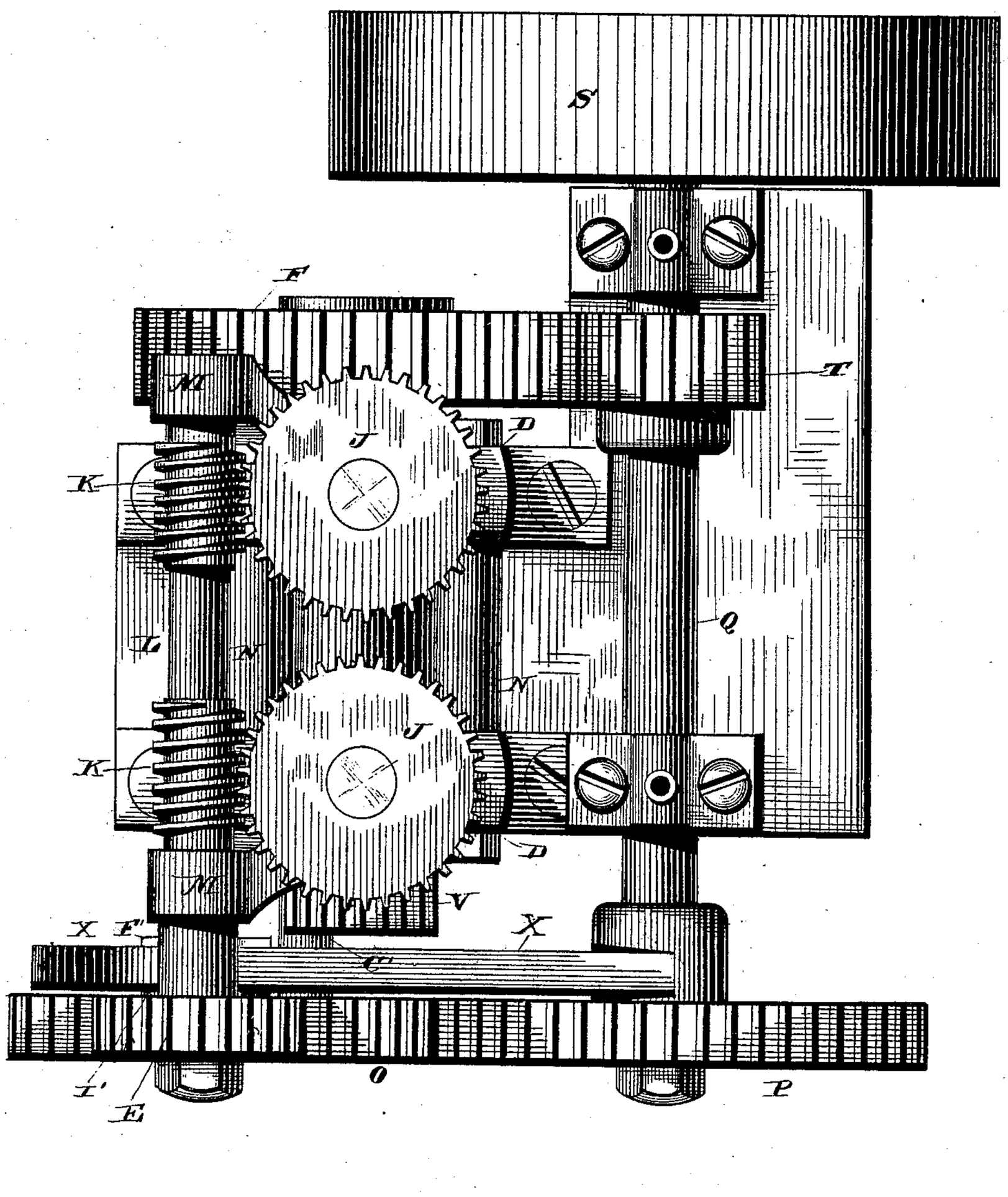
(No Model.) 4 Sheets—Sheet 1.

W. BARNES.

MACHINE FOR ROLLING BLANKS FOR CLOCK SPRINGS.

No. 254,101. Patented Feb. 21, 1882.

Fig. 1.



WITNESSES

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Fig. 2.

