E. D. C. BAYNE & L. A. SUBERS.

AUTOMATIC MACHINE FOR APPLYING LONGITUDINALLY AND SPIRALLY LAID COATED CORDS OR THREADS TO PRODUCE A FABRIC.

APPLICATION FILED JULY 13, 1908.

990,694.

Patented Apr. 25, 1911.

5 SHEETS—SHEET 1.

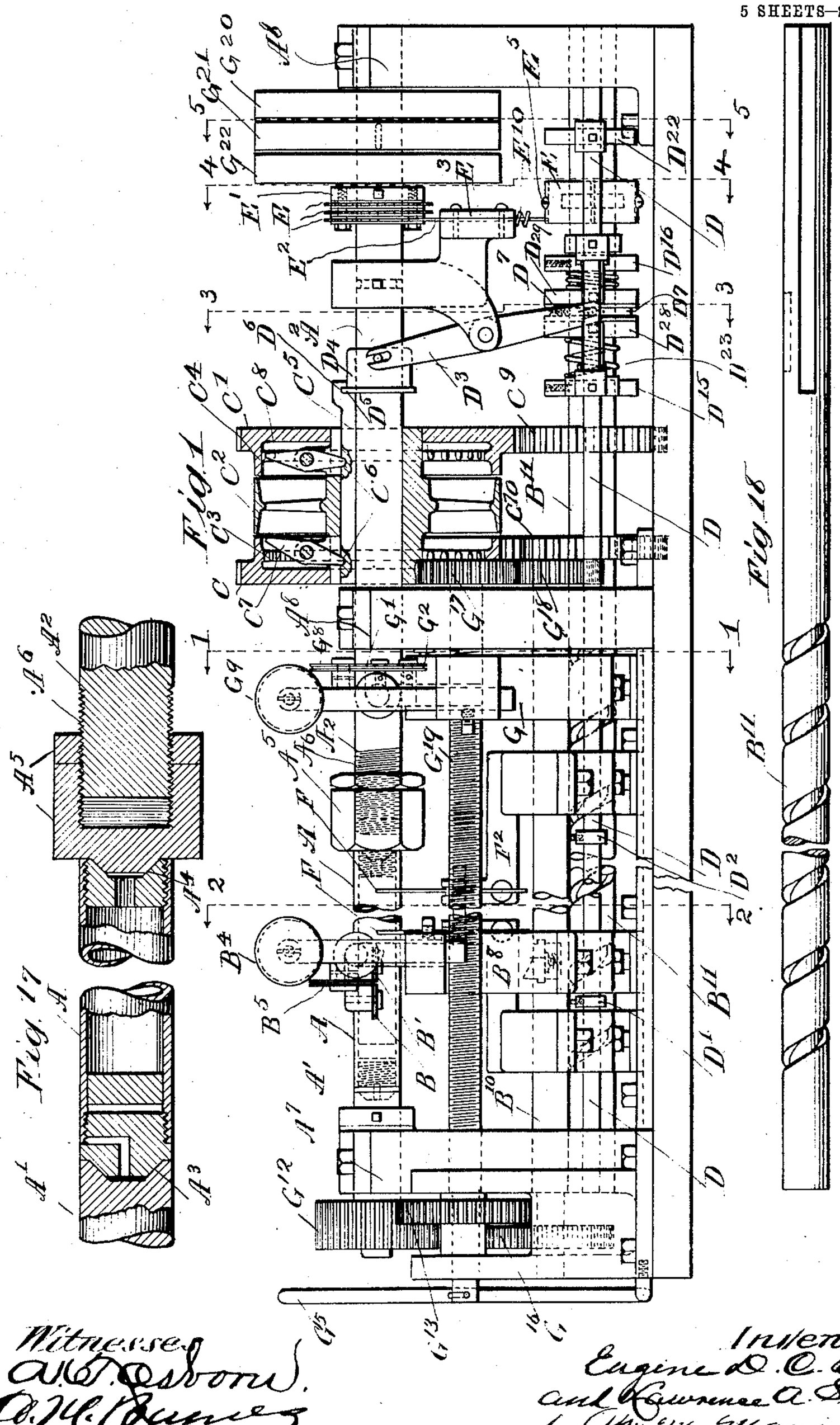

Fig. 1.

Fig. 1a.

Fig. 1b.

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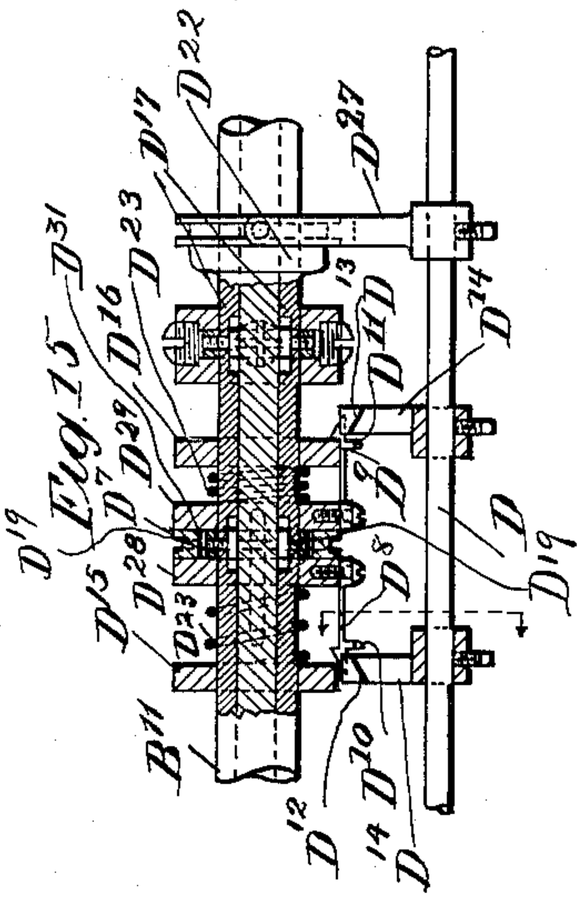

