No. 747,598. PATENTED DEC. 22, 1903.

L. F. FALES.

METHOD OF FORMING COILS.

APPLICATION FILED APR. 8, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

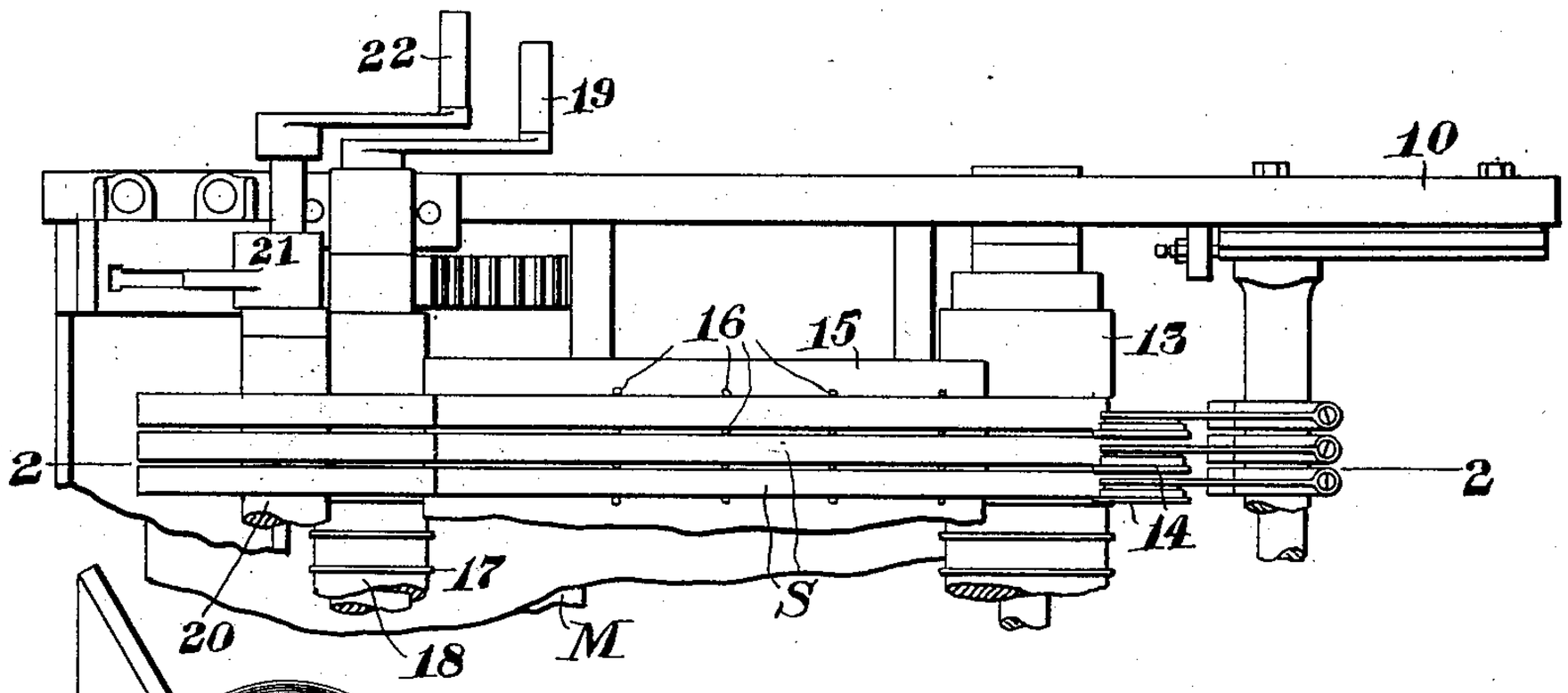

Fig. 1.

