(No Model.) 3 Sheets—Sheet 1.

A. H. FROST & F. L. BRYANT.

WIRE COILING MACHINE.

No. 296,551. Patented Apr. 8, 1884.

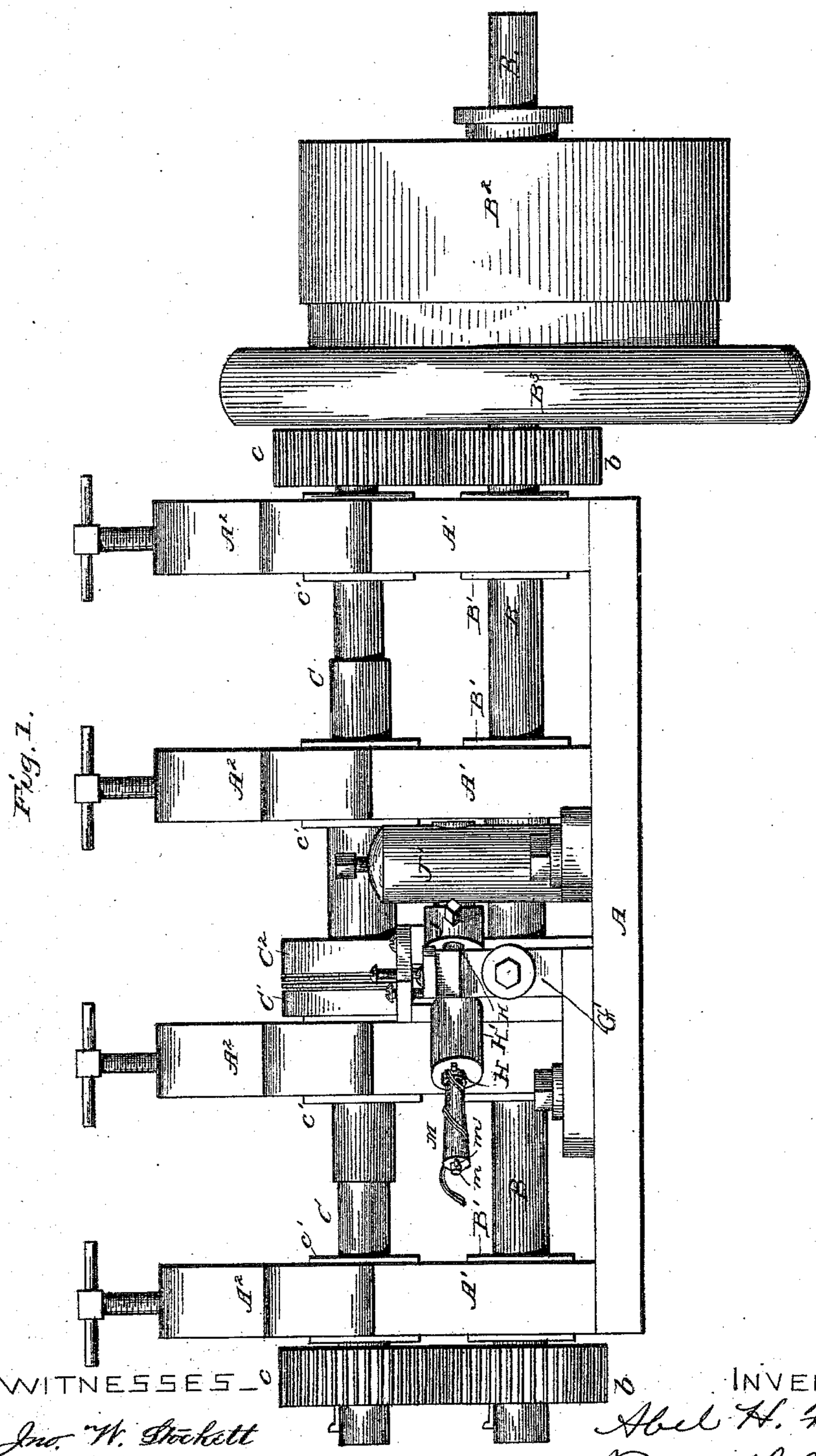

Fig. 1.

