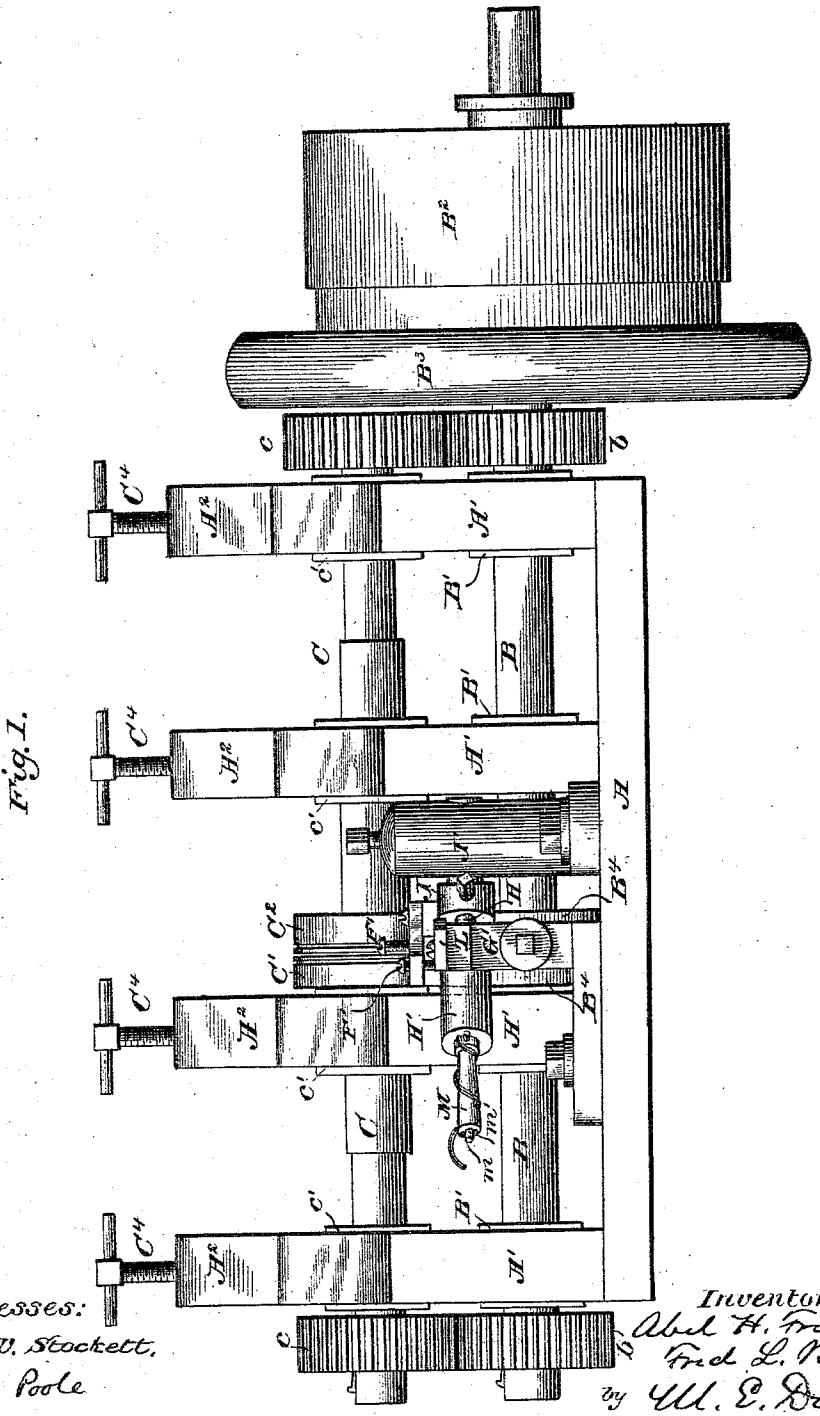
(No Model.) 3 Sheets—Sheet 1.

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

METHOD OF COILING WIRE.

No. 296,671. Patented Apr. 8, 1884.

Fig. 1.



