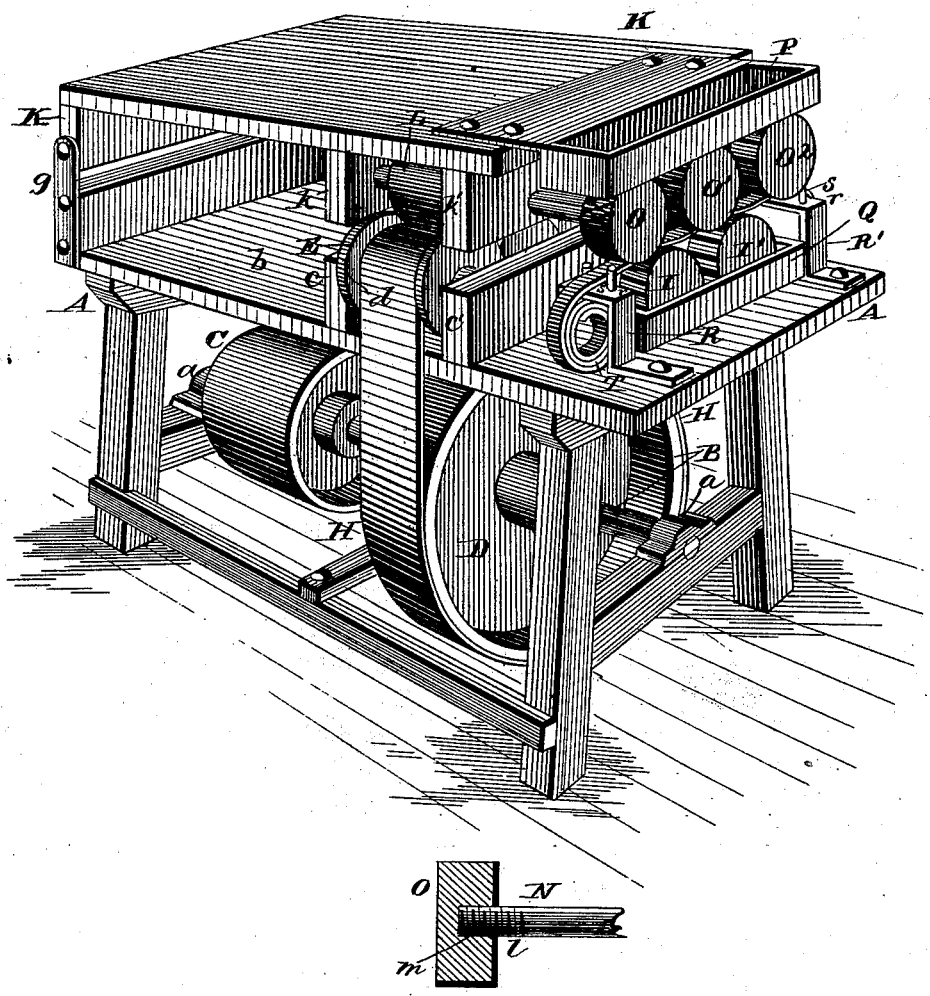
3 Sheets—Sheet 1.

L. A. SANFORD.

Polishing-Machines.

No. 216,763. Patented June 24, 1879.

Fig. 1.



WITNESSES

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Fig. 2.

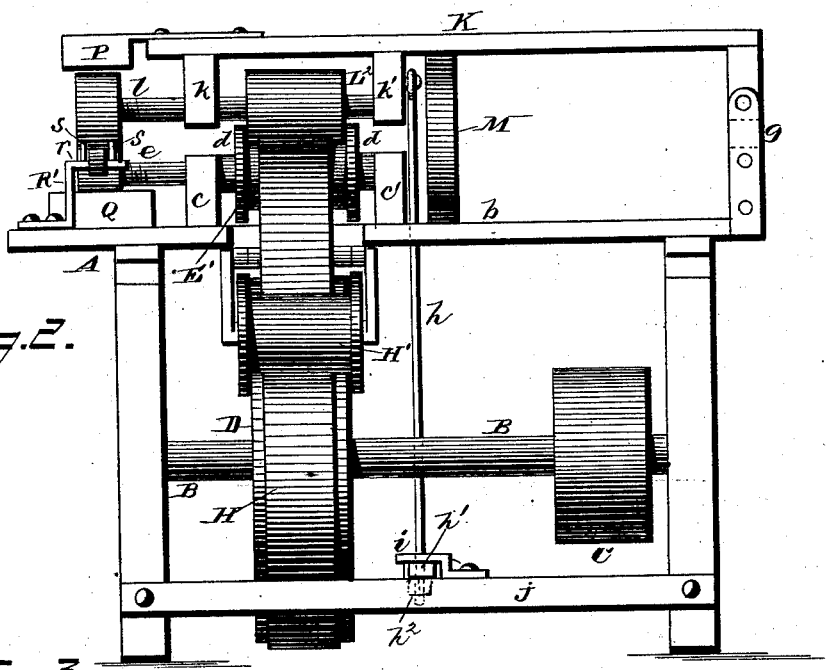

Fig. 3.

