(No Model.)

C. F. BRADFORD.

MACHINE FOR WINDING COTTON, &c., UPON CORES.

No. 438,910. Patented Oct. 21, 1890.

Fig. 1.

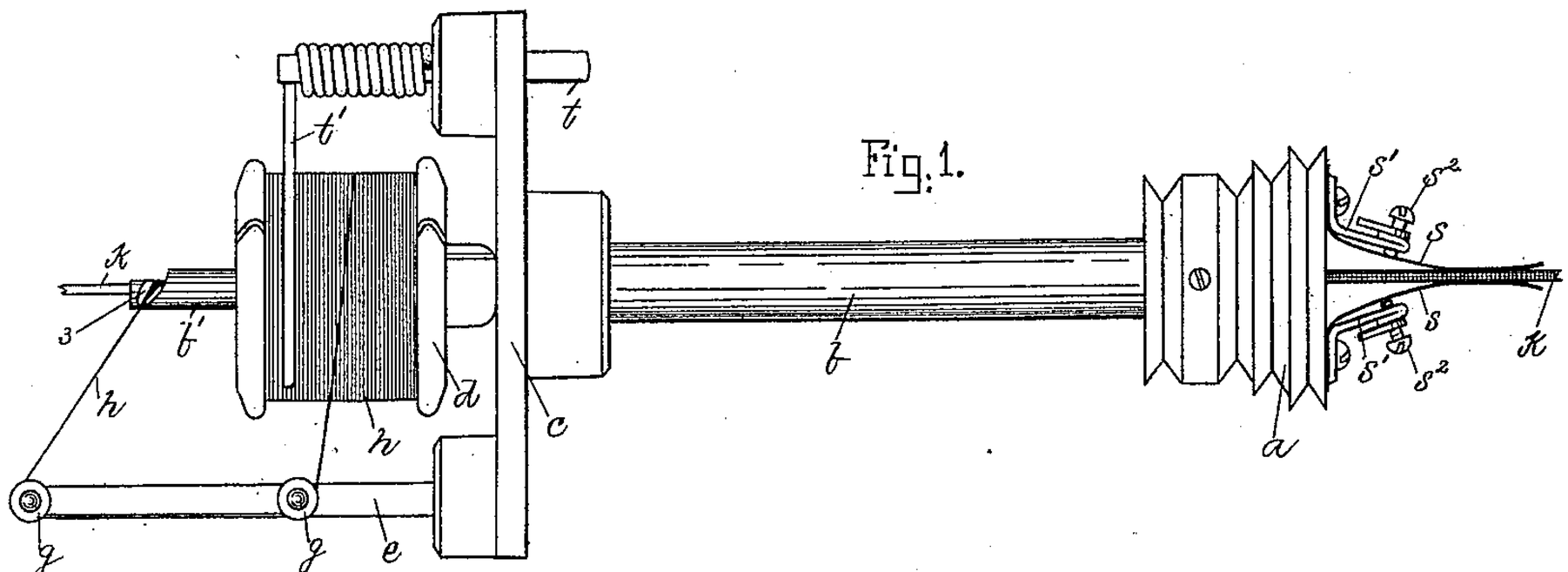

Fig. 2.