Fig. 15

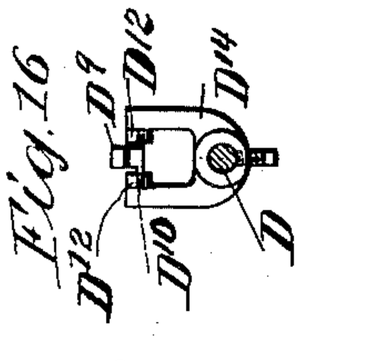

Fig. 16

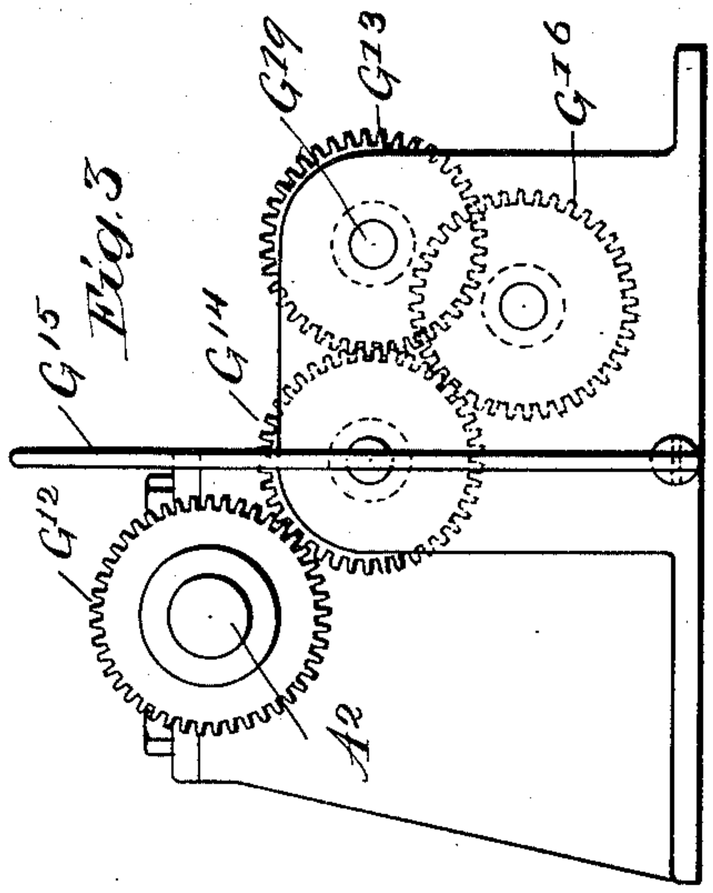

Fig. 3

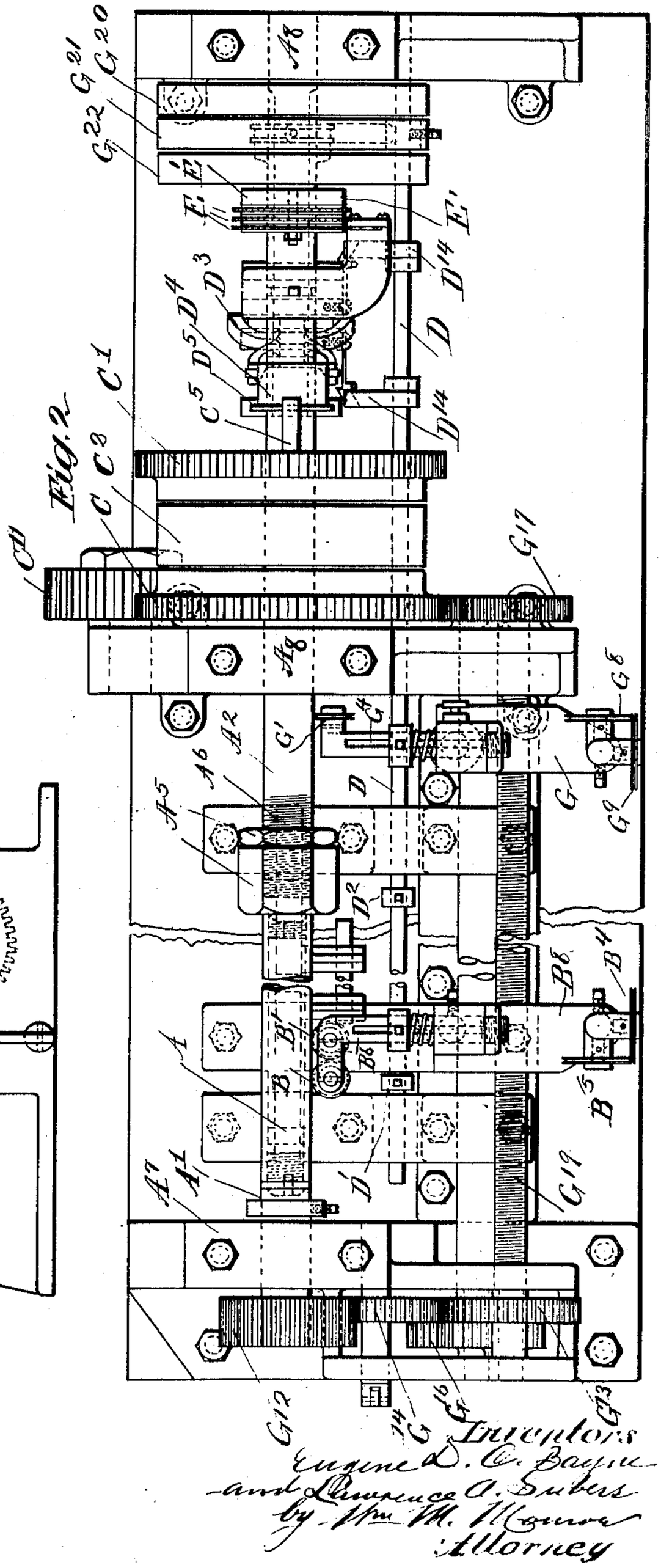

Fig. 2