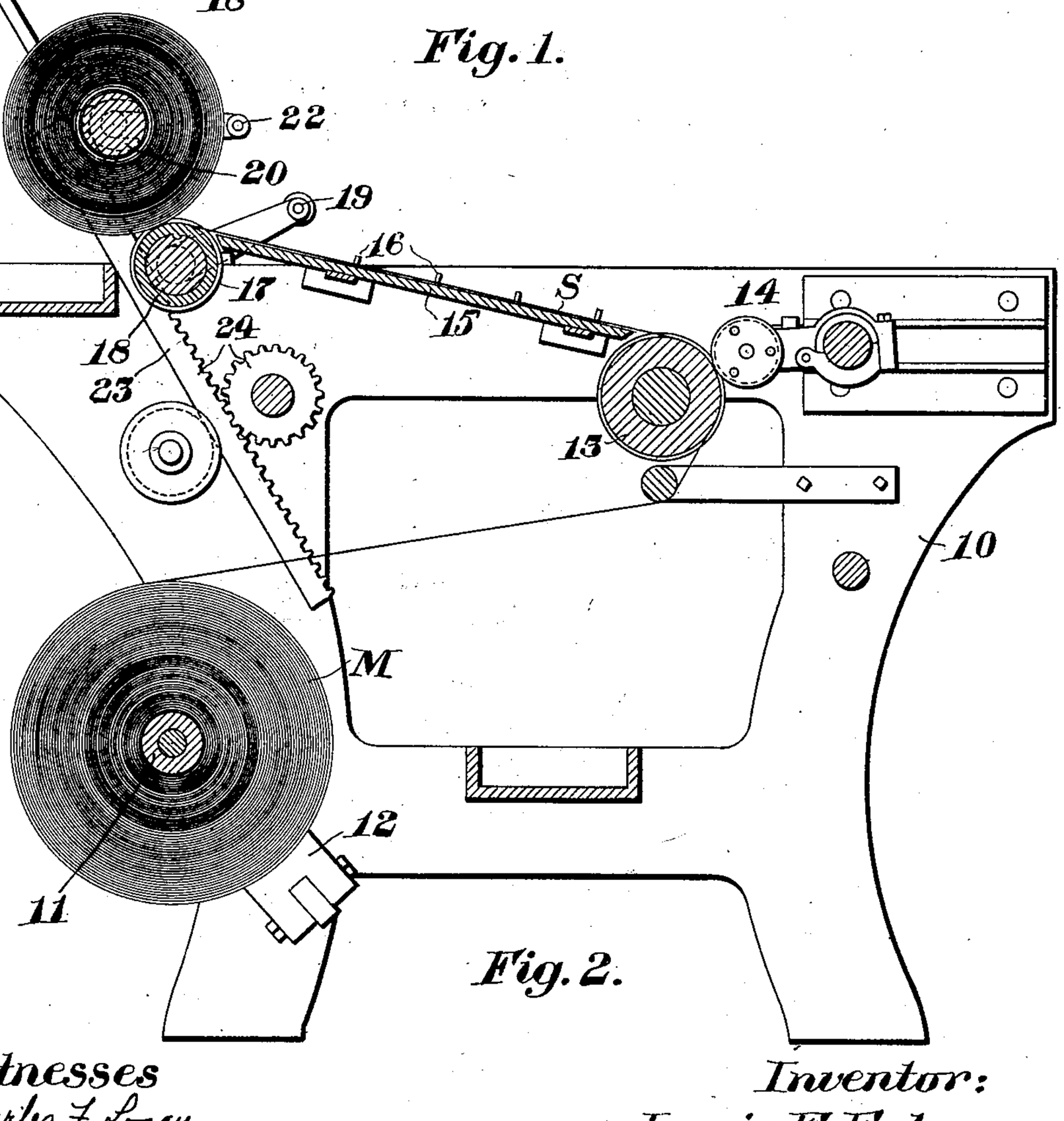

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

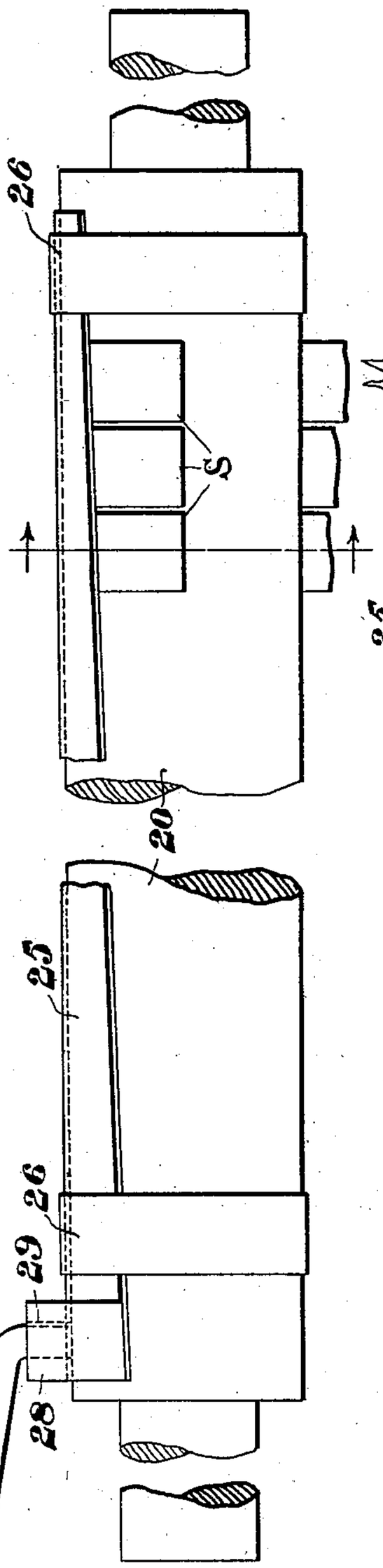

Fig. 7.

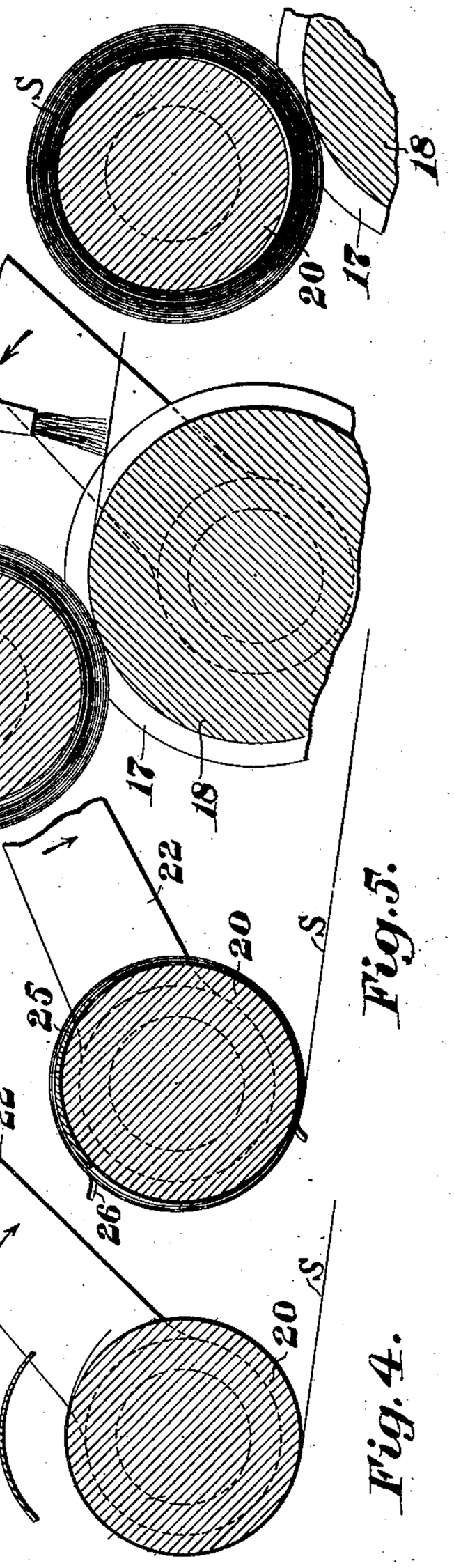

Fig. 6.

Fig. 5.

Fig. 4.

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No. 747,598. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

LEWIS F. FALES, OF WALPOLE, MASSACHUSETTS.

METHOD OF FORMING COILS.

SPECIFICATION forming part of Letters Patent No. 747,598, dated December 22, 1903.

Application filed April 8, 1903. Serial No. 151,629. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. FALES, a citizen of the United States, residing at Walpole, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Methods of Forming Coils, of which the following is a specification.

My invention relates to methods of forming coils; and it consists, more essentially, in such manipulation by the operator upon the material to be wound that it may itself be caused to form an initial body or core, offering a suitable resistance to compression and collapse, upon which the coil may be completed.

