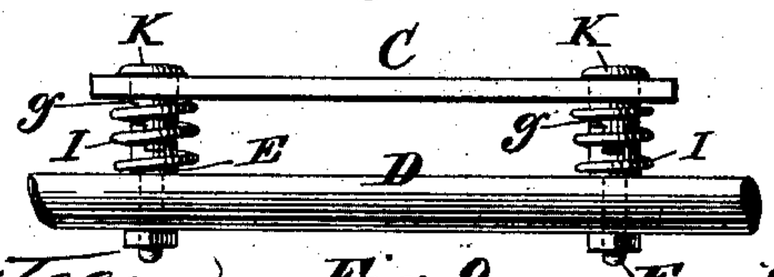


Fig: 9.

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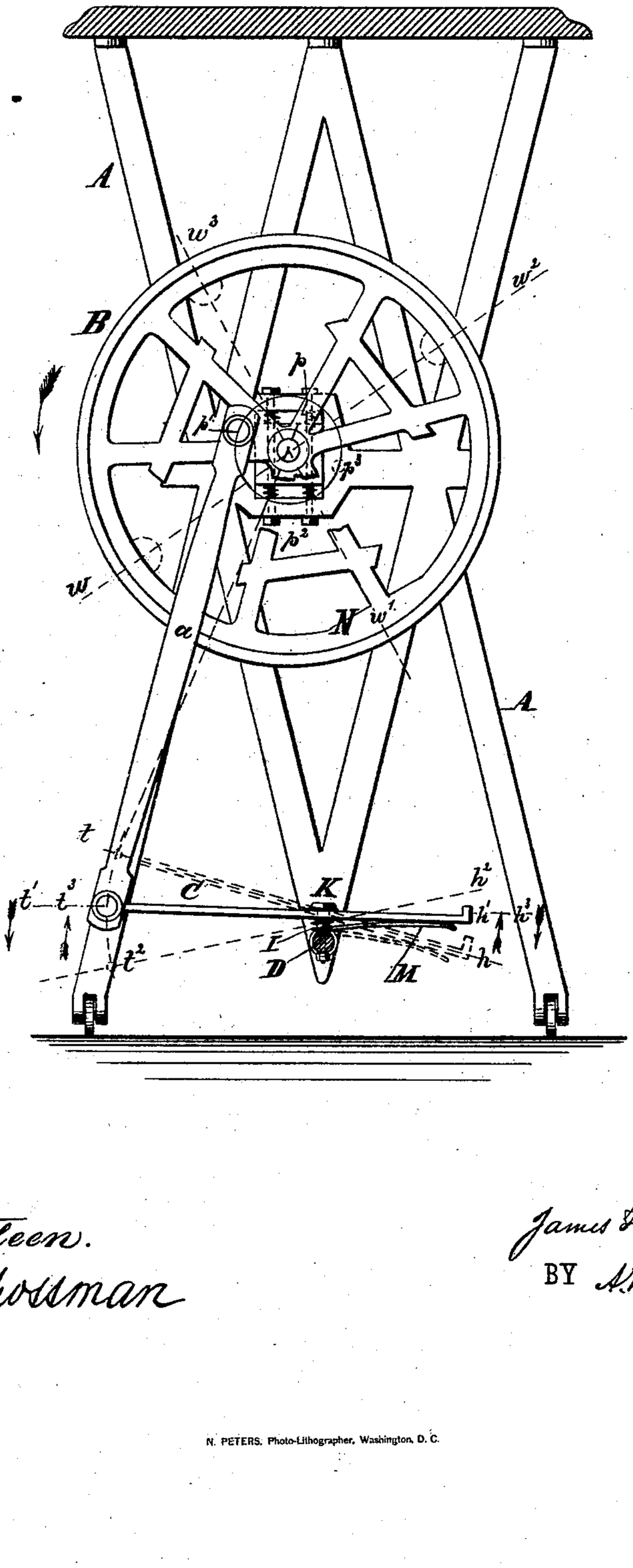
J. H. WHITNEY.

ELASTIC TREADLE FOR SEWING MACHINES.

No. 372,281. Patented Oct. 25, 1887.

Fig: 11



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UNITED STATES PATENT OFFICE.

JAMES H. WHITNEY, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO DEBORAH C. FOLK, OF SAME PLACE.

ELASTIC TREADLE FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 372,281, dated October 25, 1887.

Application filed March 5, 1887. Serial No. 229,781. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. WHITNEY, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Elastic Treadles, &c., for Sewing-Machines, of which the following is a specification.