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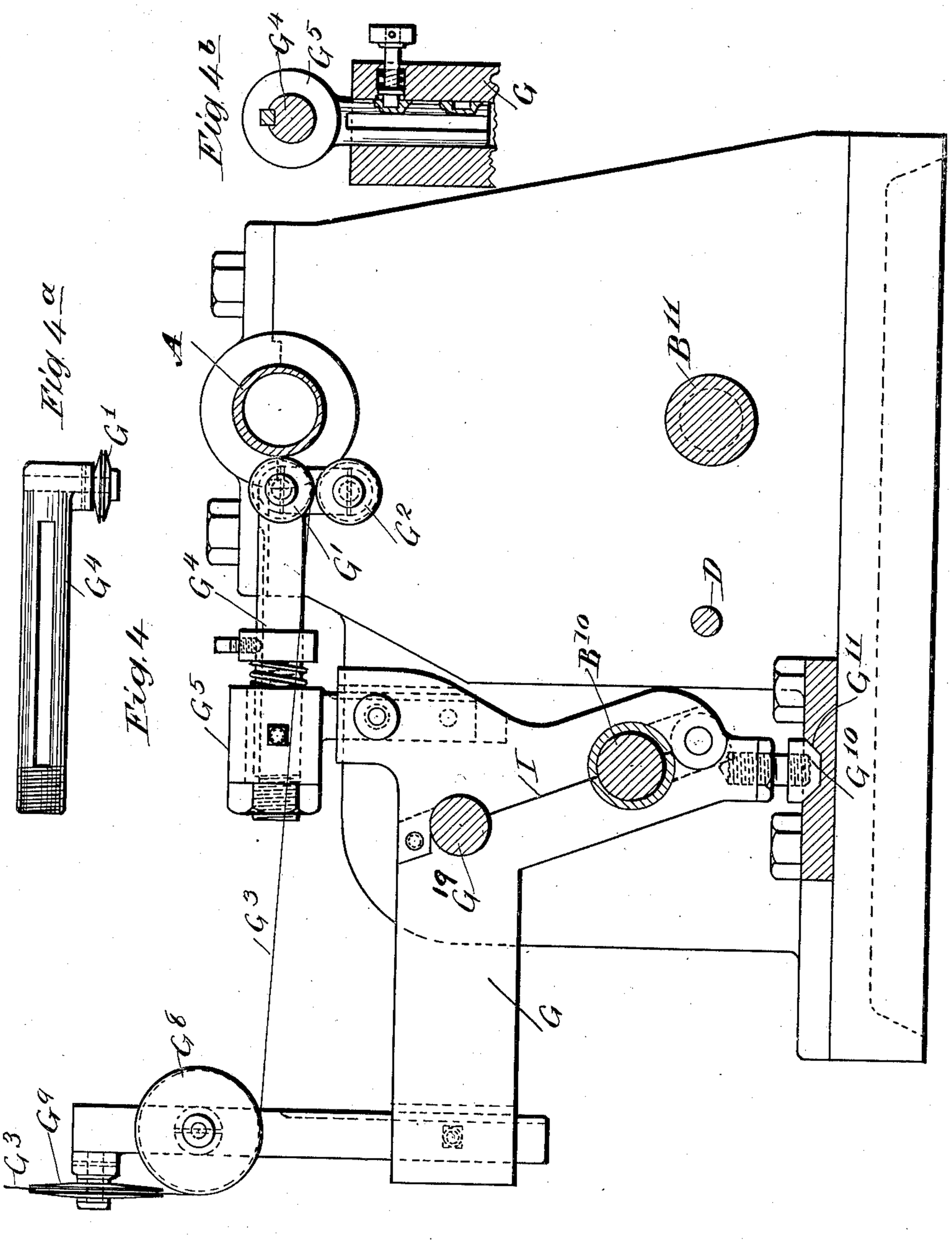

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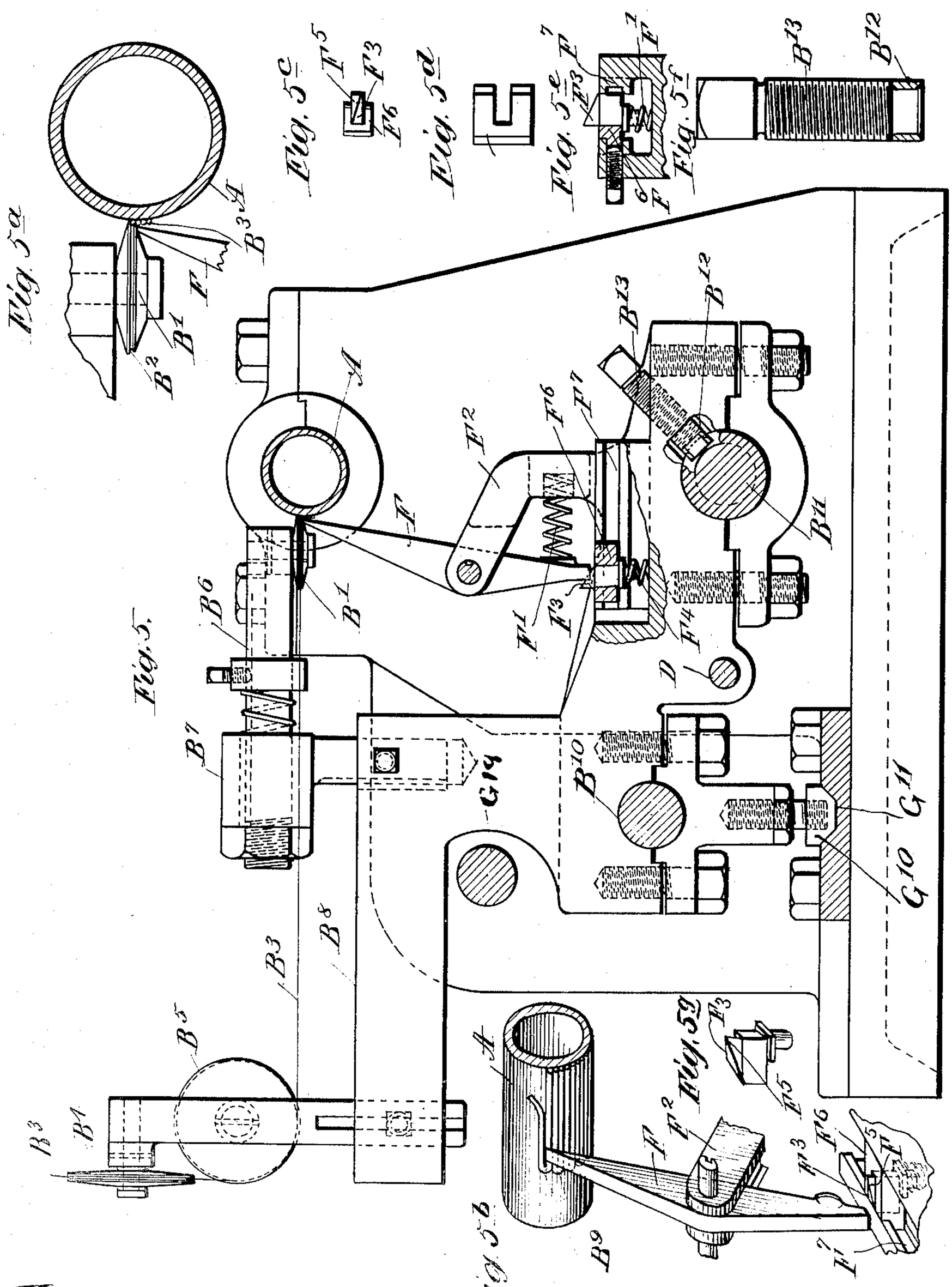