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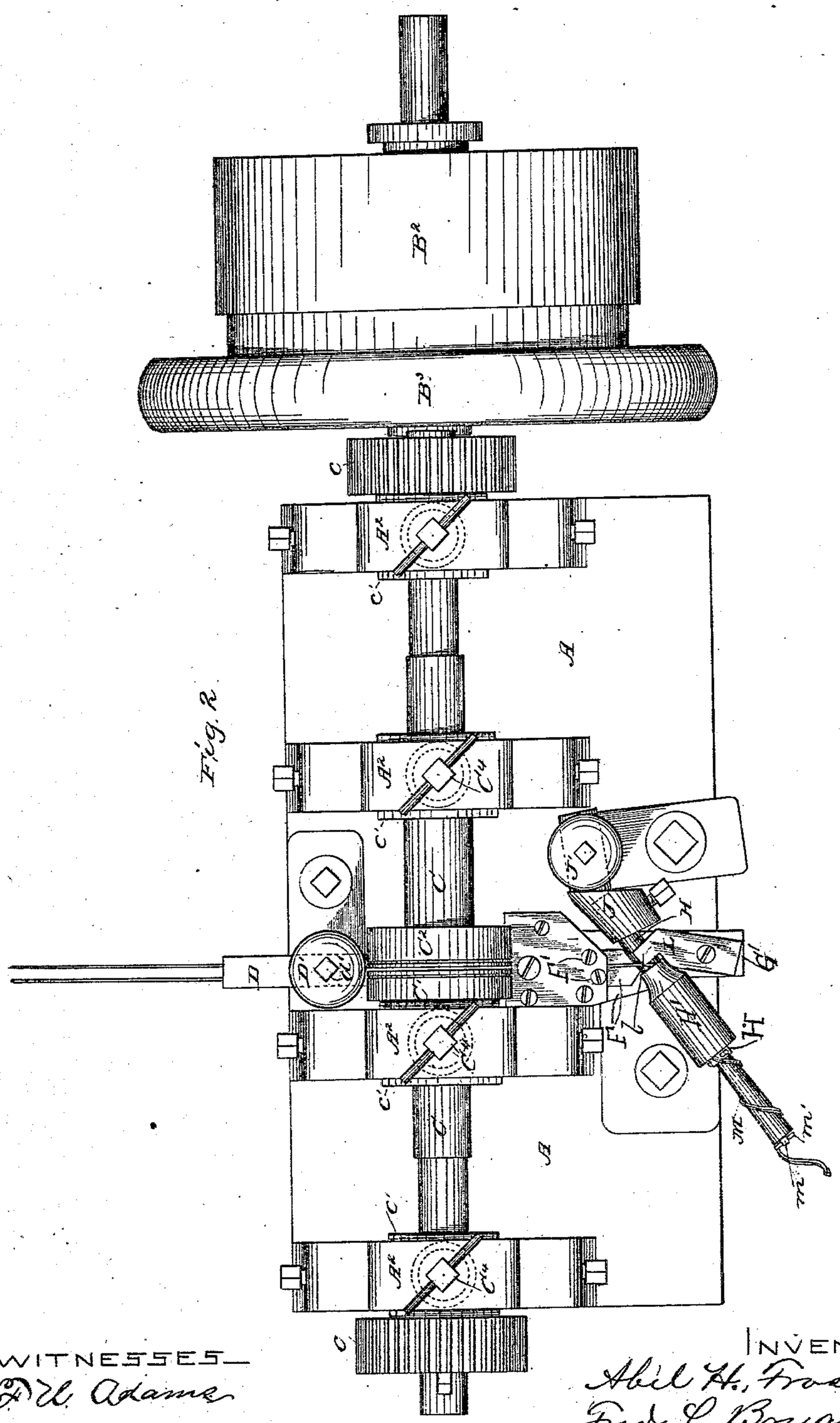
Fig. 2.



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A. H. FROST & F. L. BRYANT.

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Fig. 3.