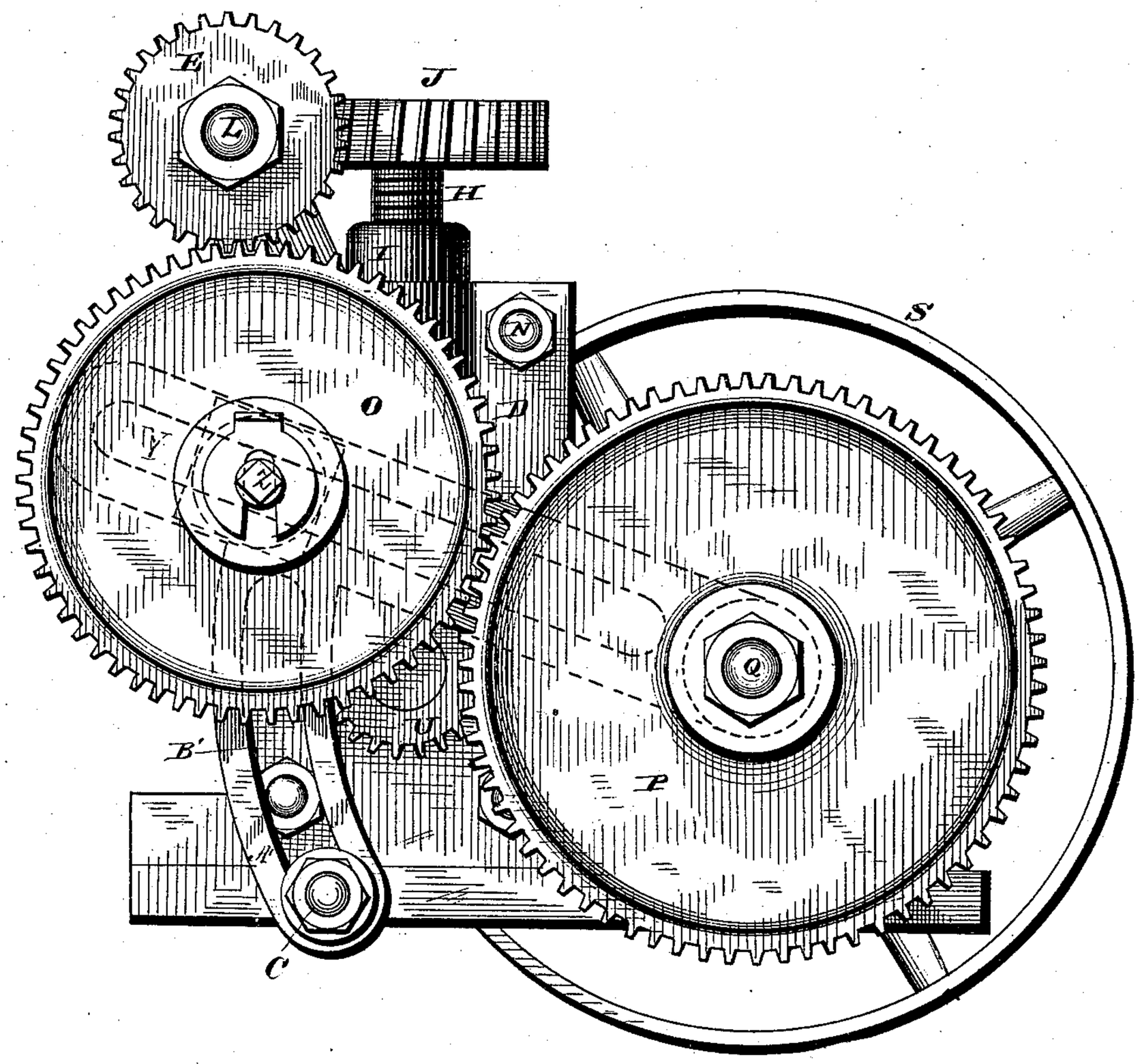

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Fig. 3.