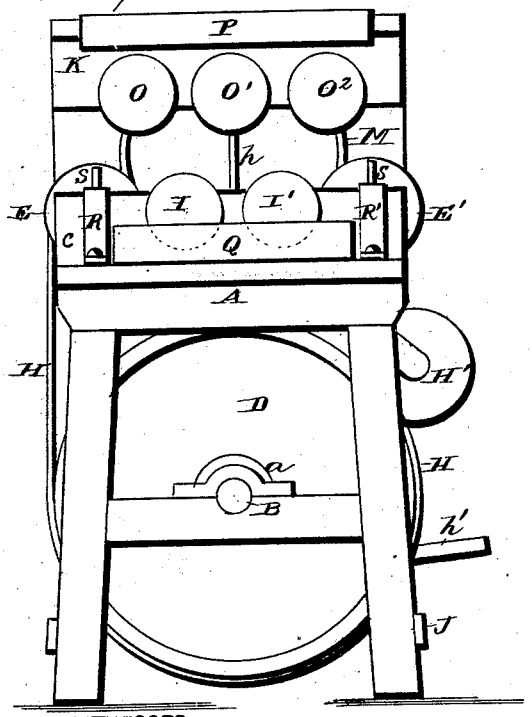

Fig. 4.

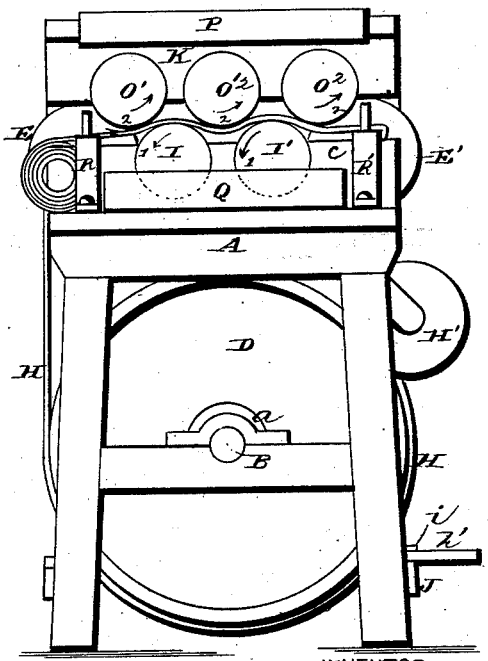

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Fig. 5.

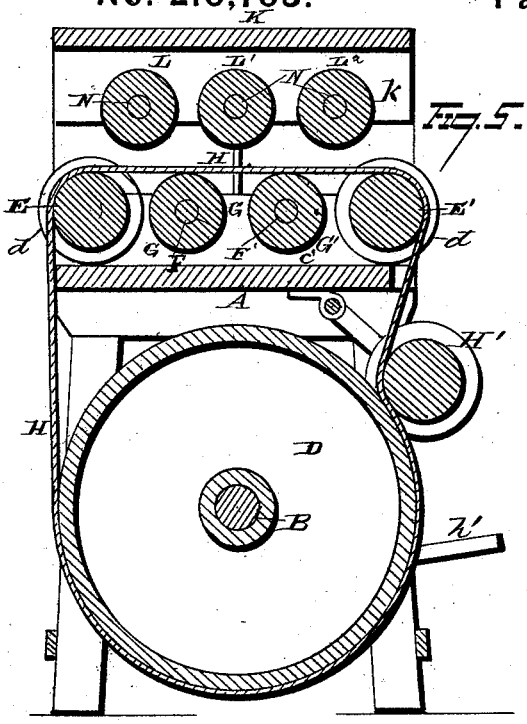


Fig. 6.

