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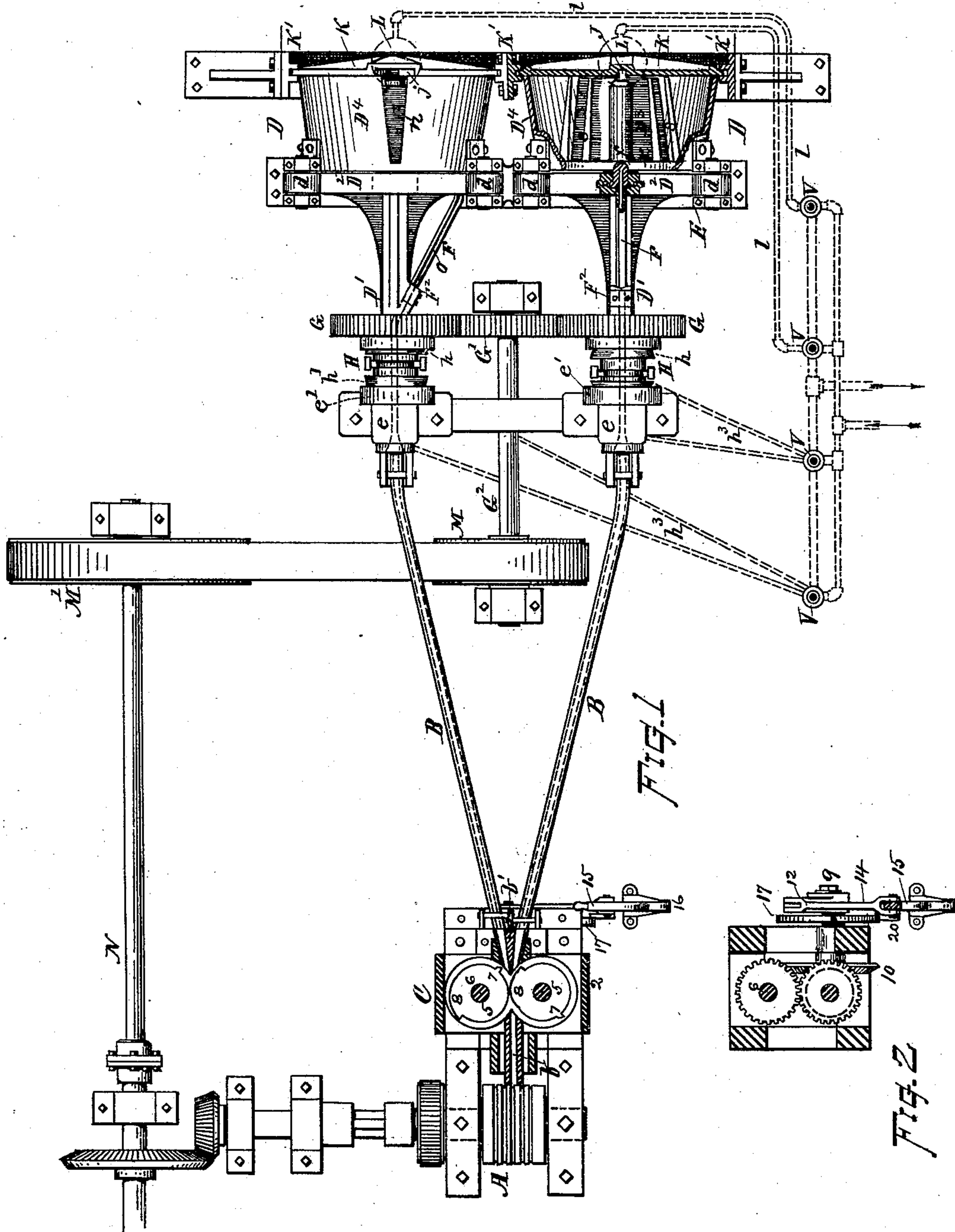
4 Sheets—Sheet 1.

F. H. DANIELS.

MACHINE FOR REELING WIRE RODS.

No. 370,688.

Patented Sept. 27, 1887.



WITNESSES

Ella P. Blum
Frank L. Wheeler.