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AUTOMATIC MACHINE FOR APPLYING LONGITUDINALLY AND SPIRALLY LAID COATED CORDS OR THREADS TO PRODUCE A FABRIC.

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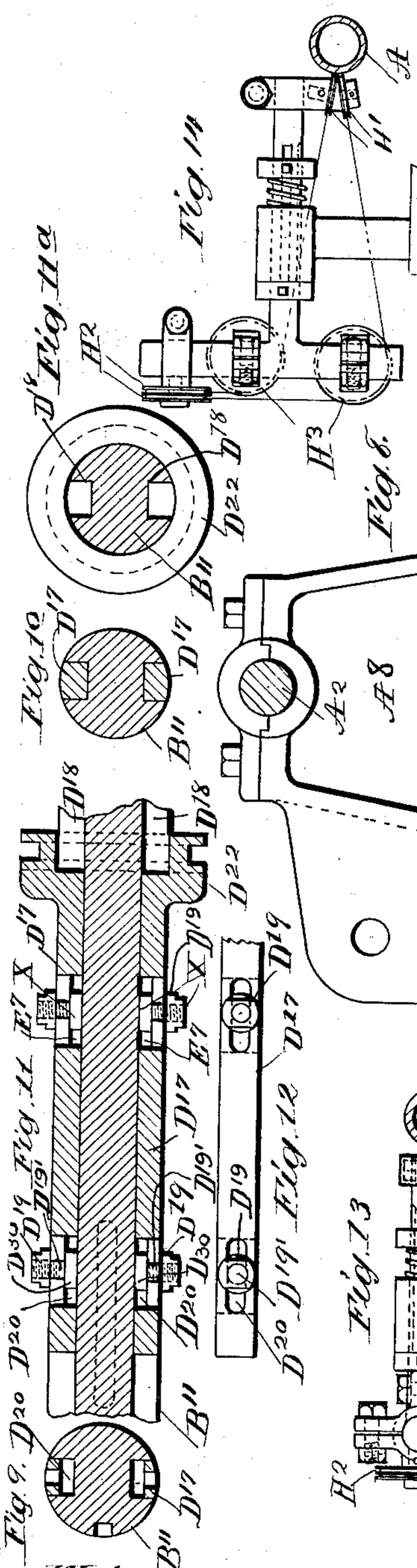

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UNITED STATES PATENT OFFICE.

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AUTOMATIC MACHINE FOR APPLYING LONGITUDINALLY AND SPIRALLY LAID COATED CORDS OR THREADS TO PRODUCE A FABRIC.

990,694. Specification of Letters Patent. **Patented Apr. 25, 1911.**

Application filed July 13, 1908. Serial No. 443,372.

To all whom it may concern:

Be it known that we, EUGENE D. C. BAYNE and LAWRENCE A. SUBERS, citizens of the United States, and residents of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Automatic Machines for Applying Longitudinally and Spirally-Laid Coated Cords or Threads to Produce a Fabric, of which we hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are to provide automatically acting instrumentalities for producing a tubular fabric for fire hose, and analogous tubing, and particularly tubing adapted to sustain a high degree of internal pressure, and is similar to the fabric described in various forms in our former Letters Patent of the United States, bearing No. 885,219 and date of April 21, 1908, and in our application for Letters Patent of the United States, bearing Serial No. 428,015, and produced from coated cords or threads similar to those protected by prior applications for Letters Patent of the United States bearing Serial Numbers, 380,401 and 411,960. This fabric is not woven or knit and is composed of alternating longitudinal and spiral, adhering layers of cords or threads, each of which is coated with an adhesive, compressible, vulcanizable and non-fibrous material, such as rubber.

The cords or threads in one layer are laid in parallel closely adjacent rows which adhere together, and the several layers of cords or threads adhere together. The adjoining layers of cords or threads cross each other at an angle and are attached together only by the adhesion of their coatings, which when vulcanized separate the several cords or threads from actual frictional contact with each other in the same layer and from actual contact from those of adjoining layers, so that a unitary fabric is produced, characterized by great tensile strength and of unusual flexibility.

The coatings of the cords or threads are sticky and hence the cords or threads are difficult to handle and each cord or thread must be individually applied in its exact position to form the fabric, and with a suitable pressure so that a perfectly smooth even surface will be produced. To insure this result the cords or threads are previously molded under pressure to solidify the coatings, as described in our former applications hereinbefore referred to.