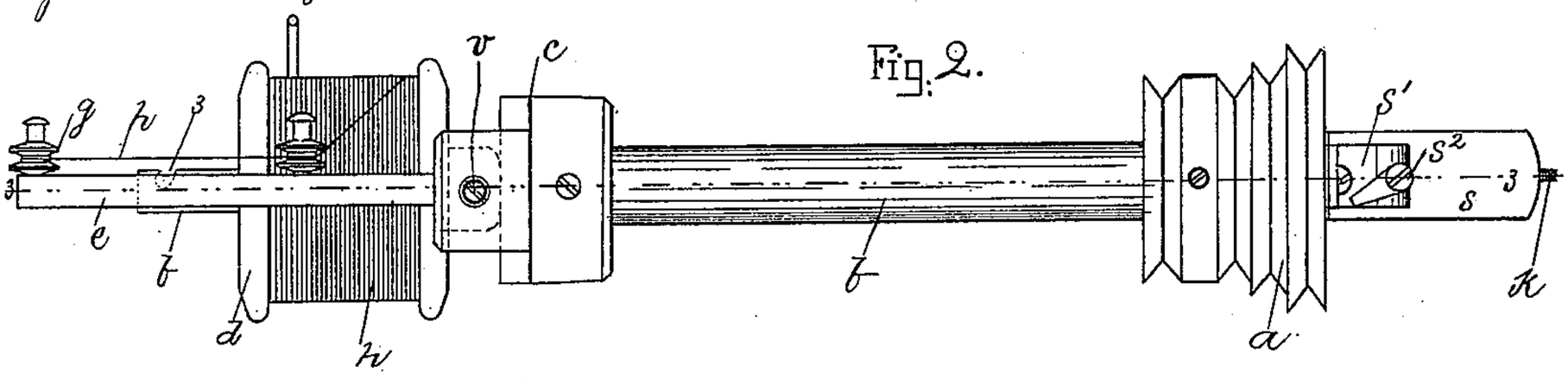

Fig. 3.

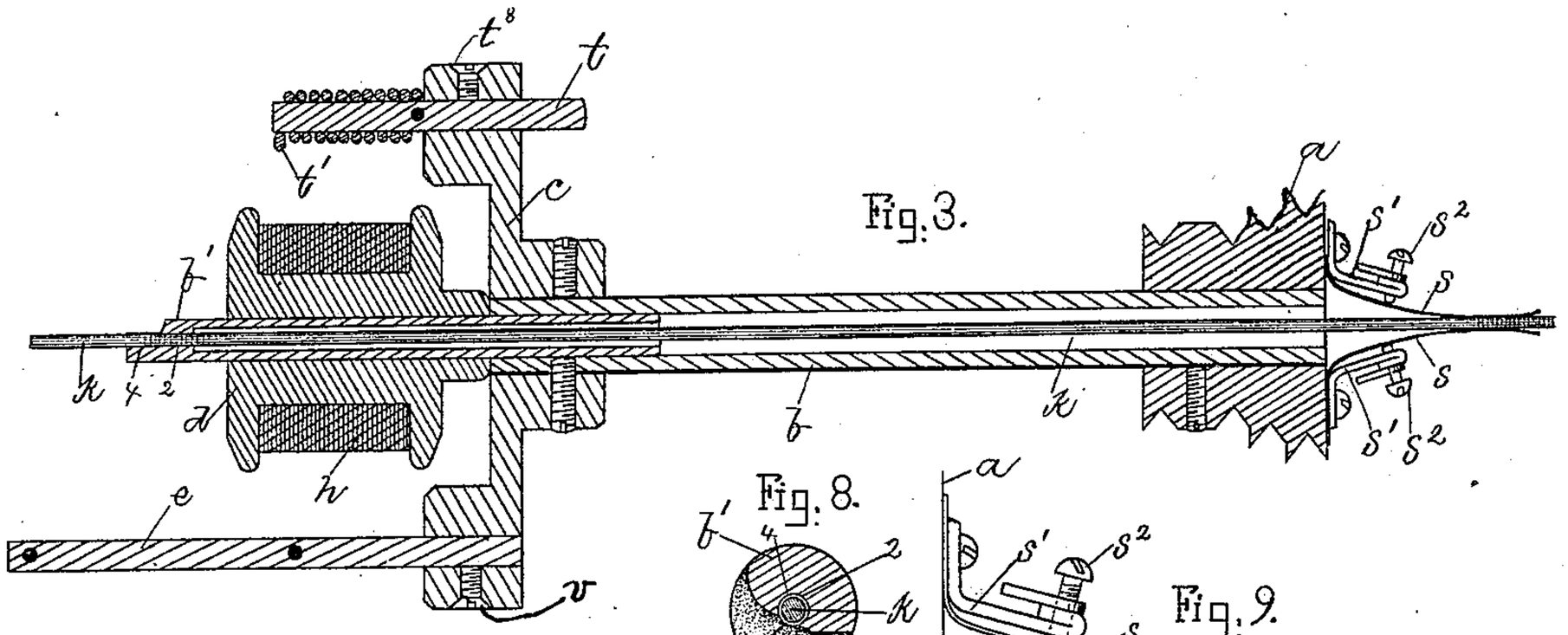

Fig. 4.

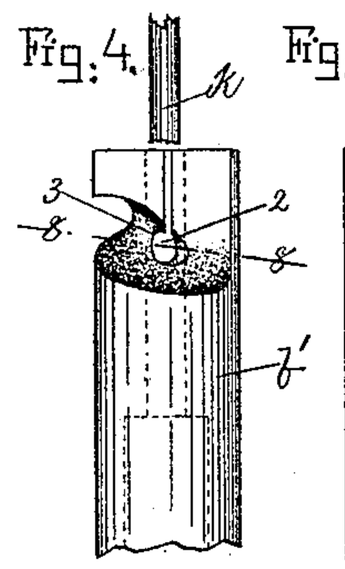

Fig. 5.