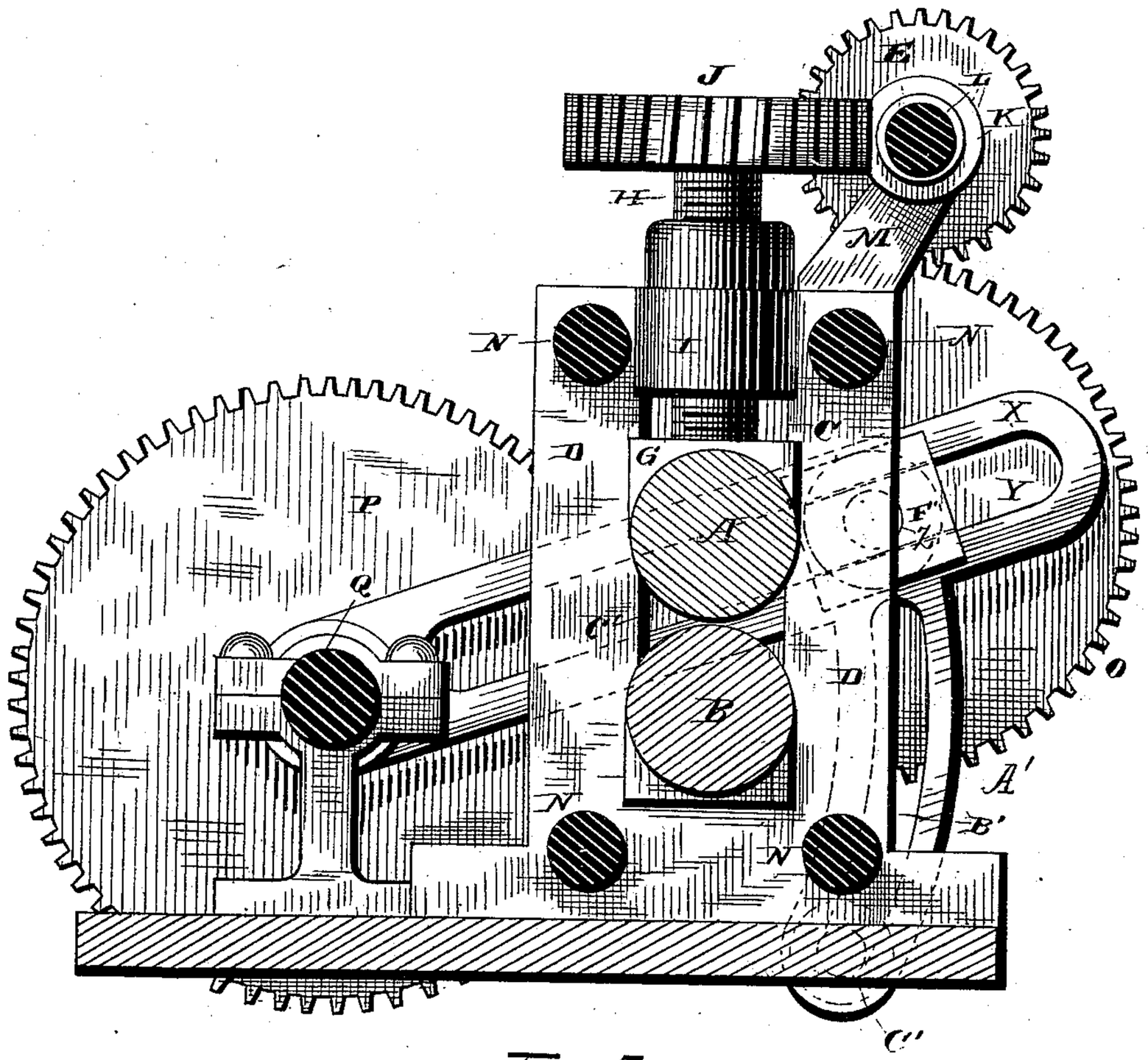
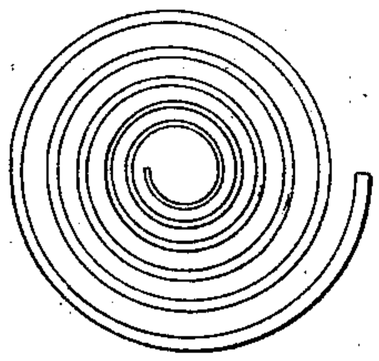


Fig. 5.



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MACHINE FOR ROLLING BLANKS FOR CLOCK SPRINGS.

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Fig. 4.