The various instrumentalities employed to apply the several cords or threads in the exact position where they may permanently remain, comprise, First: A polished receiving member or rotatable forming tube upon which a section of prescribed length of tubing can be produced. Second: Spring pressed polished and grooved disks or director wheels by means of which the several cords or threads are applied to the forming tube. Third: Longitudinally reciprocating instrumentalities for moving said director wheels to apply the cords or threads in their places upon the forming tube. Fourth: Means for continuously rotating the forming tube in conjunction with the longitudinal movement of one set of director wheels, to apply a transverse or spiral winding of cords or threads thereon. Fifth: Means for giving an intermittent rotation to the forming tube in conjunction with the longitudinal reciprocating movement of another set of director wheels, to apply a longitudinal coating of parallel cords or threads thereon. Sixth: Mechanism for controlling the longitudinal distance traversed by the director wheels to produce a fabric of predetermined length, for varying the intermittent rotary movement of the forming tube to accommodate it to receiving varying sizes of cord or thread and to forming tubular fabrics of varying diameter.

The invention also includes means for operating the various parts and for reversing the movements of the carriers, and consists further in the combination and arrangement of the various parts and construction of details as hereinafter described, shown in the accompanying drawings and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of the device, showing a portion of the driving pulley and gears which operate in conjunction with the lon-

gitudinal application of the cord or thread, broken away to show the clutches for reversing the movements of the shaft and forming tube; Fig. 2 is a plan view of the same; Fig. 3 is an end view of the device showing the reversing gear for the screw shaft controlling the movements of the carriage for the director wheel which applies the spiral winding; Fig. 4 is a transverse section through the machine on line 1—1 Fig. 1, showing a side elevation of the carrier for the director wheel which applies the spiral winding; Fig. 4ª is a plan view of the said director wheel and support therefor; Fig. 4ᵇ is a vertical section of the carrier and adjustable support for the director wheels shown in Fig. 4; Fig. 5 is a transverse section on line 2—2 Fig. 1 showing a side elevation of the carriage for the director wheel which applies the longitudinal layers; Fig. 5ª is an enlarged transverse section of the forming tube, upon which the fabric is wound and an enlarged view of the director wheel and holding finger; Fig. 5ᵇ is a perspective view of the holding finger and actuating cam therefor, showing the manner in which it secures the cord or thread when looped for the return parallel movement; Fig. 5ᶜ is a plan view of the said actuating cam; Fig. 5ᵈ is a plan view of the sliding block which holds the said cam; Fig. 5ᵉ is a vertical section through said block and guides; Fig. 5ᶠ is a detail of screw and roller which operates in the worm slot of the actuating shaft for the longitudinal layer of cord or thread; Fig. 5ᵍ is a perspective view of the cam for operating the cord or thread holding finger; Fig. 6 is a transverse section on line 3—3 Fig. 1 through the machine showing the driving and reversing gear for the worm shaft which operates the carriage of longitudinally laying director wheel; Fig. 7 is a transverse section on line 4—4 Fig. 1 showing ratchet and pawl operating device for rotating the forming tube; Fig. 8 is a transverse section on line 5—5 Fig. 1 showing the shifting rod and arm for operating the reversing device for the worm shaft and for operating the pawl and ratchet mechanism; Figs. 9 and 10 are transverse sections and Fig. 11 is a longitudinal section of the worm shaft for operating the carrier and director wheels which apply the longitudinal layer of cords or threads showing in detail the forked rod for operating a cam which moves the ratchet and operating device therefor, and which also operates the reversing devices therefor; Fig. 11ª is also a transverse section thereof; Fig. 12 is an edge view of one fork of said rod; Figs. 13 and 14 are side elevations of a device for applying two cords or threads simultaneously to the forming tube, the first being adapted for spiral and the second for longitudinal application of the cord or thread; Fig. 15 is a longitudinal horizontal section showing the shifting rod and forked rod upon the worm shaft and in detail the mechanism adapted to reverse the movement thereof, and also to operate the feed ratchets therefor; Fig. 16 is a side elevation of cam finger for operating the spring catch in the device adapted to operate the shifting arm for reversing the direction of said worm shaft. Fig. 17 is a longitudinal section showing the extremities of the mandrel, and mode of securing the same in socket bearings; Fig. 18 is a detail view of the worm shaft.

In these views A is the forming tube or receiving member upon which the cords or threads are applied preferably, in alternate longitudinal and spiral layers to form a tubular fabric. It is detachably secured between the sections A′ and A² of the main driving shaft, by means of socket bearings A³ and A⁴ and a nut and a lock nut A⁵, A⁵ upon the threaded portion A⁶ of the main shaft; as shown in detail in Fig. 17. The sections of the main shaft are mounted in ordinary pedestal bearings A⁷ and A⁸.

The mechanism for applying the longitudinally laid cord or thread upon the forming tube may be first described and comprises primarily (referring to Figs. 2 and 5) a pair of disk shaped director wheels B, B′ each having a circumferential groove B² adapted to receive and guide the cord or thread to its exact position on the forming tube.

The cord or thread B³ passes over suitable grooved guide wheels B⁴ and B⁵ and is led between the director wheels B and B′ so as to alternately engage therewith according to the direction of the movement taken by these wheels in traversing the forming tube. These director wheels are preferably horizontal and are mounted upon a spring pressed pin B⁶, longitudinally movable in a vertical adjustable support B⁷, mounted in turn upon the carriage B⁸, which traverses the forming tube with a reciprocating movement equal to the length of the fabric desired, allowing sufficient length to form loops B⁹ at the ends of the tubular fabric. The carriage B⁸ moves longitudinally upon the guide shaft B¹⁰ and is given a reciprocating movement by means of a roller B¹² mounted upon a pin B¹³, adjustably secured in said carriage, which engages the groove of a worm shaft B¹¹ mounted parallel to the main shaft A² in the machine.