The object of my invention is to complete the system of elasticity and evenness of motion aimed at by my improvements in sewing-machines described in Letters Patent of April 17, 1883, No. 275,966, and February 5, 1884, No. 292,969, and to still further reduce the strain and jar upon the operator, and also to impart such alternating and reciprocating momenta to the intermediate mechanism working from the feet of the operator to the sewing-machine proper or sewing-machine head as will greatly lessen the power required to run the machine; and by thus combining momenta with elasticity to remove all points of inertia and produce a complete adaptation of the system to the human nerves and muscles, enabling sewing-machines and the like to be run by foot-power with far greater ease, and at the same time greatly lessen or entirely prevent the fatigue and injury which operators have heretofore experienced.

The invention comprises improvements, first, by which the treadle, in addition to its ordinary rocking motion, obtains an elastic vibratory movement upon its bearing, so as to form also an elastic or yielding support for the feet of the operator and gradually meet or resist the downward pressure of the feet and prevent jar or sudden strain upon the operator, and is thus also adapted to act in conjunction with the elastic bearing of the stand fly-wheel described in above-named Patent No. 275,966; second, by which the belt which transmits the motion from the stand fly-wheel to that of the head or the machine proper not only becomes an additional link in the system of elasticity for the relief of operators, but also, while retaining the desirable strength and durability of a leather belt, obviates or lessens the tendency to stretch and set, and obtains at proper intervals or distances apart of its length the elasticity needed to take up its own slack, and to act in unison with and not to impede the elastic vibratory movement of the stand fly-wheel, whether or not the machine-head be supported in elastic bearings, and by the action of the springs is hugged tighter in the wheel-grooves; third, by which the rocking movement of the treadle in one direction, aided by the increasing momentum of the descending weighted portion of the stand fly-wheel, (described in Patent No. 292,969,) causes an accumulating resistance, and thus creates a reactive force in the treadle, which force is exerted and spent to raise the said weighted portion on its ascent, and thus to maintain its momentum sufficiently to carry it past the highest point or points of descent, and at the same time the power obtained by the velocity of the counter-weight in the fly-wheel is regulated and softened by the counteracting force in the treadle.

In the accompanying drawings, Figure 1 is a front view of the sewing-machine stand, the top of the stand being shown in section and the fly-wheel being provided with elastic bearing according to the patent previously referred to, the treadle and belt being constructed according to my present invention. Fig. 2 is an enlarged cross-section of the treadle-bearing taken on the line *x x* of Fig. 1. Fig. 3 is a similar cross-section of a slightly-modified construction of the same. Fig. 4 is an end view of the elastic bearing of the fly-wheel placed in juxtaposition to the front view of it, shown in Fig. 1 and drawn to a larger scale. Fig. 4½ is a detail section on the line *y y* of Fig. 1, showing the elastic belt upon the fly and belt wheels. Fig. 5 is a detail view showing one of the elastic joints of the belt. Fig. 6 is a sectional view of a preferred modification of the treadle-bearing and the counteracting-spring, which is set by the momentum of the descending weighted portion of the fly-wheel. Fig. 7 is a plan view (looking down from the section-line *y' y'* of Fig. 6) of the said spring attached to the rod which supports the treadle. Fig. 8 is a view similar to Fig. 6, but showing a modification of the fly-wheel-weight-counteracting spring. Fig. 9 is a detail front view of the device shown in Figs. 6 and 8 for pivoting and supporting the treadle. Fig. 10 is

a detail view showing a modification in which the spring which counteracts the fly-wheel weight is made in one piece with the spring or springs which support the treadle. Fig. 11 is a sectional elevation of a sewing-machine stand, showing the elastic treadle-support and the action of the fly-wheel-weight counteracting spring in conjunction with the crank-motion as poised in accordance with the aforesaid Patent No. 292,969.

A is the stand, B the fly-wheel, and *b* the elastic bearing of the same.

C is the treadle connected by the pitman *a* to the crank of the fly-wheel, as usual.

D is the ordinary rod upon which the treadle is fulcrumed.

In order to produce elasticity or yielding resistance between the treadle C and the rod D, the treadle may be provided on the under side in two places with hubs or bosses *c*, and above and below the treadle, through each of the said hubs, with sockets *d e*, respectively, and then bored centrally through the partition between the said sockets for the insertion of a bolt, thus leaving an annular shoulder, *f*, around the said central perforation. A bolt, E, provided with an eye, H, by which it fits upon the rod D, and with a circular shoulder or flange, H′, by which it fits to slide in the socket *e*, is inserted with its shank *g* to slide through the opening in the said annular shoulder *f*, as seen in Figs. 2 and 3. A spring, I, which is preferably a spiral metallic spring, but may be made of a piece of rubber or other suitable material, is placed to surround the bolt-shank within the socket *e* and to bear with its ends against the flange or shoulder H′, and directly or by the interposition of a washer, *i*, against the under side of the shoulder *f*. A similar spring, J, surrounding the threaded end portion of the bolt-shank, is likewise interposed in the socket *d*, between the upper surface of the shoulder *f* and the lower surface of the nut K, by which latter the said threaded bolt, the treadle, and the springs are kept together in their desired relative positions.