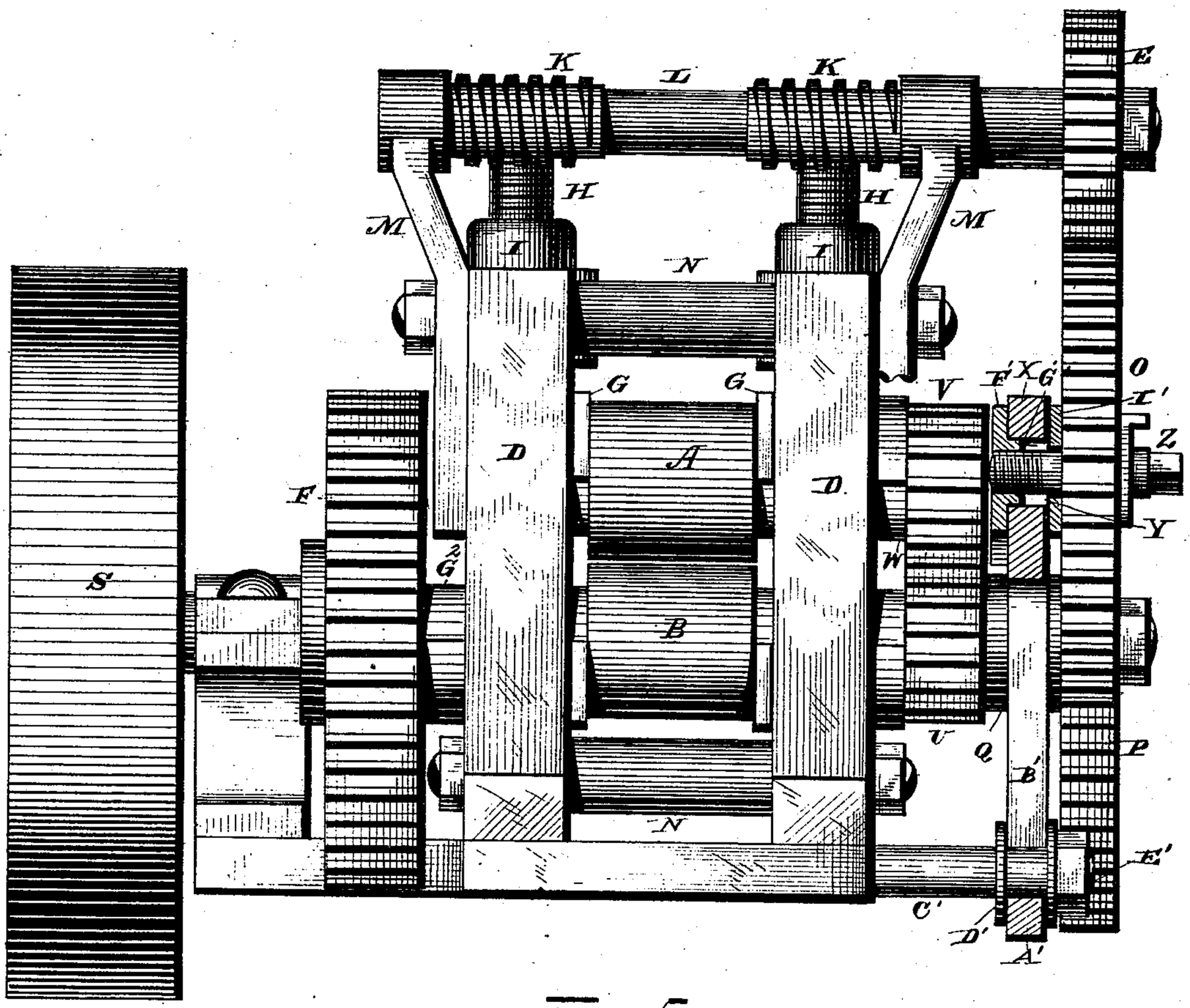

Fig. 6.

inner end — outer end

Fig. 7.

outer end — inner end

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UNITED STATES PATENT OFFICE.

WALLACE BARNES, OF BRISTOL, CONNECTICUT.

MACHINE FOR ROLLING BLANKS FOR CLOCK-SPRINGS.

SPECIFICATION forming part of Letters Patent No. 254,101, dated February 21, 1882.

Application filed July 20, 1881. (No model.)

To all whom it may concern:

Be it known that I, WALLACE BARNES, of Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Rolling Blanks for Clock-Springs; 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 mechanism for the manufacture of springs, the object being the production by improved mechanism of a coiled spring blank or band, which gradually increases in thickness from its inner to its outer end.

With this object in view my invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of mechanism constructed in accordance with my invention for the production of tapered spring bands or blanks. Fig. 2 is a view in side elevation thereof. Fig. 2 is a view in vertical cross-section. Fig. 4 is a view in front elevation. Fig. 5 is a plan view of one of my improved taper-springs after coiling. Fig. 6 is a similar view before coiling; and Fig. 7 is a view in side elevation of an uncoiled spring-blank, which decreases in width from its inner to its outer end.