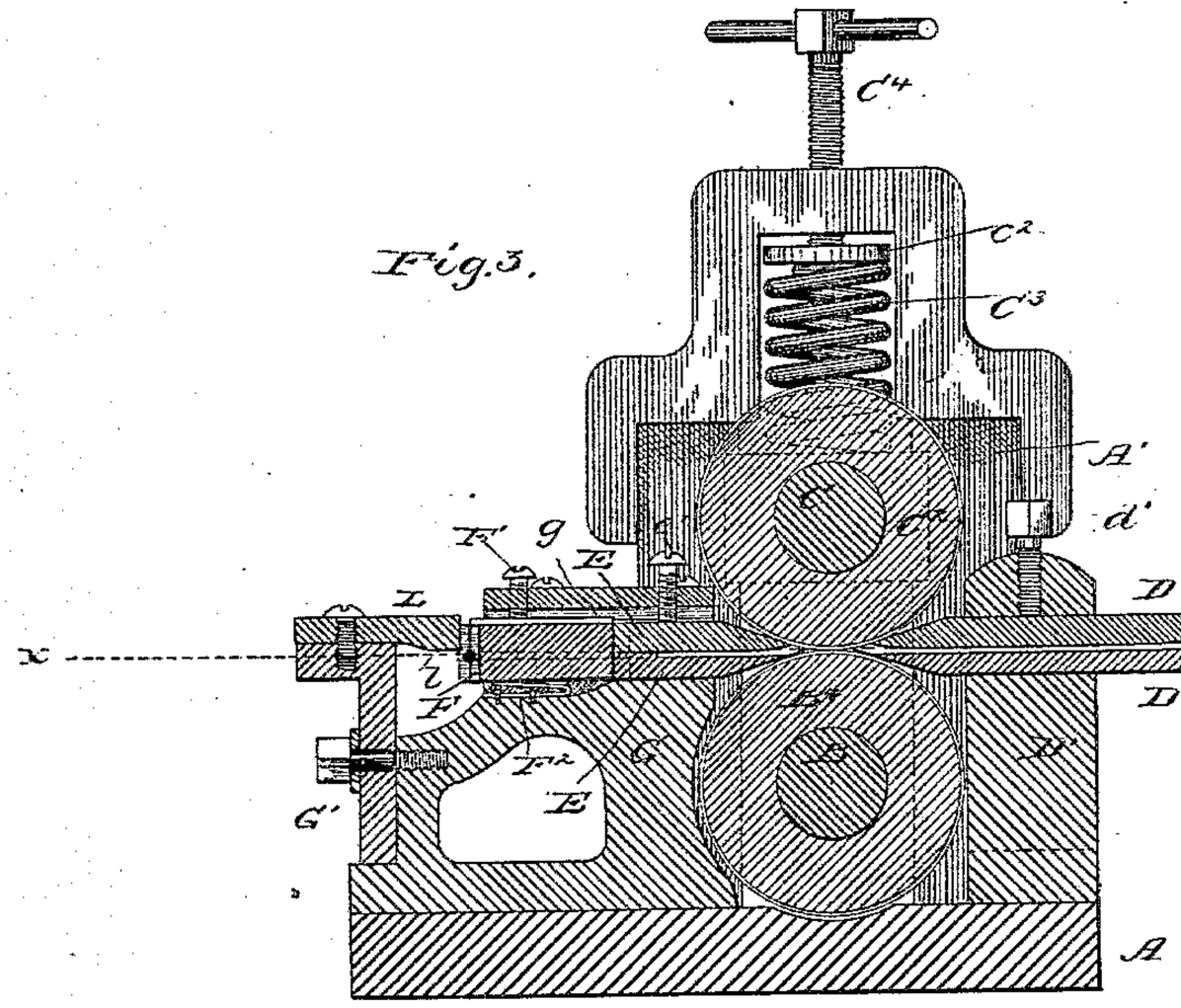


Fig. 6.

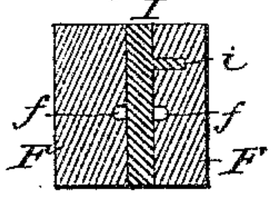


Fig. 5.