In the accompanying drawings, Figure 1 is a broken top plan view of one form of mechanism in connection with which my improved method may be advantageously used. Fig. 2 is a vertical longitudinal section therethrough on the lines 2 2, Fig. 1. Fig. 3 is an enlarged broken elevation of one form of coil-supporting body which may be used to assist in carrying out the method, showing strips engaged thereby and with the tool used by the operator to free the coils from engagement with and to decrease the diameter of the body illustrated in connection with it. Fig. 4 is a transverse section through the support, showing the parts ready to engage the strips of material. Fig. 5 is a similar view showing the strip engaged by the support. Fig. 6 is a sectional view, including also the external winding element, illustrating the step of securing the turns of the core; and Fig. 7 is a similar view showing the support after it has been reduced in diameter and the material released by the operator to permit rotary movement of the coils thereon.

Similar characters designate like parts throughout the several figures of the drawings.

In the formation of coils which are to be removed from the support or arbor upon which they are wound for use in various connections it is customary to meet conditions arising both in the winding or production and the unwinding or use to employ a central core upon which the coil is wound coacting with the support. There are several forms of these employed, of which may be mentioned rings or collars of pasteboard, wood, and metal of various designs. All of these expedients are open to the objection that if they are allowed to remain in the coils when sold they add very considerably to the cost thereof, and if, on the other hand, they are removed from such coil when finished and again utilized it compels the performing of operations which take so much of the workman's time as to seriously impair his efficiency, since each core must be separately placed upon the winding-support, each strip secured to its independent core, and finally such core removed from its coil. To avoid the necessity of employing these independent cores and to enable coils to be formed with increased facility and at a reduced expense my improved method has been devised. It is here described as carried out in connection with a machine commonly applied to the slitting of webs of paper and like thin material into a plurality of strips with which it is of especially great utility; but it will be understood that it may be used in the formation of coils in general without such limitation as to the material operated upon or the apparatus employed.

The machine illustrated in Figs. 1 and 2 consists, more essentially, of a frame 10, in which is journaled a shaft 11, supporting a roll of material M, with which may coact suitable friction or resistance devices 12 to retard its rotation. From the roll the web of material passes over a bed-roll 13, upon which it is slit or divided by a suitable gang of cutters 14 into a plurality of strips S. These strips then travel over a table 15 between dividers 16, then between dividing-plates 17 on a winding-roll 18, journaled in the frame, which will be shown as provided with a crank 19 to effect its rotation, and are finally coiled about a temporary support or arbor 20, preferably tapering slightly from one end to the other to facilitate the removal of the completed coils. The support may be mounted in bearings 21 and rotated when desired by a crank 22. The bearings are shown as mounted on sliding bars 23 and are movable from the winding-roll by the contact of the accumulating coils therewith, the pressure necessary to cause this movement being controlled by suitable resistance devices 24. To positively cause the material to rotate with

the support, an engaging member is provided, here shown as a plate or bar 25, of thin material, curved to conform to the surface of the support and tapering somewhat in width from end to end. This engaging member may be held in place and forced into close proximity with the support by spring-clips 26 26, partly encircling the same near its outer ends. The engaging member may have formed with or secured to it at its widest end an enlargement 28, which is shown as having a recess 29 for engagement by a tool 30 in the hands of the operator to permit him to move the member longitudinally of the support. The support also has means for varying its diameter, which may be supplied by the member 25, since when in position on the support the coils are wound over and in contact with it, and it increases the diameter to the extent of its thickness, while when it is withdrawn the diameter is reduced by this amount.