INVENTOR

Fred. H. Daniels
By Chad H. Burleigh
Attorney

(No Model.)

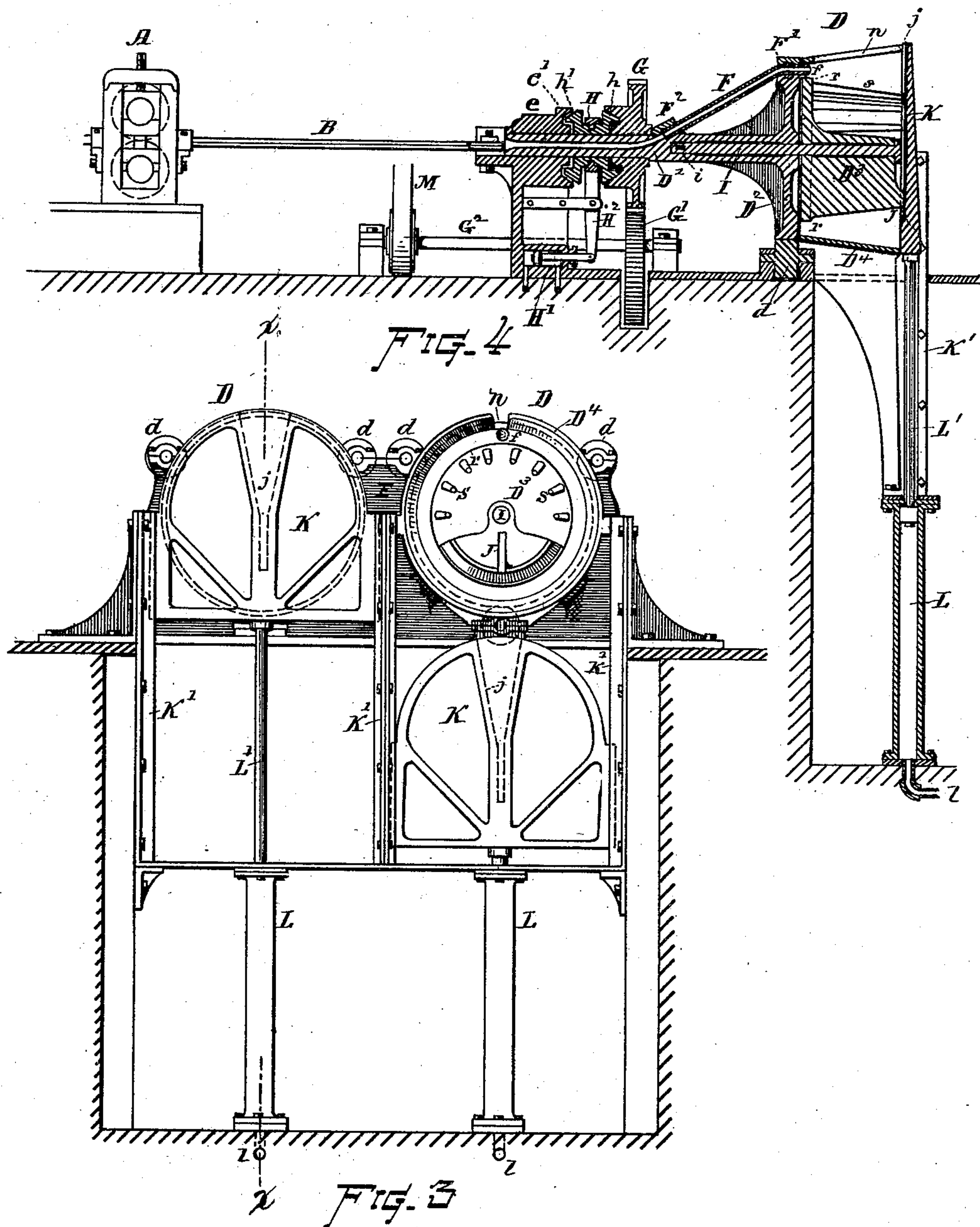
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Ella P. Blum
Frank L. Wheeler