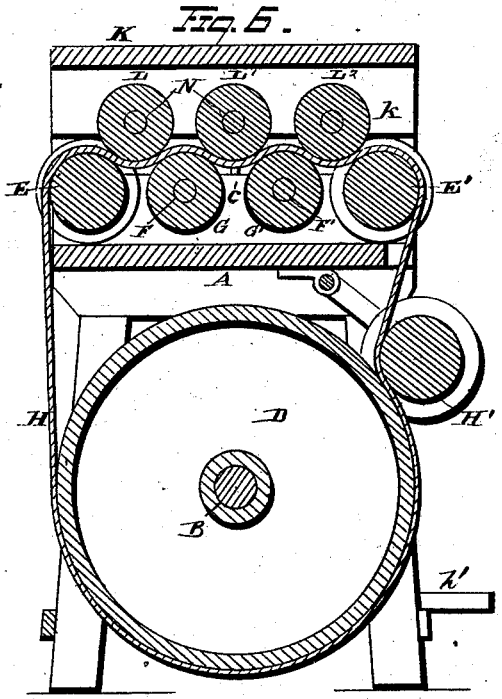


Fig. 7.

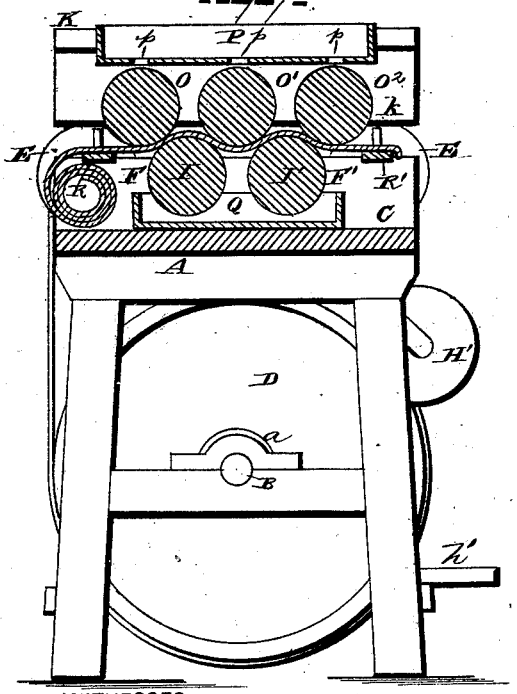
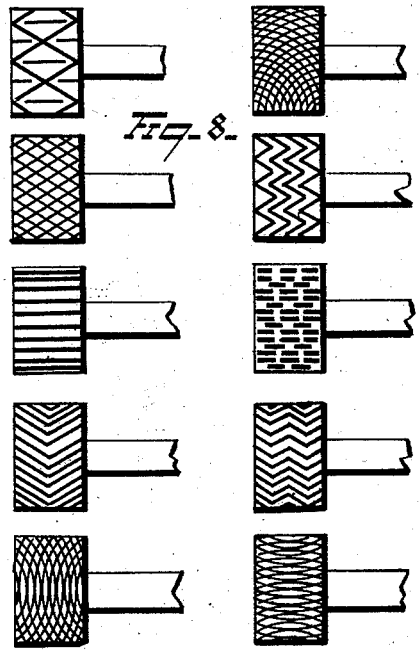


Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

LEVERETT A. SANFORD, OF BRISTOL, CONNECTICUT.

IMPROVEMENT IN POLISHING-MACHINES.

Specification forming part of Letters Patent No. **216,763**, dated June 24, 1879; application filed May 3, 1879.

To all whom it may concern:

Be it known that I, LEVERETT A. SANFORD, of Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvement in Polishing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in polishing-machines, the object being to provide a polishing-machine of such construction that clock-springs and other articles of sheet metal may be highly polished on opposite surfaces at a single operation; and to this end my invention consists, first, in a polishing-machine, the combination, with one or more soft-metal rolls, of two or more soft-metal rolls adapted to be moved toward or away from the sheet-metal to be operated upon, to allow of the insertion and withdrawal of the clock-spring or other sheet-metal strip, and to enable the spring to be subjected to the desired pressure between said rolls, the latter being arranged so that the rolls of one series will partly overlap the rolls of the other series.

My invention further consists, in a polishing-machine, the combination, with one or more soft-metal rolls provided with corrugated or roughened peripheries, of two or more soft-metal rolls, each of which is formed with corrugated or roughened peripheries, and adapted to be vertically adjusted to allow of the insertion and withdrawal of the spring or other article to be polished.