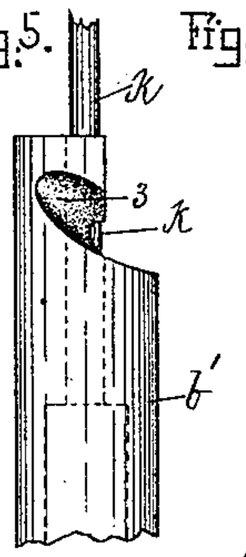

Fig. 6.

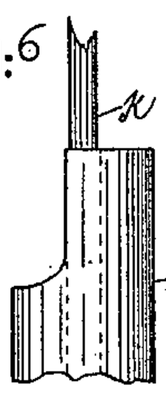

Fig. 8.

Fig. 7.

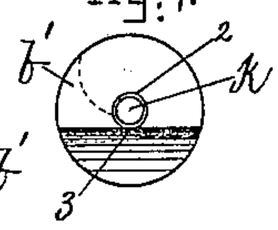

Fig. 9.

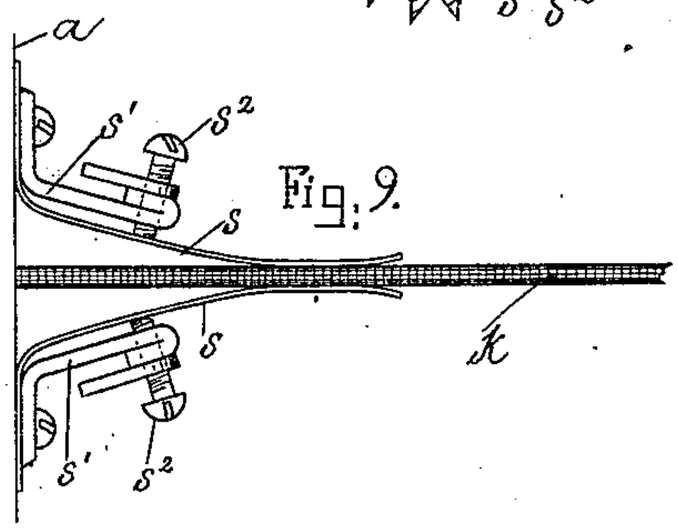

Fig. 11.

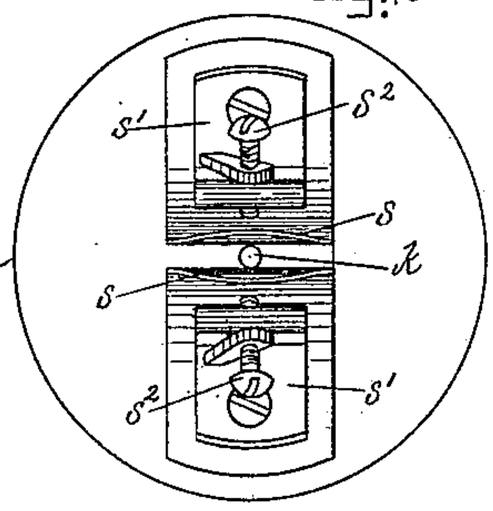

Fig. 10.

Witnesses.

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UNITED STATES PATENT OFFICE.

CORNELIUS F. BRADFORD, OF PLYMOUTH, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO NATHANIEL MORTON, OF SAME PLACE.

MACHINE FOR WINDING COTTON, &c., UPON CORES.

SPECIFICATION forming part of Letters Patent No. 438,910, dated October 21, 1890.

Application filed March 10, 1890. Serial No. 343,277. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS F. BRADFORD, of Plymouth, in the county of Plymouth and State of Massachusetts, have invented an Improved Machine for Winding Cotton and the Like upon a Core, of which the following is a specification, reference being had to the accompanying drawings, making a part hereof, in which—

Figures 1 and 2 are elevations of the shaft and the parts carried by it. Fig. 3 is a section on line 3 3 of Fig. 2. Figs. 4, 5, 6, 7, and 8 are details enlarged to illustrate the working end of the hollow spindle which supports the core and also guides and lays the cotton upon the core. Figs. 9, 10, and 11 are details of the rotary surface-finisher.