My improved method may be carried out in full and in connection with the particular mechanism illustrated, as follows: After the material to be operated upon has been drawn from the web-roll and divided into strips by the cutters these strips are passed between the dividers 16 and plates 17 and are laid side by side across the supporting-body 20 by the person performing the process, the member 25 being raised therefrom, Fig. 4. The strips are now positively secured to the support by lowering the engaging member and forcing it against them by the clips, and their ends are revolved by turning the crank 22 in the direction of the arrow to start the formation of the coils by winding successive turns upon one another, Fig. 5. As a result of the positive rotation of the strip acting against a considerable resistance as drawn from the web-roll a dense and closely-wound coil is formed by this internal or end wind which presents sufficient resistance to compression to furnish a body or core for the remainder of the coil, which will not collapse if the direct engagement of the support contacting about its inner periphery is withdrawn. The formation of the core continues, as described, until a sufficient depth is secured to furnish the desired resistance to collapse and to adapt it for continued winding by contact with its outer surface, as is often desired in the production of coils. In the present instance this will be when the periphery contacts with the surface of the winding-roll between its dividing-plates, and at such time the core may be considered to be of sufficient thickness. It may now, if desired, be completed by securing together adjacent turns by the application by the operator of some suitable adhesive by means of a brush 32 or the like, Fig. 6. This prevents the turns constituting the core from slackening back, and thus destroying the density thereof, and also solidifies it; but this step is not essential to the successful performance of my method and may be entirely omitted. To prepare each core for proper external or surface winding by contact of the periphery and sides of the coil with the surface of the winding-roll and the dividing-plates, the operator simultaneously releases them all from positive engagement and at the same time decreases the diameter of the supporting-body and renders them free to rotate independently of one another by withdrawing from their interior the engaging member of the support, this withdrawal being made easy by the taper of the member, Figs. 3 and 7. The crank 19 is now turned by the operator in the direction of the arrow, Fig. 6, and the formation of the coil upon its dense inner portion as a core continues. It will be seen that this capability of relative rotation between a plurality of coils of material wound by contact with a common body is of particular advantage, since any one may slip circumferentially upon its support to compensate for variations in thickness which are certain to occur across webs of paper or other sheet material and the consequent cumulative variations in the diameter of the coils, and it is evident that in connection with whatever machine this method may be used it will affect a very marked saving of core material and operators' time in handling the same by forming said cores as a portion of the operation of forming the coil and from the substance of the coil itself.

Having thus described my invention, I claim—

1. The method of forming coils which consists in winding material to furnish a core, and then continuing the winding upon this core.

2. The method of forming coils which consists in winding material by internal contact to furnish a core, and then continuing the winding by external contact upon this core.

3. The method of forming coils which consists in winding material by positive engagement therewith to furnish a core, and then releasing the material and continuing the winding upon this core.

4. The method of forming coils which consists in winding material to a suitable depth and securing adjacent turns together to furnish a core, and then continuing the winding upon this core.

5. The method of forming a plurality of coils which consists in winding separate pieces of material by positive engagement therewith to furnish cores, and then releasing such positive engagement of the pieces and simultaneously rotating them to continue the winding upon these cores.

6. The method of forming coils which consists in winding material by positive engagement therewith and securing adjacent turns together to furnish a core, and then releasing the material from said positive engagement and continuing the winding upon this core.

7. The method of forming coils which consists in winding material upon a body to fur-

nish a core, rendering the core free to rotate independently of the body, and then continuing the winding upon the core.

8. The method of forming coils which consists in winding material upon a body to furnish a core, decreasing the diameter of the body, and then continuing the winding upon the core.

9. The method of forming coils which consists in winding material upon a body to furnish a core, rendering the core free to rotate independently of the body, and then continuing the winding upon the core by contact with the coil.

10. The method of forming a plurality of coils which consists in winding separate pieces of material upon a body common to all to furnish cores, rendering the cores free to rotate independently of the body, and then continuing the winding upon the cores by the contact of a common body with the coils.

11. The method of forming coils which consists in securing material to a body, rotating the body to produce a portion of the coil, releasing the material from the body, and continuing winding by contact with the exterior of the coil.

12. The method of forming coils which consists in securing material to a body and rotating the body to produce a portion of the coil, releasing the material from the body, decreasing the diameter of the body, and continuing the winding by contact with the exterior of the coil.

13. The method of forming coils which consists in securing material to a body, rotating the body to produce a portion of the coil, securing turns thereof together, releasing the material from the body, and continuing the winding by contact with the exterior of the coil.

14. The method of forming a plurality of coils which consists in securing separate strips of material to a body common to all, rotating the body to produce a portion of each coil, releasing all the strips from the body, and continuing the winding by the contact of a common body with the coils.

15. The method of forming a plurality of coils which consists in securing separate strips of material to a body common to all, rotating the body to produce a portion of each coil, releasing all the strips from the body, rendering the coils free to rotate independently of said body, and continuing the winding by the contact of a common body with the coils.

Signed at Walpole, in the county of Norfolk and State of Massachusetts, this 23d day of March, 1903.

LEWIS F. FALES.

Witnesses:
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MARGARET C. DALTON.