My invention further consists, in a polishing-machine, the combination, with a series of soft-metal rolls having roughened peripheries and attached to shafts journaled in stationary bearings, of a series of soft-metal rolls having roughened peripheries, the latter-named rolls arranged over the stationary rolls and adapted to be vertically adjusted, and a receptacle for emery or other abrasive material located to feed the emery upon the adjustable rolls, and from thence to the stationary rolls.

My invention further consists, in a polishing-machine, two series of polishing-rolls, in combination with suitable mechanism, whereby motion is imparted to said rolls when the movable series of rolls is forced toward the opposite series of rolls, and both series are brought to rest when separated from each other.

My invention further consists in the several other details of construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective of my improved polishing-machine. Fig. 2 is a side view of the same. Fig. 3 is an end view, showing the polishing-rolls separated for the insertion of the spring; and Fig. 4 is a similar view, representing the polishing-rolls forced toward each other for imparting pressure upon the opposite surfaces of the spring. Fig. 5 is a vertical section through the band-wheel and band-pulleys when the upper polishing-rolls are raised; and Fig. 6 is a similar view, showing the position of parts when the upper polishing-rolls are forced toward the lower rolls. Fig. 7 is an enlarged vertical section through the polishing-rolls and receptacles located above and below the same. Fig. 8 shows several different styles or forms of rolls for carrying my invention into effect.

A represents the frame of the machine, which may be of wood or cast-iron, and of any suitable form, within which is journaled the driving-shaft B, the ends thereof being supported in suitable journal-boxes *a*. C is a band-pulley, rigidly keyed to shaft B, and receives a driving-belt, by which the machine is operated. D is a large band-wheel, which is also keyed to the driving-shaft B. Upon the top *b* of the frame of the machine are secured the transverse beams or supports *c c'*, between which, at opposite ends, are journaled the band-pulleys E E', the same being preferably provided with flanges *d*, to prevent the lateral displacement of the belt. Between the band-pulleys E E' are journaled the shafts F F', to which are rigidly keyed the band-pulleys G G', which latter are of such size and so arranged that their upper surfaces are practically in the same horizontal plane as the upper surfaces of the band-pulleys E E'.

H is the driving-belt, which surrounds the large band-wheel D and band-pulleys E E' and G G'.

It will be observed, as illustrated in Fig. 5, that when there is no pressure exerted upon the upper surface of the driving-belt it barely touches the peripheries of the band-pulleys G G′, and, in fact, may not come in contact with either of said pulleys, so that although the belt may be constantly driven, pulleys G G′ will remain stationary unless pressure is brought to bear upon the upper surface of the driving-belt, as will be hereinafter explained.

H′ is a belt-tightener, hung from the top *b* of the machine-frame, to automatically take up all slack in the driving-belt.

I do not confine myself to any particular construction of belt-tightener, as it is evident that any preferred construction may be employed.

Shafts F F′ project outwardly from the transverse beam or support *c*, and are provided with screw-threaded ends *e e′*, upon which are secured the polishing-rolls I I′, which are provided with screw-threaded sockets for their ready and secure attachment to the ends of the driving-shafts F F′.

Polishing-rolls I I′ are preferably made of lead or equivalent soft metal, and are cast in the desired form for use.

I have illustrated one form of attachment for securing the polishing-rolls to the shafts, but do not confine myself to this particular method of attachment, as the rolls may be removably secured to the shafts by keys; or the ends of the shafts may be made slightly tapering or conical in form, and rolls be secured by nuts and washers.

To the top or table of the frame of the machine is hinged at *g* one end of a roller-carrier frame, K, which is provided with transverse beams or supports *k k′*, between which are journaled the band-pulleys L L^1 L^2, said pulleys being located and arranged relatively to the pulleys E E′ G G′ in such a manner that when the hinged frame in which the pulleys L L^1 L^2 are supported is forced downwardly the pulleys L, L^1, and L^2 will force the driving-belt H downwardly in direct contact with the pulleys G G′, and cause the driving-belt to impart a rotary motion to said pulleys and to the rolls attached to the ends of the pulley-shafts. M is a spring located between the vertically-adjustable frame or carrier and the top of the machine-frame, and serves to uphold the roll-carrier frame in a yielding manner. To the upper and adjustable frame is attached a rod, *h*, the lower end of which is secured to a treadle, h^1.

In order to provide for the adjustment of the rod, its lower end is screw-threaded for the reception of a nut, h^2, the latter serving to allow of the adjustment of the rod, as desired. A stop-flange or bridge, *i*, is attached to the string-piece or side brace J, so that when the free end of the treadle is depressed it may be inserted beneath the flange and retained in position.