I have not shown the frame of the machine, the boxes in which the shaft is mounted, the mechanism for feeding the wire or other core to be covered, and the like for these are matters of mere construction, and one example of them is shown in my patent, No. 383,856, dated June 5, 1888.

My improved machine, like that of my patent above named, consists of a hollow shaft *b*, carrying a face-plate *c*, a tension device *t t'*, and a spindle *b'*, concentric with the shaft *b* and supporting a spool or bobbin or reel *d*, also a guide which guides the covering material *h* from spool *d* to the wire or core *k*.

One feature of my present invention relates to the construction of the outer end of the hollow spindle *b'*, and consists in forming it with a groove 3, which extends from the outer periphery of the spindle into the bore 2, as fully shown in Figs. 4 to 8. This groove 3 serves as a guide to the thread *h*, and the inner surface 4 of the bore 2 at and about this groove acts as a support for the core. The entire outer end of spindle *b'*, except enough of it to form the groove 3 and wire-support 4, may be cut away; but for convenience it is enough to cut off one side of the outer end of spindle *b'*, as shown, for the groove 3 can then be filed or otherwise formed in the remaining portion of the spindle *b'*. The surface of groove 3 forms an acute angle with the surface of the bore 2, and the thread *h* is therefore guided by the groove 3 close to the core *k*, and the core is supported by the inner surface of the spindle on both sides of the groove 3, and this is the chief advantage of this part of my invention.

Another advantage is that when several strands or threads *h* are applied together, the guiding-surface of groove 3 acts as a spreader, laying the several strands side by side on the wire *k*.

This part of my invention is of general application in machines for covering wire or the like, but is especially useful where the spindle *b'* and the bobbin *d* are concentric, as in the machine shown.

Another feature of my invention is the combination, with the face-plate *c* and spindle *b'*, of a finisher *s s* by means of a shaft *b*, the main novelty being that the face-plate and spindle are at one end of the shaft *b* and the finisher at the other end, this feature of my invention consisting in a novel arrangement of the finisher with relation to the covering device, which results in an improved machine that both covers the core and finishes the covering. Patent No. 102,110 of April 19, 1870, shows a single machine intended to both cover and finish; but the arrangement in that patent is such that the spool cannot be removed without taking with it the finisher and other parts, while by my arrangement of the spool-spindle *b'* at one end of a shaft *b* and the finisher *s s* at the other end of that shaft I am enabled to use both in the same machine without either interfering with the other, and what is still more important I am enabled to revolve the shaft *b* and feed the core much faster than would otherwise be possible—that is to say, with my improved machine I can increase the feed of the core so much that the product would be ill-covered were it not for the finisher, which spreads out as well as smooths the covering, and as both devices are in the same machine I can so regulate the feed that the finisher is always certain to complete the work of the covering device. I do not claim, of course, the mere placing together in one machine of a covering device and a finishing device, for this part of my invention consists in the arrangement of these devices, as above described—that is, at oppo-

site ends of the shaft *b;* and it is to this invention that the great practical advantages of my improved machine (as to largely-increased quantity of product without detriment to quality) are mainly due. Theoretically the speed of the covered core through the finisher might be very much greater than anything attained in practice. Before my invention the rate of speed through the covering-machine was practically limited by the need of placing each turn of the spiral casing in close contact with the next preceding one; but in my improved machine the feed of the core can be greatly quickened without increasing the number of revolutions of the shaft *b*, which carries both the covering and the finishing devices, and it is practical so to adjust the core-feed as to adapt it admirably to both these devices, with the result of greatly increasing the quantity while fully maintaining if not improving the quality of the product. Were the finishing device not used, the core-feed would require to be so adjusted to the number of revolutions of the covering device that the spirals of the covering would be laid in contact each with its neighbor, so as to have no part of the core uncovered; but when the finishing device is used with the covering device the core-feed should be so adjusted that the spirals of the covering will be laid by the covering device at a slight distance apart, as they will be brought into contact by the spreading action of the finishing device. Hence the proper rate of feed of the core depends not only upon the number of revolutions of the covering device, but also upon the spreading action of the finishing device.

A third feature of my invention is an improvement in the machine of my patent above referred to relating to the combination of the face-plate *c* with the spindle *b'* and a tension *t t';* and it consists in the combination, with the face-plate *c* of the central spindle *b'*, projecting from it, and a tension device adjustable, as now to be described—that is, consisting of an arm or stud *t*, projecting from the face-plate and held by a set-screw t^8 or its equivalent, this arm *t* carrying a spring *t'*, adapted to bear upon the thread *h* while upon the spool or bobbin *d*. When the set-screw is loosened, the stud *t* can be turned on its axis to increase or lessen the pressure of the spring *t'*, and can be moved endwise to cause the spring *t'* to bear at the desired place upon the spool or bobbin *d*.