The mechanism for reversing the movements of the carriage B⁸ and for determining the length of the travel in both directions is shown in Figs. 1, 2, 6, 8, 10, 15 and 16, to be constructed and arranged as follows: C and C′ are spur gears mounted upon the hub of the driving pulley C², one

on each side of the pulley. This pulley C^2 is free to rotate on the main shaft. The gears C and C′ are provided with clutch teeth at C^3 and C^4 respectively in the inner surfaces of their rims. Slidingly mounted upon the shaft is a bar C^5 engaging by means of depressions C^6 the extremities of rock arms C^7 and C^8 pivoted upon the hub, which are adapted to alternately engage with the clutch teeth C^3 and C^4, and rotate them with the pulley.

Referring to Fig. 1 the gear C′ engages the gear C^9 upon the worm shaft B^{11} and is adapted to rotate it in one direction while the gear C operates the gear C^{10} upon the shaft B^{11} through the intermediate gear C^{11} and rotates the shaft in the opposite direction.

To control the length of longitudinal movement of the carriage B^8 and to automatically reverse its movements at the proper moment, the shifting rod D is provided, upon which are shown the adjustable collars D^1 and D^2. This rod passes through the carriage B^8 and is operated by the carriage as the carriage strikes alternately upon the collars. This shifting rod D is designed to operate the reversing mechanism, which comprises, an arm D^3 which engages a sleeve D^4 upon the main shaft. This sleeve by means of a raised rim D^5 engages a groove D^6 in the outer end of the sliding bar C^5 and operates the rock arms C^7 and C^8 previously described.

The shifting arm D^3 engages at its lower end the sleeve D^7 longitudinally movable upon the screw shaft B^{11}. Two collars D^{28} and D^{29} are mounted loosely upon the worm shaft, one on each side of the sleeve D^7. Upon the edges of these collars are mounted the spring catches D^8 and D^9, as shown in Fig. 15. These spring catches are provided with short cross arms D^{10} and D^{11} which are alternately engaged and pressed away, (together with the catches), from the set collars, by the inclined faces D^{12} and D^{13}, on arms D^{14}, which project from the shifting rod D. The spring catches are adapted to alternately engage the edges of the set collars D^{15} and D^{16} upon the worm shaft and to secure the shifting device and prevent release of the parts until the shifting rod is again thrown back.

In Fig. 15 the spring catch D^9 is shown in engagement with the disk D^{16} and the inclined face D^{13} will engage the cross arm D^{11} and depress the catch D^9 as soon as the shifting rod is thrown back again. A forked bar D^{17} mounted in longitudinal grooves D^{18} in the screw shaft B^{11} alternately moves the collars D^{28} and D^{29} (D^{29}) by means of nuts D^{19} upon bolts $D^{19'}$ adjustable in longitudinal slots D^{20} in the arms of the bar. These nuts slide in grooves D^{31} in the sleeve D^7. The bar is operated by the rigid arm D^{27} engaging the head D^{22} of the forked bar. (Refer also to Fig. 10.) The coiled springs D^{23} throw the sleeve D^7 in alternate directions as soon as the catches and collars are released.

The ratchet device for giving an intermittent rotary movement to the main shaft and forming tube, is constructed as follows, and must be timed to correspond with the reversing of the direction of rotation of the worm shaft B^{11}. The ratchets E may be of any required number and are detachably secured upon a sleeve E^1, longitudinally adjustable upon the main shaft. This device operates as follows: When the shifting rod D is moved to the left in Fig. 15, the arm D^{27} will move the forked bar D^{17} and through the agency of the nuts D^{19} will move the collar D^{28} to the left and compress one of the springs D^{23}, and the movement is continued until the spring catch D^8 engages the set collar D^{15}. Meanwhile the inclined surface D^{13} is depressing the spring catch D^9 and as soon as the spring catch D^8 has engaged the set collar D^{15}, the spring catch D^9 will have been released from the set collar D^{16} and the coiled spring D^{23} at the right of the sleeve D^7 will then expand and move the collar D^{29} and thereby the sleeve D^7 and throw the shifting arm D^3. The reverse movement of the arm D^3 is obtained in the same manner. The number of teeth upon the several ratchets varies to correspond with the diameter of the tube to be made and with predetermined diameter of the cords or threads to be applied, the requirement being that the cords or threads should be laid perfectly parallel and close enough together to adhere. The ratchets are engaged by the tangentially movable pawl E^2 and the sleeve E^1 and ratchets E can be moved along the shaft so that any desired ratchet may come into engagement with the pawl. The pawl E^2 is movably mounted in the bearing E^3 and a flat spring E^4 at one side gives resiliency thereto. The pawl is periodically raised to operate the ratchet by means of the cam E^5 upon a sleeve E^6 adjustably secured to the arms of the forked bar D^{17} by means of bolts X adjustable in slots E^7 in the forked bar and entering an annular groove E^9 in the sleeve E^6. The cam E^5 is shown to be an adjustable screw pin with a slotted head in which a lug E^8 projecting from an arm of the pawl is inserted, thus preventing the cam sleeve from revolving with the shaft. A number of detachable cams E^5 can be kept in stock and be inserted in the sleeve if it is desired to vary the action in lieu of the one shown Two slots at right angles to each other in the cam head are shown for convenience in adjustment, since then a quarter turn thereof can be made at a time. A

spring E^{10} upon the stem of the pawl returns it when it has been lifted by the cam. In this manner described a reciprocating longitudinal movement is imparted to the carriage and director wheels, which apply the longitudinal layers of cords or threads to the forming tube, and also an intermittent rotary movement is imparted to the latter at the time that the movement of the carriage is reversed.