Instead of employing a spring, either elliptical or spiral, for upholding the adjustable frame, a counter-weight may be employed for such purpose, and in such case a convenient method of arrangement is to attach a cord or rope to the adjustable frame and carry the end of the cord or rope upwardly over a pulley attached to the ceiling, and to the free end secure a weight.

Pulleys L L^1 L^2 are each rigidly secured to shafts N, which project outwardly, and are furnished with screw-threaded ends *l*, for the removable attachment of the soft-metal polishing-rolls O O^1 O^2, the latter being provided with screw-threaded sockets *m*, for their ready and secure attachment to the ends of the shafts N. Immediately over the polishing-rolls O O^1 O^2 is secured a receptacle, P, provided with openings *p*, which register with the rolls, and for the purpose of allowing emery or other suitable polishing material to be placed in said receptacle and fed directly upon the peripheries of said rolls.

If desired, the receptacle P may be provided with a sliding plate provided with openings, which may serve as a valve by regulating the amount of feed-opening to each of the polishing-rolls.

Q is another receptacle, which is situated beneath the lower polishing-rolls, and serves to receive the polishing material as it falls from the rolls, and thus allows of the continuous use of the same supply of polishing material until it is rendered unfit for insuring the desired effect.

R R′ are guide-brackets, secured to the table or top of the machine-frame, the upper ends of which are bent horizontally at *r*, and provided with guide-pieces *s*. If desired, the upper ends of said guides may be attached to the transverse beams or supports in which the lower series of band-pulleys are journaled, and such ends provided with a series of perforations, to allow the guide-pieces to be secured at any desired distance from each other, and also at any desired point with reference to the peripheries of the rolls.

Having described the construction of my improved polishing-machine, I will now proceed to describe its operation. The receptacle P is first filled, or partially filled, with emery or other suitable polishing material, and a clock-spring, as indicated at T in the drawings, is placed on the outside of one of the guide-brackets, so that the coil will be located below the upper end of said bracket. The treadle being left free, the spring or counter-weight retains the upper series of rolls from contact with the lower series, thereby insuring a free open space between the peripheries of the upper and lower series of polishing-rolls. The operator then grasps the outer end of the spring, which is located between the guide-pins, and pulls said end between the rolls and inserts the end between the guide-pins on the opposite bracket. During this manipulation of the spring the driving-belt is being constantly driven, but the polishing-rolls are stationary. The operator then depresses the free end of the treadle

and locks it in place. This latter operation has the effect of forcing the band-pulleys mounted on the shafts to which both the upper and lower series of polishing-rolls are secured in direct and intimate contact with the driving-belt, thus causing a rotary motion to be imparted to both the upper and lower series of polishing-rolls. When the polishing-rolls are forced toward each other, or the upper series of rolls forced toward the lower series, the clock-spring is bent into reverse curves, as shown in Figs. 4 and 7, and as the rolls are caused to turn in reverse directions, as indicated by the arrows 1 and 2, every portion of both surfaces of the spring, except the extreme end portions, is subjected to the action of the rolls. The operator pulls the spring through between the series of rolls in direct opposition to the motion of said rolls, and hence, when the entire spring has been polished, the rolls will carry the spring back, allowing it to recoil; but it is necessary to release the treadle and allow the upper series of rolls to rise to enable the end of the spring, which is provided with a ring, to be extracted or withdrawn.

As heretofore stated, the peripheries of the soft-metal rolls are all provided with roughened surfaces.

I do not limit myself to any particular form of roughened surface, as they may be provided with diagonal, zigzag, transverse, or other form of grooves, or with depressions or pockets, the object being to provide each roll with a roughened surface, so that the emery or other abrasive material will be retained on the roll a sufficient length of time to accomplish the work.

It has been demonstrated that smooth polishing-rolls are defective, for the reason that they fail to hold the emery and carry it forcibly against the surface to be polished; but the roughened-surfaced rolls receive the emery or other substance within the depressions formed in its periphery, and prevent the emery or other substance from being forced away from the surface to be polished, thus subjecting the sheet-metal to the continuous abrasive action of the emery, and insuring a highly and evenly polished surface on opposite sides of the clock-spring or other article operated upon. As the emery is fed from its receptacle P onto the upper series of rolls, it is deposited in the depressions or grooves formed in the peripheries of said rolls and carried against the upper surface of the spring, when it operates to polish said surface. The emery thus fed onto the upper rolls falls onto the lower rolls, and is received in the depressions or grooves in the peripheries of the same and carried against the under surface of the spring, thus polishing the same.