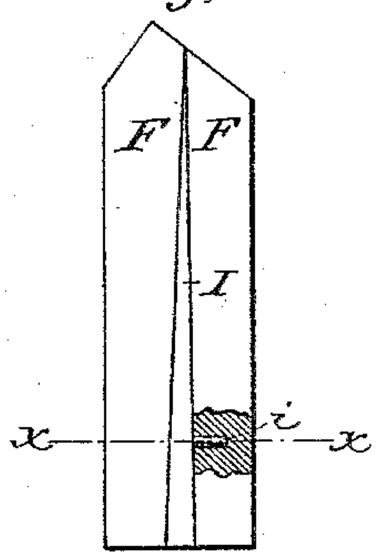
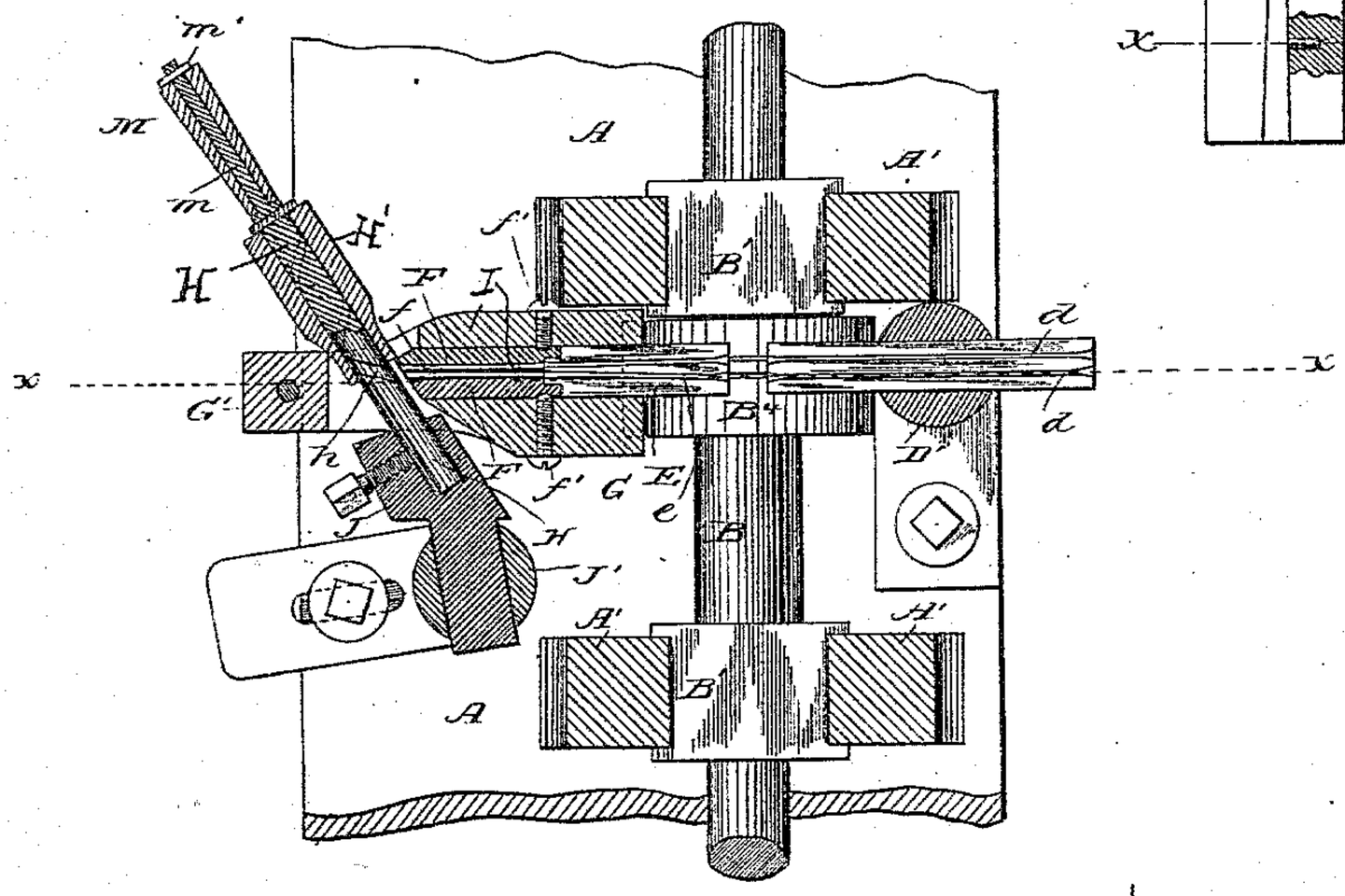