As soon as the carriage begins its return movement after one length of cord or thread has been laid, it is necessary to provide means for holding the looped end while the return movement thereof is made. This is accomplished by means of a pivoted finger F which is pressed upon by a spring F^1 so as to tightly hold the cord or thread just laid at the end and prevent its being carried back again. The finger is pivotally mounted upon a longitudinally adjustable support F^2 and is thrown back from the cord or thread at the proper moment just before the reverse movement occurs, by means of the inclined inner surface F^3 of a cam block, which is mounted upon a spring F^4 so that it can be depressed and the spring is supported by the carriage. The spring pressed finger is released to engage the cord as soon as the cam block passes and in the return movement of the carriage the lower end of the finger engages an inclined upper surface F^5 upon the cam block and depresses the block, so that the finger can readily pass, without releasing the cord or thread. The cam block is mounted in a sliding plate F^6 mounted in guides F^7 so that it can be adjusted to its required position in the carriage B^8. See Figs. 5, 5^a, 5^b, 5^c, 5^d, 5^e, and 5^g. When a spiral layer is being applied on the forming tube the carriage G is employed. (See Fig. 4). This is provided with two director wheels G^1 and G^2 between which the coated cord or thread G^3 passes, so that it can be applied to either director wheel according to the direction of rotation of the forming tube, which is in continuous rotation when winding the spiral layers. The director wheels are mounted upon a spring pressed pin G^4 and stand vertically. They are similar in shape to the director wheels for laying the longitudinal cords or threads. The support G^5 for the spring pressed pin G^4 is secured adjustably in the carriage G which is given a longitudinal reciprocating movement by means of the screw threaded shaft G^{19}. Guide wheels G^8 and G^9 pass the coated cord or thread to the director wheels G^1 and G^2. To give steadiness of movement to the carriage and director wheels, a sliding bearing is preferably formed at G^{10} upon the bed plate of the machine, in a longitudinal guide G^{11}. The screw G^{19} which operates the carriage G is given a rotating movement to accord with the rotating movement of the forming and main shafts referred to, by means of spur gears G^{12} and G^{13} and idler G^{14} and the movement can be reversed by means of the reversing lever G^{15} and spur gears G^{16} and G^{17} and G^{18}, and idler G^{14}. The main shaft when the circumferential winding is desired is rotated alternately by means of the band wheels G^{22} and G^{20} which move in opposite directions and a central idler G^{21} is shown between them. Reverse direction of movement can be given by means of a crossed belt, or any other ordinary mechanical device. The carriage B^8 is also supported upon the track G^{11} by means of a sliding bearing G^{19}.

In Figs. 13 and 14 is shown a double arrangement of director wheels H and H^1 adapted to wind two cords or threads simultaneously. Here the supports are practically the same, except that they are adapted for two sets of guide wheels H^2 and H^3 and the director wheels are preferably set radially to the axis of the winding or forming shaft, so that their grooved edges shall be as close as possible together. This device can be used for either circumferential or longitudinal winding by giving a horizontal or vertical position to the director wheels. In Fig. 13 the director wheels are shown vertically placed for applying two cords or threads simultaneously to the forming tube and in Fig. 14 they are shown horizontally arranged to apply two cords or threads longitudinally of the forming tube. The same device is by adjustment adaptable for both purposes.

We do not confine ourselves to the exact details of construction or arrangement of the various parts, and the addition of duplicate winding shafts and reciprocating carriages and director wheels, or the omission of one wheel from the pair of wheels in each carriage so as to operate in one direction only, will be within the spirit of the invention.

In use the main shaft and forming or winding tube are common to both sets of director wheels and the different sets of wheels are used alternately to form the alternating layers of spirally and longitudinally disposed cords or threads, alternating layers preferably running in opposite directions. If desired, the carriage for the director wheels applying the spiral layer can be made separable at I, so that it can be removed entirely if desired, while the longitudinal layer is being applied.

It is understood that the length of the teeth upon the ratchet wheels should correspond with the predetermined diameter of the cord or thread and the number of teeth should correspond with the number of longitudinal rows of cords or threads, which should be adapted to entirely cover the sur-

face of the forming tube. It is also obvious that forming tubes of any diameter could be employed and that the fabric formed thereon could be removed by a longitudinal cut, and spread out into a flat fabric, or by means of the longitudinally reciprocating carrier a flat fabric formed of longitudinal and transverse layers of cords or threads could be made upon a flat surface, if desired, both layers being made by a reciprocating carriage and director wheels without spiral winding, without departing from the spirit of the invention.

Having described the invention what we claim as new and desire to secure by Letters Patent, is:

1. In a machine for laying cords or threads longitudinally and spirally upon a mandrel, in combination, with said mandrel, a traveling head, guide wheels thereon, adapted to receive and guide the cord or thread, a pair of director wheels, a rotatable support for said director wheels, pivotally mounted in said traveling head, means for adjustably securing said support in said head to bring said wheels into either the horizontal or vertical position, a spring tension for said director wheels on said head, a worm shaft and a screw threaded fine feed shaft adapted to be alternately connected in an operative manner with said traveling head, a bed-plate in which said shafts are mounted and means for rotating said shafts.

2. In a machine for laying a cord or thread in parallel rows upon a rotatable mandrel, in combination with the mandrel, a supporting bed for the mandrel, means for continuously rotating said mandrel and for alternately giving an intermittent periodical rotation thereto, a traveling head adapted to move parallel to said mandrel, a worm shaft passing through said head, adapted to give a quick movement thereto, a parallel screw threaded shaft adapted to give a slow movement thereto, means for alternately connecting said worm and screw threaded shafts operatively with said traveling head, director wheels, a support therefor secured in said traveling head for horizontal and vertical adjustment of said director wheels therein, said director wheels adapted to apply said cord or thread to said mandrel alternately in a longitudinal and spiral direction, means for rotating said shafts and for reversing the movements thereof, said reversing means for said worm shaft operatively connected with the said traveling head.

3. In a machine for forming a tubular fabric composed of coated cord or thread laid in parallel rows, the coatings thereof being adhesive whereby the rows adhere together, in combination, a rotatable member adapted to receive the cord or thread as laid, a pair of longitudinally movable director wheels for said coated cord or thread on a common plane, common guide wheels for director wheels adapted to deliver the cord or thread alternately to both director wheels, means for rotating said rotatable member and for giving a reciprocating movement to said director and guide wheels relatively to said rotatable member.