The modification in Fig. 3, as distinctive from that shown in Fig. 2, is for the purpose merely of allowing increased thickness of the nut, and yet give sufficient space for the upper spring, J, and consists simply in reducing the diameter of the nut for the greater portion of its height or thickness, surrounding the reduced portion of the nut with the spring J, and allowing the spring to bear with its upper end against the under side of the unreduced portion of the nut. The springs being of proper stiffness, it is evident that a pressure upon the treadle will cause the same to move down slightly upon the bolt E and correspondingly compress the spring I. On withdrawal or decrease of the downward pressure the spring I will again raise the treadle and act against the upper and weaker spring, J, thus affording, also, an elastic stop for the upward movement, instead of a rigid stop, to avoid noise, which sometimes would be caused if the shoulder *f* were allowed to come in direct contact with the rigid nut K. The nuts K are intended to be concealed in their sockets *d*, so as not to protrude above the upper surface of the treadle far enough to inconvenience the foot of the operator. By this construction the desired elastic touch of the treadle is obtained, and, particularly when used in connection with the elastic bearing *b* of the fly-wheel B, produces the desired elastic yielding which moderates and obviates unevenness of motion and prevents rapid and excessive wear of shafts and bearings prevalent in machines as heretofore constructed.

A simpler and cheaper modification of the device for pivoting and supporting the treadle is shown in Figs. 6, 8, and 9. In this the bolt E, instead of being pivoted by the eye H upon the stationary rod D, is made in two parts, the lower part being rigidly secured to the said rod and provided above the rod with a jaw, to which the lower end of the upper part or shank, *g*, is hinged or pivoted by a pin, *k*. The shank *g*, being thus a detachable part of the bolt E, may be provided with a thin head, K, rigid upon it, as in Fig. 6, (instead of a threaded nut, as in Fig. 2,) and is inserted from above through a hole in the treadle, the spiral spring J being replaced by an elastic washer interposed between the head K and the treadle. Like as in Fig. 2, the treadle is capable of a slight sliding movement upon the shank *g*, being supported upon the spring I surrounding the bolt E. This latter modification is much preferred also because it brings the treadle nearer to its fulcrum, and thus lessens the circular swing of the foot in operating the treadle, and the hinge-pin or fulcrum *k* can thereby also be made of much smaller diameter than (the rod D) in the modification shown in Figs. 2 and 3, consequently reducing friction to a minimum.

The belt G, which transmits motion from the fly-wheel B to the wheel F of the sewing-machine head, is made in sections of leather or non-elastic parts L, interconnected by spiral-wire springs or other elastic parts, *l*. For these latter I prefer the kind shown in the drawings, which is sometimes used to connect the two ends of the belt together for the purpose of taking up the slack due to wear and stretching of the belt, so as to prevent slipping. One single such spring *l*, or even sometimes two, (see the upper and lower springs, *l*, in contact with the wheels F and B in Fig. 4½,) will not effect more than a taking up of the slack of the belt, and will not effect my purpose to make it elastically yielding in every position, because when a spring *l* is about midway on the arc of contact between the belt and the wheel the friction which keeps the belt from slipping also prevents the spring from yielding. For this reason I make the belt in a sufficient number of sections L, interconnected by springs *l*, so that during the travel of the belt there will always be one or more springs

l out of contact with the wheels, thereby obtaining the elasticity desired.

M is a spring tending to raise the front or heel end of the treadle. This may be made of or divided in two separate springs; but I make it preferably, as in Fig. 7, in one continuous wire, fastened with its ends *n* in holes in the rod D, then wound by coils *m* around the rod, the middle part of the wire or free end of the spring forming a U in upward-pressing contact with the under side of the front or heel end of the treadle. In making the coils *m* the wire is of course wound upon a core or mandrel of larger diameter than the rod D, so as to be free to act; or the ends of the wire may be coiled around the bolt E, and thus form the elastic support I of the treadle, as in Fig. 10; or the coils *m* may be dispensed with and the U-ends fastened to the rod D directly, as in Fig. 8, and a flat spring may be used.