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Inventors:
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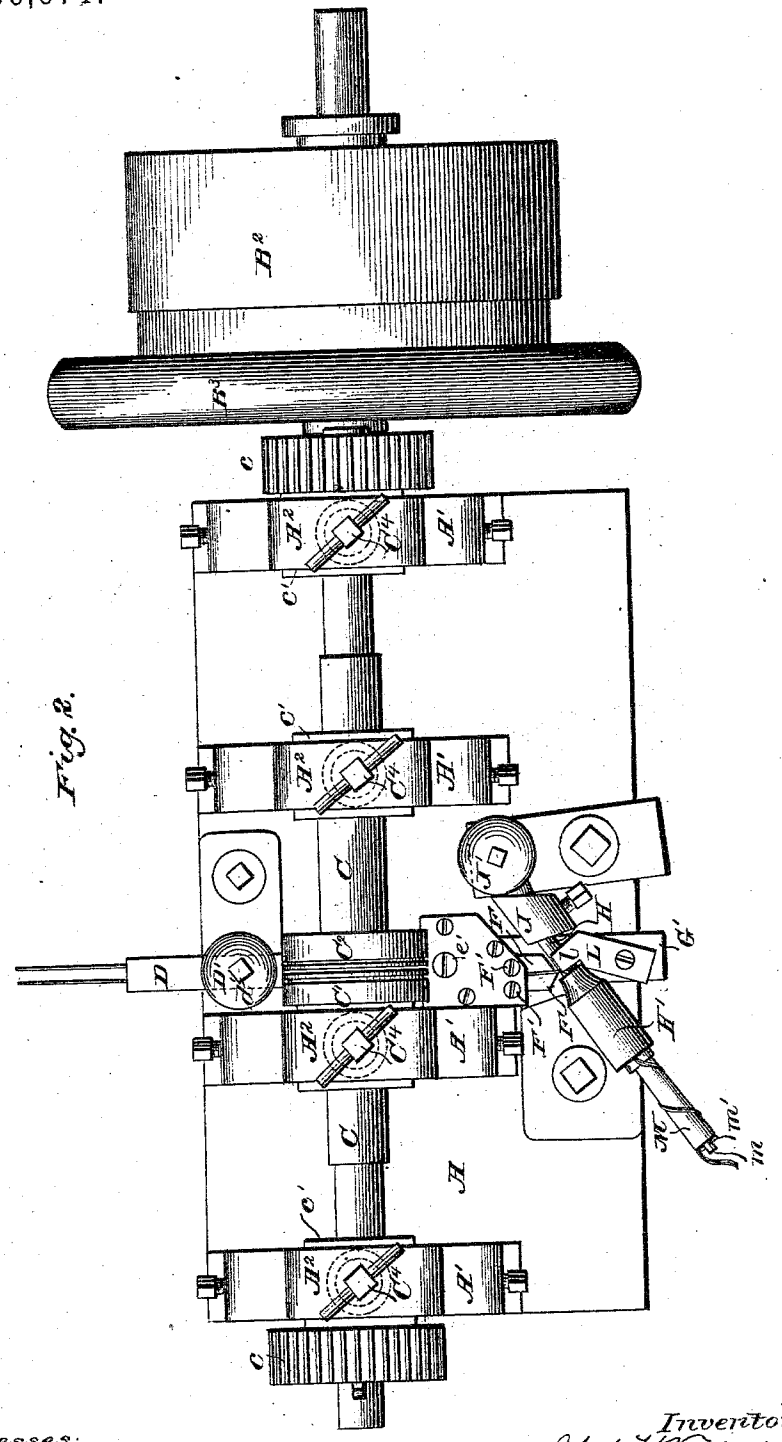

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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Fig. 3.

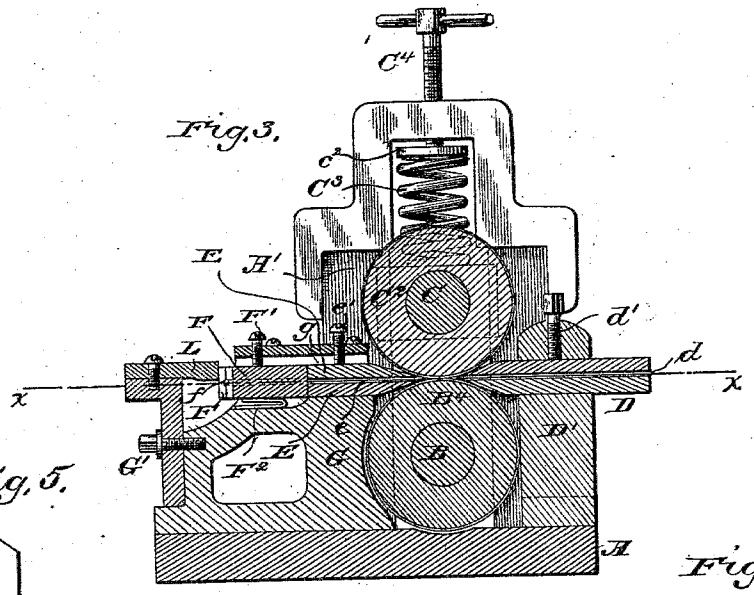


Fig. 5.

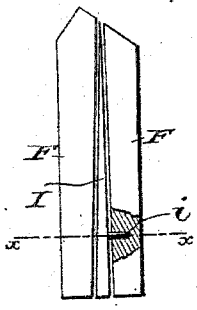


Fig. 6.