4. In a device for forming a fabric composed of parallel rows of adhering coated cords or threads, a receiving member on which said cords or threads are applied, a pair of director wheels on a common plane, common guide wheels for applying longitudinal and transverse layers of said cords or threads alternately to said director wheels, and instrumentalities for giving a reciprocating movement thereto, longitudinally of said receiving member.

5. In a machine for the purpose described the combination with a common shaft, and forming member rotatable therewith, of a carrier and a pair of director wheels adjacent to said forming member, adapted to apply a longitudinal layer of coated threads thereon, and a carrier and director and guide wheels adjacent to said forming member adapted to apply a transverse spiral layer thereon, mechanism for intermittently rotating said shaft and forming member in accordance with the movements of the director wheels for applying the longitudinal layer, and mechanism for continuously rotating said forming member to accord with the movements of said director wheels for applying said transverse spiral layer, said intermittent and continuous movements alternating in said machine.

6. In a machine for applying a longitudinal layer of adhesive cords upon a former, in combination with a rotatable forming member, a carrier longitudinally reciprocable thereof, a pair of spring pressed director wheels in line with each other in said carrier, a guide wheel adapted to direct the cords alternately thereto, automatically acting means for moving said carrier and director wheels longitudinally of said former, and for reversing said movement and means for giving an intermittent rotary movement to said former timed to act as the carrier arrives at the extremities of said forming member.

7. In a machine for applying a longitudinal layer, of cords or threads having adhesive coatings in parallel rows to a receiving member, the combination with said receiving member of a carrier, and a pair of horizontally placed director wheels therein, of means for reciprocating said carrier longitudinally of said receiving member, for giving an intermittent rotary movement to said receiving member, holding devices for

the ends of the several rows of cord or thread, adapted to act upon one row while the next adjacent row is being laid, and means for releasing said holding device for readjustment thereof.

8. In an automatic machine for applying a longitudinal layer of cords or threads having adhesive coatings to a receiving member, the combination with said receiving member of a carrier and a pair of director wheels reciprocable longitudinally of said receiving member, means for reciprocating said carrier, means for giving an intermittent rotary movement to said receiving member, and a holding device adjustably secured at each end of the receiving member, and adapted to hold the end of one row while the adjacent row is being laid.

9. A carrier in combination with a pair of grooved director wheels located therein on one plane for a cord or thread, a spring pressed and adjustable support for said director wheels, said support rotatable in said carrier and a guide wheel mounted in said carrier, said guide wheel adapted to direct said cord or thread alternately to said director wheels, substantially as described.

10. In an automatic machine for applying a longitudinal layer of adhering cords or threads to a forming tube to produce a tubular fabric, the combination with said tube of a main shaft in which it is detachably secured, pedestal bearings for said shaft, a band wheel and main and reversing gears on said shaft, a shifting rod and mechanism operatively connected therewith for alternately bringing into engagement said main and reversing gears and said band wheel, a longitudinal worm in said standard bearings, a carrier operated by said worm, director and guide wheels in said carrier, collars on said shifting rod adapted to be alternately engaged by said carrier, a ratchet on said main shaft, automatically acting mechanism operatively connected with said shifting rod for moving said ratchet, whereby an intermittent movement is given to said main shaft, and a holding finger at each end of said forming tube adapted to secure the end of one row of cord or thread while the return row is being laid.

11. In a machine for applying parallel rows of cord or thread having adhesive coatings to form a tubular layer, a rotatable receiving member on which said cord or thread is laid, said receiving member having an intermittent rotary movement, a carrier and director wheels therein longitudinally reciprocable relatively to said receiving member, a pivoted finger located adjacent to each end of said receiving member and adapted to secure the ends of each row of cord in turn while the next row is being laid, a depressible cam upon said carrier adapted to engage and release said finger while the reverse movement of the carrier is taking place, and to be depressed by said finger upon the return movement of said carrier.

12. In a machine of the character described for laying a longitudinal layer of cord or thread, the combination with a forming tube, said tube having an intermittent movement, of a carrier reciprocable longitudinally thereof, means for reciprocating said carrier, a pair of director wheels in said carrier movable therewith, and a finger adjacent to each end of said former, said finger adapted to normally rest upon the end of one row of said cord or thread, while the next adjacent row is being laid, means for giving an intermittent movement to said forming tube and for simultaneously reversing the movement of the carrier, and a device in said carrier adapted to engage said finger and release the same while the carrier is at the end of a row, before the return movement takes place.

13. The combination with a rotary member having an intermittent movement and upon which a coated cord or thread is laid in parallel rows, a carrier and director wheels reciprocable longitudinally thereof, a pivoted spring pressed finger and support therefor adjacent to each end of said former, and a depressible cam in said carrier, said cam being provided with an inclined surface adapted to engage and release said finger when the carrier arrives at the end of the row, and also provided with a second cam surface engaged by said finger to depress said cam on the return movement of said carrier.

14. In combination with a receiving member, having an intermittent rotary movement and a carrier longitudinally reciprocable thereof, a spring pressed and pivoted finger and a support therefor adjacent to the end of said receiving member, an adjustable block in said carrier and a cam depressibly mounted in said block, said cam provided with two faces, one face adapted to engage and release said finger when the carrier arrives at the end of its travel, and the other face adapted to be engaged by said finger on the return movement and to be depressed thereby.

15. In a machine for the purpose of applying a longitudinal layer of coated and tenacious cords or threads in parallel rows to a receiving member, a main shaft in which said receiving member is mounted, said receiving member having an intermittent rotary movement, a carrier and director wheels thereon, said carrier having a longitudinal reciprocating movement relatively to said receiving member, a ratchet upon said main shaft, a spring actuated pawl for said

ratchet, an adjustable cam adapted to engage said pawl, a shifting rod provided with collars adapted to be engaged by said carrier at each end of its travel, and an arm thereon adapted to move said arm to engage and release said cam, substantially as described.

In testimony whereof we hereunto set our hands this 7th day of July 1908.

EUGENE D. C. BAYNE.
LAWRENCE A. SUBERS.

In presence of—
ED. C. PEET,
A. T. OSBORN.