In the following description the mechanism for producing the spring-blanks and its *modus operandi* will first be set forth, and followed by a statement of some of the peculiar advantages possessed by the spring over those hitherto employed. Two rollers, A and B, between which the spring-blanks are passed, have their opposite ends journaled in bearings located in the guideways C, formed in the upright frames D, which support the driven gear E and its connections, and also the driven gear F, which latter actuates said rollers. The upper or receding roller, A, is journaled in bearings G, adapted to have reciprocatory movement in the guideways C. Screws H, mounted in screw-nuts I, formed integral with and between the upper ends of the frames D, impinge upon the upper faces of the bearings G, in which the said receding roller is journaled. Spiral gears J, keyed to the upper ends of the screws H, are actuated to cause them to impinge upon or to be withdrawn from engagement with the said journals by worms K, mounted on or formed with a worm-shaft, L, journaled in brackets M, secured to the upright frames D by rods N, which also serve as braces for the frames D. The driven gear E, secured to one end of the worm-shaft L, is actuated by an intermediate gear, O, which meshes with a driving-gear, P, keyed to shaft Q, upon which the belt-wheel S is mounted, and to which motive force may be transmitted from any convenient source. A driving-gear, T, keyed to the shaft Q, meshes with the driven gear F, which is secured to one end of the shaft G^2, upon which the roller B is mounted, and to the opposite end of which a gear, U, meshing with the gear V, keyed to the shaft W of the receding roller A, is secured.

As has been before stated, the object of the machine is to produce spring-bands which shall gradually increase in thickness from their inner to their outer ends. In imparting this peculiarity of construction to them the ends of the spring-blanks are inserted within the rolls when they are in suitable adjustment to roll the thinnest or to give the required thickness of cross-section to the extreme inner ends of the springs. As the spring-blanks progress through the rolls they are increased in thickness by the gradual ascension of the screw H and the consequent removal of pressure from the bearings G of the receding roll A, allowing it to be raised by the slightly wedge-shaped band of steel between it and the stationary roll B. The screws H are raised by motion transmitted from the belt-wheel S to them through shaft Q, driving-gear P, intermediate gear, O, driven gear E, shaft L, worms K, and spiral gears J; and it must be apparent that the rapidity with which the said screws are elevated, upon which depends the gradual increase in thickness of the spring-blanks, will be the result of the relation which the several elements of the train of gearing above described bear to each other.

In making different grades of spring-bands the ratio of their increase in thickness from their inner to their outer ends will of course vary with the quality of the material entering into their construction, their length, and the use to be made of them. It is therefore necessary in effecting such a variety of results on the same machine to provide means for modifying the train in such manner as to accelerate the elevation of the screws H, and thus increase the thickness of the spring-blanks in rapid ratio, or to diminish the rate of their elevation, thereby causing the increase in thickness of the spring-blanks to be more gradual. This modification of the train is the most easily accomplished by providing the machine with a set of gear-wheels of different sizes and adapting it to receive them. This adaptation consists in providing a vertically and laterally adjustable bearing for the intermediate gear, O, enabling it to be meshed with both the driven and driving gears E and P, of whatever size they may be. The said bearing consists in a two-armed support, each arm of which is provided with an elongated slot. The upper arm, X, in the slot Y of which the short stud Z is adjustable, is pivoted at its inner end to the driving-shaft Q, while the arc-shaped lower arm, A′, which is formed integral with and depending from the arm X, is arranged to support it in any desired vertical adjustment by the reception within its arc-shaped slot B′ of a stud, C′, provided with a collar or washer, D′, against which the said arm A′ is adapted to be tightly held in frictional contact by an adjustable nut, E′. The inner end of the stud Z, which, as before described, is adjustable in the slot Y of the upper arm, X, of the bearing, is screwed into a plate, F′, provided with a guide, G′, adapted to be received within the slot Y aforesaid. The stud Z is also provided with a shoulder, between which and the outer face of the arm X a washer, I′, is interposed. By screwing the stud into the plate F′ both the said plate and the washer I′ are clamped against the arm X, thus rigidly holding the stud in that portion of the arm in which this adjustment is effected. An intermediate gear, O, of any convenient size, is mounted on the projecting end of the stud Z, which is adjusted, as described, to bring the gear in engagement with the driven and driving gears E and P.