A polishing-machine embodying my improvement can be readily operated by a single attendant, and is capable of doing not only very much more work than can be performed by hand in the ordinary manner of polishing clock-springs, but the work is much better executed, for the reason that an even and highly-polished surface is given the entire surface of the springs.

It is evident that many changes may be resorted to in details of construction and arrangement of parts without departing from the spirit of my invention, and hence I would have it understood that I do not limit myself to the exact construction shown and described; but,

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

1. In a polishing-machine, the combination, with a series of polishing-rolls provided with corrugated, grooved, or roughened peripheries, of an adjustable series of polishing-rolls provided with corrugated, grooved, or roughened peripheries, said series of rolls being located one above the other, and arranged so that the peripheries of two rolls in one of said series will overlap the periphery of a single roll in the other series, substantially as set forth.

2. In a polishing-machine, the combination, with a series of soft-metal polishing-rolls provided with corrugated, grooved, or roughened peripheries, of an adjustable series of soft-metal polishing-rolls provided with corrugated, grooved, or roughened peripheries, said series of rolls being located one above the other, and arranged so that the peripheries of two rolls in one of said series will overlap the periphery of a single roll in the other series, substantially as set forth.

3. In a polishing-machine, the combination, with a non-adjustable series of soft-metal polishing-rolls, of an independent and adjustable series of soft-metal polishing-rolls, the latter attached to a vertically-adjustable support and located over the non-adjustable series, the rolls of the two series being arranged so that the peripheries of two rolls in one series will overlap the periphery of a single roll in the other series, and adapted to be adjusted so that portions of the peripheries of both the upper and lower series of rolls will be located in the same horizontal plane, substantially as set forth.

4. In a polishing-machine, the combination, with a non-adjustable series of soft-metal polishing-rolls having roughened or grooved peripheries, of an independent and adjustable series of soft-metal rolls supported in a vertically-adjustable frame or carrier, said series of rolls being located one above the other, and arranged so that the peripheries of two rolls in the adjustable series will overlap the periphery of a single roll in the lower series, and an emery-receptacle attached to the vertically-adjustable frame or carrier, the parts being arranged so that emery will flow upon the upper rolls, and from thence upon the lower rolls, substantially as set forth.

5. In a polishing-machine, the combination, with two series of soft-metal polishing-rolls having grooved, roughened, or corrugated peripheries, one of said series being arranged and adapted to be moved toward and away

from the other series, of guide-brackets constructed and arranged to support a clock-spring, and retain it against displacement while being acted upon by the rolls, substantially as set forth.

6. In a polishing-machine, the combination, with an upper and a lower series of soft-metal polishing-rolls, of actuating mechanism whereby the rolls of both series are caused to revolve when the upper series of rolls is forced downwardly toward the lower series of rolls, and both series of rolls are brought to a state of rest when the upper series of rolls is moved away from the lower series, substantially as set forth.

7. In a polishing-machine, a band-wheel on the driving-shaft, a series of band-pulleys arranged in the same vertical plane as the band-wheel, soft-metal polishing-rolls secured to the shafts of one or more of said series of band-pulleys, and a driving-belt surrounding the band-wheel and series of band-pulleys, in combination with a series of band-pulleys journaled in an adjustable frame, said band-pulleys being mounted upon shafts having soft-metal rolls attached to their outer ends, substantially as set forth.

8. The combination, with a series of soft-metal rolls having grooved or roughened peripheries, of a series of soft-metal rolls having grooved or roughened surfaces, and connected with a yielding frame or carrier, and a treadle for depressing said yielding frame and springs, or equivalent means for raising said yielding frame, substantially as set forth.

9. In a polishing-machine, the combination, with a non-adjustable series of polishing rolls, of an independent and vertically-adjustable series of polishing-rolls, said series of rolls being arranged one above the other, the rolls of one series being located to intersect the rolls of the opposite series, and the distance between the rolls being less than the diameter of one of the rolls, substantially as set forth.

10. In a polishing-machine, the combination, with two series of band-pulley shafts, of soft-metal rolls having grooved or roughened peripheries, and removably secured to the ends of said shafts, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of April, 1879.

LEVERETT A. SANFORD.

Witnesses:

C. S. TREADWAY,

WILLIAM A. DUNBAR.