Fig. 4.



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UNITED STATES PATENT OFFICE.

ABEL H. FROST AND FRED L. BRYANT, OF CHICAGO, ILLINOIS.

WIRE-COILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 296,551, dated April 8, 1884.

Application filed March 24, 1883. (No model.)

To all whom it may concern:

Be it known that we, ABEL H. FROST and FRED L. BRYANT, both of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Wire-Coiling Machines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to what are known as "force-feed" machines for coiling wire as performed in the manufacture of coiled-wire fabric for use in the construction of woven-wire bed-bottoms or mattresses, and has for its primary object to insure a more symmetrical form in the coil made by this class of machines.

The principal feature of the invention, as will be observed from the following description of the devices employed, consists in means, operating in connection with the coiling devices of the machines mentioned, for modifying the final form of the coil by a flexure of the wire other than and preliminary to that by which the coil proper is made.

The more specific objects of the invention, as applied to manufacture of coiled-wire fabric, are, first, to enable two or more wires to be simultaneously coiled side by side with such regularity and symmetry in the form of the coils that the several wires will continue to run at a distance from the machine in the same positions relative to each other in which they leave the coiler, whereby the manifold coil will not only present the same close appearance throughout its length, but will more certainly enter and interweave with a previously-made coil in the production of fabric.

A second specific object of the invention is to give the coils, whether single, double, or otherwise manifold, a more perfectly cylindric form, whereby the said coil will run more steadily from the machine upon the weaving-table and will therefore more readily and certainly interweave with an adjacent previously-formed coil of the fabric being made.

To insure a better understanding of these objects, it may be stated that in force-feed wire-coiling inequalities in thickness, density, and temper of the wire have a tendency to materially modify the form of the coils. When two wires are coiled side by side, therefore, a difference between the two wires in either of the above respects will tend to make the coils of unequal diameter or length, or both, and consequently as the wires advance from the machine their ends separate more and more, failing to both enter an adjacent coil of the fabric, and presenting an uneven and unsatisfactory appearance when completed. Lack of cylindric accuracy may arise from the same conditions in the wire or from defects in the coiler.

The invention is herein illustrated in connection with a force-feed machine for coiling two wires side by side.

Figure 1 is a front elevation of a machine embodying the invention. Fig. 2 is a top view of the same machine. Fig. 3 is a transverse section through the wire-guides or through *x x* of Fig. 4. Fig. 4 is a horizontal section through said guides or through *x x* of Fig. 3. Fig. 5 is a plan view of the adjustable wire-guides detached; and Fig. 6 is a vertical section through *x x* of Fig. 5.

A is a bed-plate of the machine-frame, and A′ A′ are slotted uprights rising from said bed-plate, intended to support the bearings of the feed-roller shafts.

B is a continuous shaft, having bearings B′ in said uprights, and provided with the driving-belt pulley B^2 and balance-wheel B^3. Said shaft B is also provided with equal pinions *b b*, exterior to the outermost uprights A′.

B^4 is a feed-roller, secured to the shaft B between the innermost uprights A′.