The combination of the face-plate *c*, spindle *b'*, a thread-guide consisting of a longitudinally-adjustable arm or stud *e*, and guide-wheel *g*, or their equivalents, (for obviously eyes or grooved bearings will answer nearly as well, and a single guide may be used instead of two or more,) and the tension device *t t'* constitutes a further feature of my invention. The longitudinal adjustment of arm *e* is best effected by mounting it in the face-plate in the manner clearly shown in the drawings. To adjust it, the set-screw *v* is loosened and the arm brought to the desired position, and the set-screw is then tightened. The face-plate *c*, with the thread-guide *e g*, and tension device *t t'*, and the spindle *b'* act together to deliver the thread *h* properly about the core *k*, and in order to obtain the proper quality of product the tension should be substantially uniform, whether there be much or little thread upon the spool. These two last-named combinations—namely, the face-plate and spindle, with a tension device adjustable toward and from the spindle and also along the spindle, and the face-plate and spindle, with a tension device, and a thread-guide carried by a rod which is adjustable endwise—are of much practical importance, for the reason that they do away with a great practical difficulty heretofore experienced in using machines of this class, for if such machines were not stopped from time to time and the tension readjusted the product was inferior in quality; but my improved machine will run continuously after the tension is once adjusted. Not only is the force of the spring *t'* automatically decreased as the diameter of the spool of thread and consequent leverage of the pull on the spool decreases, thus keeping the tension practically constant, but the spring *t'* may be set to suit the length of the spool, and also to bear upon the proper part of the thread. The contact of spring *t'* with the thread on the spool prevents the spool from moving endwise to any great extent, and for the best results the spring *t'* should press upon the thread on the spool in one place when the spool is short, but in a different place if the spool be long. In theory the spring *t'* should always bear midway between the spool-heads; but, owing to lack of uniformity in the spools, it will be found, as I think, that the proper adjustment of the spring *t'* is commonly nearer the outer spool-head. The adjustment of the thread-guide endwise changes the angle at which the thread joins the core, which is a matter of extreme importance, for that angle varies with the size of the core and the thickness of the covering desired. Moreover, unless this angle be adjusted with great nicety, the work is defective, especially where the covering consists of several strands which are spread upon the core. The bobbins are slit, as shown in Fig. 1, so that an empty bobbin can be removed without disturbing the core, and in practice several filled bobbins are strung upon the core before it enters the end of spindle *b'*, as will be well understood without further description.

I am aware of United States Patent No. 42,040, dated March 22, 1864, and disclaim the spindle and groove there shown, for the groove extends from the periphery over the front end of the spindle, the intersection between the bottom surface of the groove and the bore of the spindle being at the front end of the spindle, the function and operation of the groove and the front end of the spindle

being wholly unlike anything in my device, for in my device the groove intersects the bore of the spindle at a distance from the outer end and the inner surface of the spindle forms a bearing for the core at both sides of the groove. Moreover, the sharp edge formed by the intersecting surfaces of the groove and bore in my device spreads the strands of thread upon the core.

What I claim as my invention is—

1. In a machine for covering a core, the spindle b', having a groove 3 at a distance from the outer end of the spindle, the bottom surface of the groove intersecting and forming an acute angle with the bore 2 of the spindle, the place of intersection being at a distance from the outer end of the spindle, and the inner surface of the spindle forming a bearing for the core at both sides of the intersection of the bottom surface of the groove 3 with the bore 2, all substantially as set forth.

2. In a machine for covering a core, the hollow shaft b, in combination with the spindle b', face-plate c, thread-guide and tension device at one end thereof, and the springs $s\ s$ at the other end, substantially as described.

3. In combination, hollow shaft b, hollow spindle b', face-plate c, arm t, spring t', carried by arm t, and a set-screw for adjusting the spring t' toward and from the spindle b' as well as along that spindle, all substantially as described.

4. In combination, hollow shaft b, hollow spindle b', face-plate c, arm e, carrying thread-guide g, and a set-screw for adjusting the arm e lengthwise, all substantially as described.

CORNELIUS F. BRADFORD.

Witnesses:
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ICHABOD CARVER.