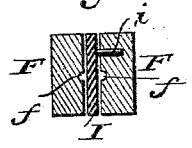
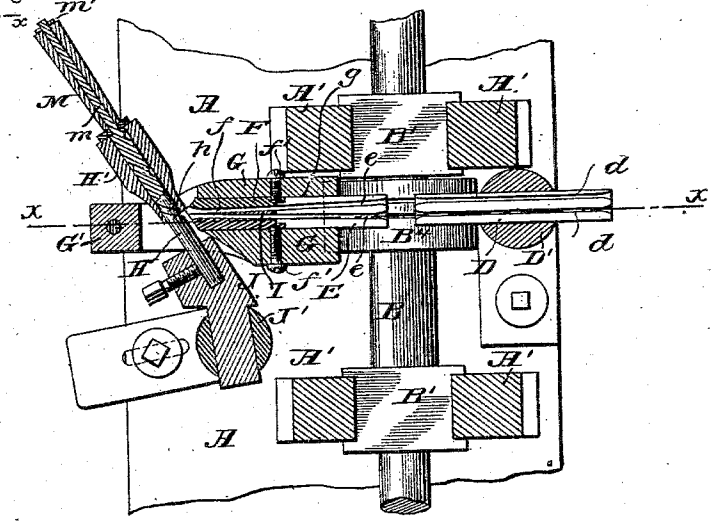


Fig. 4.



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UNITED STATES PATENT OFFICE.

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

METHOD OF COILING WIRE.

SPECIFICATION forming part of Letters Patent No. 296,671, dated April 8, 1884.

Application filed December 1, 1883. (No model.)

To all whom it may concern:

Be it known that we, FRED L. BRYANT and ABEL H. FROST, both of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Coiling Wire; 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 has reference to the production of spirals from wire, in which the several coils shall be symmetrical, and also of uniform dimensions as compared with each other.

The invention is more particularly related to the production of wire spirals in the manufacture of fabric for so-called "woven-wire matresses" and similar purposes, in which the spirals are intercoiled with each other at the same time that they are formed, and in which it is frequently desired to simultaneously form two or more spirals in which the wires shall lie closely side by side throughout their length. The symmetrical form of the coils and their uniformity in dimensions as produced by the improved method herein described better enable the several strands of multiple spirals of a fabric to be formed simultaneously, and at the same time together interwoven with the previously-made spiral of the fabric, and also enable a spiral and fabric to be produced of greater length than has heretofore been practicable by a "force-feed" or pushing action upon the wire in carrying it to and through the coiler, as contemplated in this case. To insure a better understanding of these matters, it is stated that in weaving a "coiled-wire" fabric, the finished spiral or spirals of the fabric are placed straight upon a table, or are otherwise supported in a similar position, and the spiral being formed has its free and advancing end directed to run in and out of the last previously-formed spiral of the fabric in such manner as to interlock therewith. By making the coils of each spiral uniform in dimensions and severally symmetrical, the spirals will interlock or interweave with certainty with the previously-made marginal spiral of the fabric, and when the spiral is composed of two or more wires coiled side by side, the several wires of the multiple or manifold spiral will continue close to each other throughout their length, and their free ends will maintain their proximate relation, and will both continue to enter and engage the coils of the fabric with the same certainty at a considerable distance from the coiler as near the latter.

In the usual process of coiling wire, especially in the process known as "force-feed" coiling, it is found that 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 particulars mentioned above will tend to make the coils of unequal diameter or length, or both, and consequently as the wires advance from the machine in the process of coiling, their ends will separate more and more, so that one or the other of the wires will fail to enter the adjacent coil of the fabric. We have found that if the wire is bent before coiling it, the coils will be more symmetrical and uniform in size, with the practical advantages above enumerated.

Our invention therefore consists in the improved process of coiling wire which embraces the steps of first bending the wire and then coiling it, as herein fully set forth, and pointed out in the appended claims.

In carrying out our invention the preliminary bending of the wire or wires is effected preferably at or just in advance of the point at which the wire passes upon the coiler, and the machine herein shown for practicing the said invention is constructed to so operate. Said machine forms the subject of another application for patent, No. 89,364, filed March 24, 1883.

In the accompanying drawings, 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 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 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 removably held in place within an aperture, *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 plate 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 the 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 may be here stated as follows: If it is observed that the ends of the coiled wire or spirals 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 the

fabric. If desired, both wires may be preliminarily bent, as described, either equally or unequally, as the case may require.

As shown in the drawings, Figs. 1, 2, and 4, an expander, M, is rotatably mounted upon 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. The purpose of the expander mentioned is to more perfectly insure a cylindrical form in the spiral as it leaves the coiling-spindle, as fully explained in the application for patent above referred to, in which it is described and claimed.

The method herein set forth is obviously applicable either to a single wire or to any number of wires coiled side by side.

We claim as our invention—

1. The method of making spiral coils of wire which consists in first bending the wire otherwise than to form the coil, and thereafter imparting to the wire the flexure by which the coil is produced, substantially as described.

2. The method of making spiral coils composed of two or more wires side by side which consists in first bending one of said wires otherwise than to form the coil, and thereafter imparting to both wires the flexure by which the coil is produced, substantially as described.

3. The method of coiling several wires side by side which consists in first unequally bending two or more of said wires otherwise than to form the coils therein, and thereafter imparting to said wires the flexure by which the coil form is produced.

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

FRED L. BRYANT.
ABEL H. FROST.

Witnesses to signature of Fred L. Bryant:
M. E. DAYTON,
WILLIAM M. STANLEY.
Witnesses to signature of Abel H. Frost:
DAVID ERWIN,
JOHN VANDERWERP.