C C are two shorter shafts, mounted in vertically-movable bearings *c′ c′* in the slots of the uprights A′, and provided with the pinions *c c*, equal in diameter to the pinions *b b*. The adjacent ends of the short shafts C C are provided with feed-rollers C′ C^2, closely proximate to each other, and both arranged in opposition to the lower feed-roller, B^4. Near their meeting faces the rollers C′ C^2 are provided with peripheral grooves, which coincide with corresponding grooves in the roller B^4, said grooves being intended to partly embrace the two wires to be simultaneously coiled. Springs C^3, Fig. 3, arranged over the bearing-boxes *c′*, and confined by the yokes or plates A^2, serve

to give a yielding pressure of the feed-rollers upon the interposed wires; and set-screws C^4, with plates c^2, serve to adjust the degree of such pressure. The construction of the feed-rollers above described—that is, the arrangement of two yielding rollers in opposition to a single roller—is intended to favor the uniformly-rapid forward feed of the two wires, notwithstanding any slight inequalities in the size of said wires. Said construction is a desirable auxiliary to the present invention, but it forms no part thereof, and is not essential thereto. It is fully described and claimed in another application for patent by its inventor.

D D are two horizontal guide-plates, which conduct the wires to the feed-rollers, said plates having in their meeting faces, or in the face of one of them, the longitudinal grooves *d d*, Figs. 3 and 4, arranged in line with the circumferential grooves in the feed-rollers, as plainly seen in Fig. 4. These guide-plates are removably secured in an apertured post, D′, by a set-screw, *d′*, and may be withdrawn at any time to be cleaned, adjusted, or renewed.

E E are similar guide-plates, having their meeting faces horizontal and grooved at *e e*, and arranged in position to receive the wires from the feed-rollers, said plates being held removably in place within an aperature, *g*, of the post G by means of a set-screw, *e′*, Fig. 3. As the wires usually require to be brought close to each other in the act of being coiled, and as the peripheral grooves of the feed-rollers described are preferably placed at a little distance apart, the grooves in the plates E will usually converge somewhat, as shown in Fig. 4.

F F are two guide-plates, (shown detached in Figs. 5 and 6,) forming continuations of the plates E E for leading the wires to the coiler; but said plates F have their proximate grooved faces in vertical instead of horizontal planes, and they are separated by a thin steel plate, I, which, at its inner and thicker end, is equal and opposite to the space between the grooves *e e* of said plates E, and which at its outer end is brought to an edge, as shown in Figs. 4, 5, and 6. One wire, therefore, passes at each side of the plate I, and the grooves *f* in the plates F are consequently each of sufficient depth to accommodate the wire. The object of this arrangement of the grooved guide-plates F is to permit the outer end of either plate and the portion of the wire emerging therefrom to be depressed relative to the other or to the coiler, and to this end the inner extremities of said plates are pivotally held in place by horizontal center-point screws *f′ f′*, Fig. 4, passing through the sides of the post G, and entering suitable recesses in the sides of said plates. The outer ends of the guide-plates F are sufficiently confined laterally by the walls of the recess, in which they are housed, and the plate I may be retained in place by a short pin, *i*, projecting therefrom into one of the said guide-plates, as shown in Figs. 5 and 6. Perfect continuity of the grooves *e* and *f* may be obtained in this construction by overlapping the parts E and F, as seen in Fig. 4. Vertical adjustment of the outer ends of the several guide-plates F is obtained by means of a set-screw, F′, arranged over each one of them and a spring, F^2, beneath each.

H is the coiling-spindle, provided with a spiral groove, *h*, and with a rotating or non-rotating sleeve, H′, being in these respects of the usual or any approved construction. Said spindle is removably secured in an arm, J, of the post J′, also in the usual way, and, as indicated clearly in Figs. 1, 2, and 4, with the upper part of the groove *h* in line with the emerging wires.

L is a plate secured to the arm G′, and having its inner end, *l*, arranged to cover the wires at the point where they enter the groove *h*, as shown in Fig. 2. This plate is not strictly essential; but it is sometimes desirable to prevent any tendency of the wires to buckle in being pushed into and through the coiling-groove.