The weighted portion N of the fly-wheel B is made heavier than is necessary, to counterbalance the pitman, crank-pin, and treadle, thereby gaining a preponderance and increase of momentum on the downward movement of the weight N. The combined action of this excess of weight and of the spring M will be understood with reference to Fig. 11, the wheel B moving in the direction of the arrow, and the letters *p t h w p' t' h' w'*, &c., indicating, respectively, corresponding positions of the crank-pin, toe end and heel end of the treadle, and weight N. When the crank is at *p* and the treadle in the position *t h'*, the weight has advanced on its descent through the arc of its greatest leverage and effectiveness to about the position marked *w*, and is thence carried past the lower perpendicular by the excess of its accumulated momentum, after having expended the main part thereof in setting the spring M, which latter has obtained its maximum of depression when the treadle is at *t h*. The force stored up in the spring now exerts itself to lift the weight N and maintain its momentum during the ascent. In the position *p' t' h'*, the weight is at *w'*, and the spring M is still acting, and continues to act until the crank is at p^2 and the treadle at t^2 h^2, with the heel end at its highest point. The weight is then at w^2, and is thence by its momentum carried past the upper perpendicular. When the crank is at p^3 on its ascent, the weight is at w^3 on its descent, the heel end of the treadle is moving downward, and the spring M is being compressed. The labor required of the operator's foot is but slight, and the strain during every part of a revolution is almost constant.

The before-described elastic support of the treadle itself should not be confounded with an elastic foot-rest placed upon the treadle, the latter being old and known.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a treadle-operated machine, a treadle elastically supported or cushioned on its fulcrum, but held in position thereto by separate mechanism.

2. In a treadle-operated machine, a treadle elastically supported or cushioned on its fulcrum, but capable of movement only in the direction of its required swing or oscillation.

3. In a treadle-operated machine, the combination, with the treadle and its fulcrum, of a spiral spring interposed between the said fulcrum and treadle.

4. In a treadle-operated machine, the combination, with an elastically-supported fly-wheel, of an elastically-supported treadle.

5. In a treadle-operated machine, a treadle supported upon its fulcrum by a guide-bolt and an interposed spring.

6. In a treadle-operated machine, a perforated treadle, in combination with a fulcrum, bolts attached to the said fulcrum and passing through the perforations in the said treadle, and springs interposed between the said fulcrum and treadle.

7. In a treadle-operated machine, a perforated treadle, in combination with a fulcrum, bolts attached to the said fulcrum and passing through the perforations in the said treadle, and springs surrounding the said bolts and interposed between the said fulcrum and treadle.

8. In a treadle-operated machine, a treadle, in combination with a fulcrum, a bolt made in two parts hinged together, one of the said parts being secured to the said fulcrum and the other part passing through a perforation in the said treadle, and a spring interposed between the said fulcrum and treadle.

9. In a treadle-operated machine, a treadle, in combination with a fulcrum, a bolt made in two parts hinged together, one of the said parts being secured to the said fulcrum and the other part passing through a perforation in the said treadle, a spring interposed between the said fulcrum and treadle, and an elastic washer surrounding the said bolt above the said treadle.

10. In combination with two wheels, a belt transmitting motion from one to the other of the said wheels, said belt being composed of flexible comparatively non-elastic sections joined together by flexible elastic sections arranged at proper distances apart, as hereinbefore set forth.

11. In combination with two wheels, one of them being elastically supported, a belt transmitting motion from one to the other of the said wheels, said belt being composed of flexible comparatively non-elastic sections joined together by flexible elastic sections arranged at proper distances apart, as hereinbefore set forth.

12. In a treadle-operated machine, the combination, with a rod and with the treadle fulcrumed to it, of a spring fulcrumed by said rod and acting with its free end to raise one end of the said treadle.

13. In a treadle-operated machine, the combination, with a rod and with the treadle ful-

crumed upon the said rod, of a fixed spring coiled around the said rod and acting with its free end to raise one end of the said treadle.

14. In a treadle-operated machine, the combination, with the fly-wheel having an extra-weighted portion, of the treadle, and a spring actuating one end of the said treadle, the said spring being set by the oscillation of the treadle on the descent of the said weighted portion and reacting to raise the said weighted portion when ascending.

15. In a treadle-operated mechanism, the combination of an elastically-supported treadle, an elastically-supported fly-wheel, a belt-wheel, and an elastic belt transmitting motion from the fly-wheel to the said belt-wheel.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 21st day of June, 1886.

JAMES H. WHITNEY.

Witnesses:
A. W. ALMQVIST,
HENRY SELLMAN.