If it is desired to produce springs rapidly increasing in thickness, the acceleration of the train and rapid elevation of the screws may be effected by adjusting in position in the train a large driving or a small driven gear. While on the other hand the adjustment in the train of a small driving or a large driven gear will cause the screws to be elevated very slowly and the spring-blanks passed through the rolls to increase in thickness very gradually.

It is optional to roll the spring-blanks singly or to roll a broad strip to give it the desired taper, and afterward cut it up into spring-blanks of the required width. The last-named method will probably be found more practicable in the manufacture of the smaller grades of springs, inasmuch as it is economical of time, in that several spring-blanks may be rolled at once. When the spring-blanks are rolled singly they will not only increase in thickness from their inner to their outer ends, but they will also gradually decrease in breadth in the same manner, inasmuch as the pressure of the rolls which laterally spreads the spring-blanks is slowly lessened from the time they enter until they have passed through them.

Springs gradually decreasing in width from their inner to their outer ends possess an advantage over those equal in width throughout their entire lengths, in that when inclosed in boxes the lateral friction between the edges of the coils and the tops and bottoms of such boxes is in great measure done away with.

When a broad strip is passed through the rolls and afterward cut up into narrow spring-blanks they may be cut to taper in width from their inner to their outer ends, if desired.

In the description of the device there has been so much said of its operation that it is not deemed necessary to give a further description thereof, save only that the belt running over the belt-wheel may be reversed by means of an ordinary clutch; and that after a strip of steel has been passed through the rolls, during which time they have been gradually separated, the belt is shifted to reverse the belt-wheel and the train of gearing to restore the screws and the rolls to the same relative positions which they respectively occupied when the spring-blank last rolled entered them. The shifting of the belt may be done by the operator of the machine or by automatic mechanism. Springs constructed after my invention possess several advantages over those hitherto employed.

It is well known that a very large majority of springs break at or near their inner ends, owing to the fact that at this point the band is forced to make much more abrupt turns than in the outer portions of the spring. However, by making the inner ends of the spring-bands thinner they become thereby more flexible and may be tightly wound without the strain which would result were they of uniform thickness throughout their entire length. This reduction in the breakage of springs thus effected will more than cover the extra cost of production.

Another advantage possessed by my improved spring is that as there is a slight space interposed between the central coils the friction between them is lessened or done away with, and a larger per cent. of the motive force of the spring is utilized. Also owing in great measure to the same cause, the motive force furnished by the spring is of more regular intensity. Again, springs constructed in accordance with my invention may, as above described, be wound tighter than the old forms of springs, thus effecting a very desirable economy of

space. They may also, for reasons above given, be more highly tempered than has been before deemed practicable.

This type of spring will retain all of its advantageous attributes through all of the grades and classes known to the trade, answering as well for the most delicate springs for watches as for the heaviest used in clocks.

It may be further added that the machine herein described, while designed primarily for the manufacture of spring-blanks, has a wider field of usefulness, as it may be employed in imparting a tapered form to many other articles—as, for instance, metallic fish-pole tips and taper-cutting tools. I would therefore have it understood that I do not limit myself to the exact construction shown and described, but hold myself at liberty to make such slight changes and alterations as fairly fall within the scope and spirit of my invention.

I make no claim in this application to the improved form of spring hereinbefore described as an article of manufacture, but reserve to myself the right to file a separate application for Letters Patent therefor.

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

1. In a machine for making clock-spring blanks, the combination, with two rolls, one of which is arranged to recede from the other by the gradual withdrawal of screws which impinge upon its journal-bearings, of a train of gearing adapted to actuate said screws, the driving and driven gears of said train being changeable, the intermediate gear being provided with a vertically and laterally adjustable bearing adapting it to be meshed with changeable driving and driven gear-wheels, substantially as set forth.

2. The combination, with a stationary and a receding roll, the recession of the latter being effected by the gradual withdrawal of screws from its journal-bearings, of a train of gearing to actuate the screws, the intermediate gear of said train being provided with a vertically and laterally adjustable bearing, consisting of a two-armed plate, the upper end of which is provided with an elongated slot in which the stud upon which the gear is mounted is adjusted, the lower arm of the bearing being provided with an arc-shaped slot which receives a stud adapted to be secured in any part of it, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of July, 1881.

WALLACE BARNES.

Witnesses:
MILES L. PECK,
CARLYLE F. BARNES.