The operation of the devices for guiding the wire above described, being complete for certain purposes of the invention, may be here stated, as follows: If it is observed that the ends of the coiled wire separate after leaving the coiling-spindle, (both being fed at equal speed,) it is because both wires are not permanently bent equally in passing through the coiling-groove. That wire which is least bent (or which springs most) will obviously form the coil of greatest diameter and shortest length or least pitch, and in the progress of both wires along the table the end of this wire will fall behind the other, which, as before stated, interferes with the act of weaving and gives an imperfect product. By depressing the end of the corresponding guide-plate F more or less, as found to be effective, a preliminary flexure is given the wire, which enables the latter to "set" at the required curve in being passed through the coiling-groove, and the two coils may be made equal and to advance accurately side by side and with their ends even throughout the entire length of fabric. If desired, both wires may be preliminarily bent, as described, either equally or unequally, as the case may require.

To insure a perfectly cylindric form in the coil or coils (either single or manifold) as it leaves the coiling-spindle, and a more steady and regular movement thereof along the surface of the coiling-table, by which it interweaves with certainty with a previously-formed coil of a fabric, an expander, M, is applied to the end of the spindle H, as shown in Figs. 1, 2, and 4 of the drawings. Said expander consists of an outwardly-enlarged conical extension of the spindle, having its inner end of the same diameter as the spindle, measured at the bottom of the grooves, so that the wires freely pass thereon from the spindle. At its outer end said expander is slightly larger than the interior diameter of the coils as set by the coiler, so that said coils, as they are forced over the expander, are slightly enlarged, and,

if previously irregular or not perfectly cylindrical, are thereby made symmetrical, so as to traverse the table with a regular movement and to more certainly interweave with an adjacent coil of the fabric. Said expander or "expanding-tip," as it is called, is preferably constructed to rotate with the movement of the coil, and to this end it is shown as centrally and longitudinally apertured to freely fit a spindle, *m*, affixed to the coiling-spindle H and axially in line therewith, and is held upon said spindle *m* by a pin, *m'*, or equivalent device at its outer end, as shown. Said tip is also preferably cylindrical for a portion of its length at the outer end, though not so shown. The expanding tip obviously acts independently of the adjustable wire-guides F F, though both manifestly contribute to the same general end or purpose of producing a perfectly symmetrical and uniform coil. Said expanding-tip has for its preliminary object to correct the faults that are otherwise obviated more or less perfectly by said adjustable guides, since the greater expansion of a lesser coil tends obviously to equalize both; but the trip, acting subsequent to the coiler, also tends to correct errors arising from imperfections in said coiler. Both may, therefore, be advantageously used together, particularly in the production of a double or manifold coil, while in making a single coil the tip only need be used.

The method or process of forming wire coils embodied in the operation of the machine above described, and which consists in preliminarily bending or flexing the wire before it receives the final bend by which the coil is produced, forms the subject-matter of a separate patent for which application has been made by us, No. 113,271, December 1, 1883, and such method or process is not, therefore, embraced in this patent.

We claim as our invention—

1. In a force-feed machine for coiling wire, the combination, with the coiling-spindle and feeding devices, of adjustable means for variably flexing the wire before it passes onto the spindle, substantially as described, and for the purposes set forth.

2. The combination, with the coiling-spindle and feeding devices, of a vertically-adjustable guide for leading the wire to the spindle, substantially as described, and for the purposes set forth.

3. The combination, with the coiling-spindle and feeding devices, of two or more separately and vertically movable guides and adjusting devices therefor, substantially as described.

4. The combination, with the coiling-spindle and feeding devices, of pivoted guide-plates F F, provided with grooves for the several wires, an intermediate plate, I, and means for adjusting the guide-plates, substantially as described.

5. In combination with a non-rotating coiling-spindle and force-feeding devices, an outwardly enlarged conical tip, M, arranged in prolongation of the coiling-spindle, substantially as described, and for the purposes set forth.

6. In combination with the non-rotating coiling-spindle, the rotating conical tip M, substantially as described, and for the purposes set forth.

In testimony that we claim the foregoing as our joint invention we affix our signatures in presence of two witnesses.

ABEL H. FROST.
FRED L. BRYANT.

Witnesses:
M. E. DAYTON,
S. ARTHUR WALTHER.