INVENTOR

Frederic H. Daniels
By Chas. H. Doolittle
Attorney

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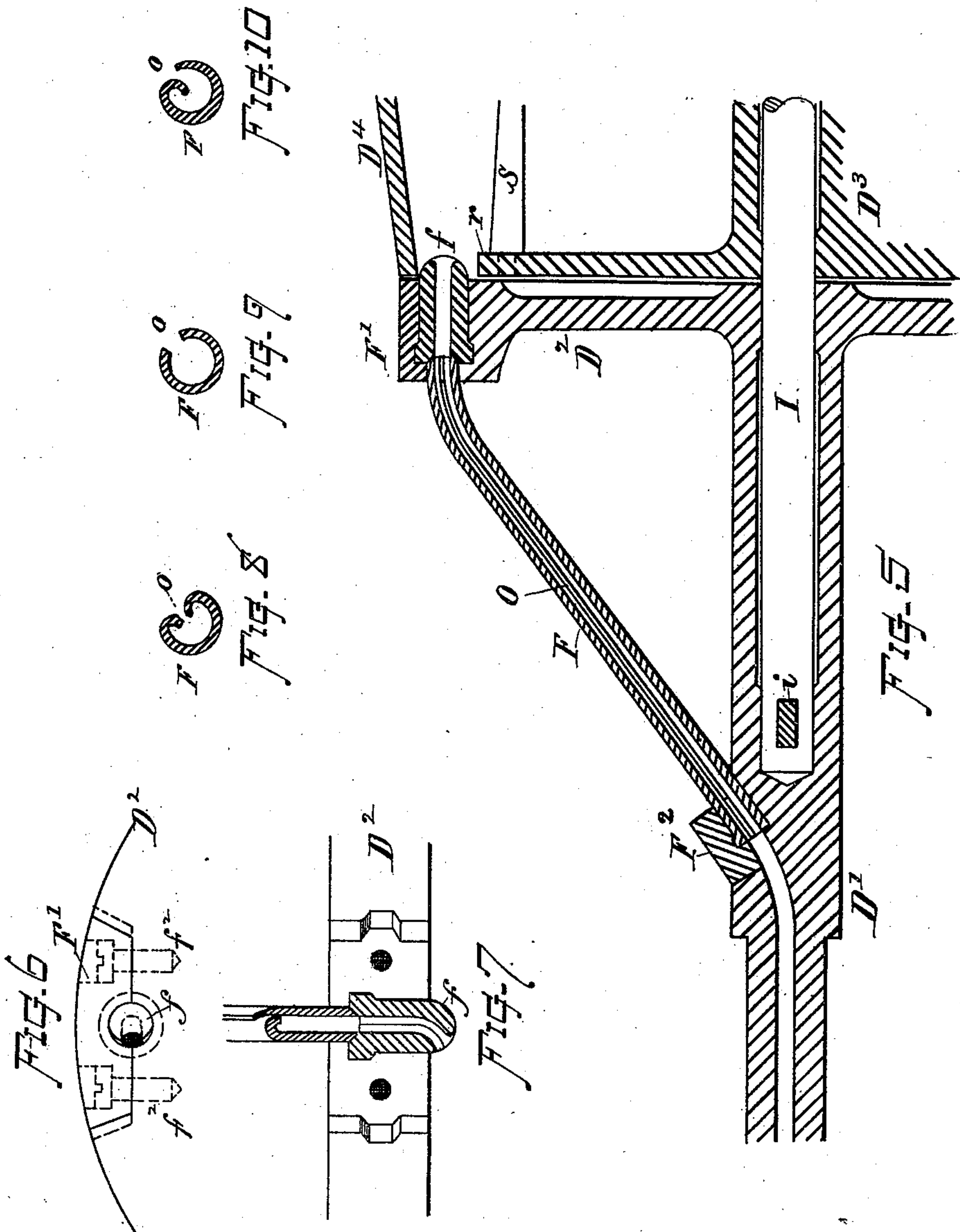
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Edla P. Blum
Frank L. Wheeler.

INVENTOR

And. H. Daniels
By Chas. H. Burleigh
Attorney

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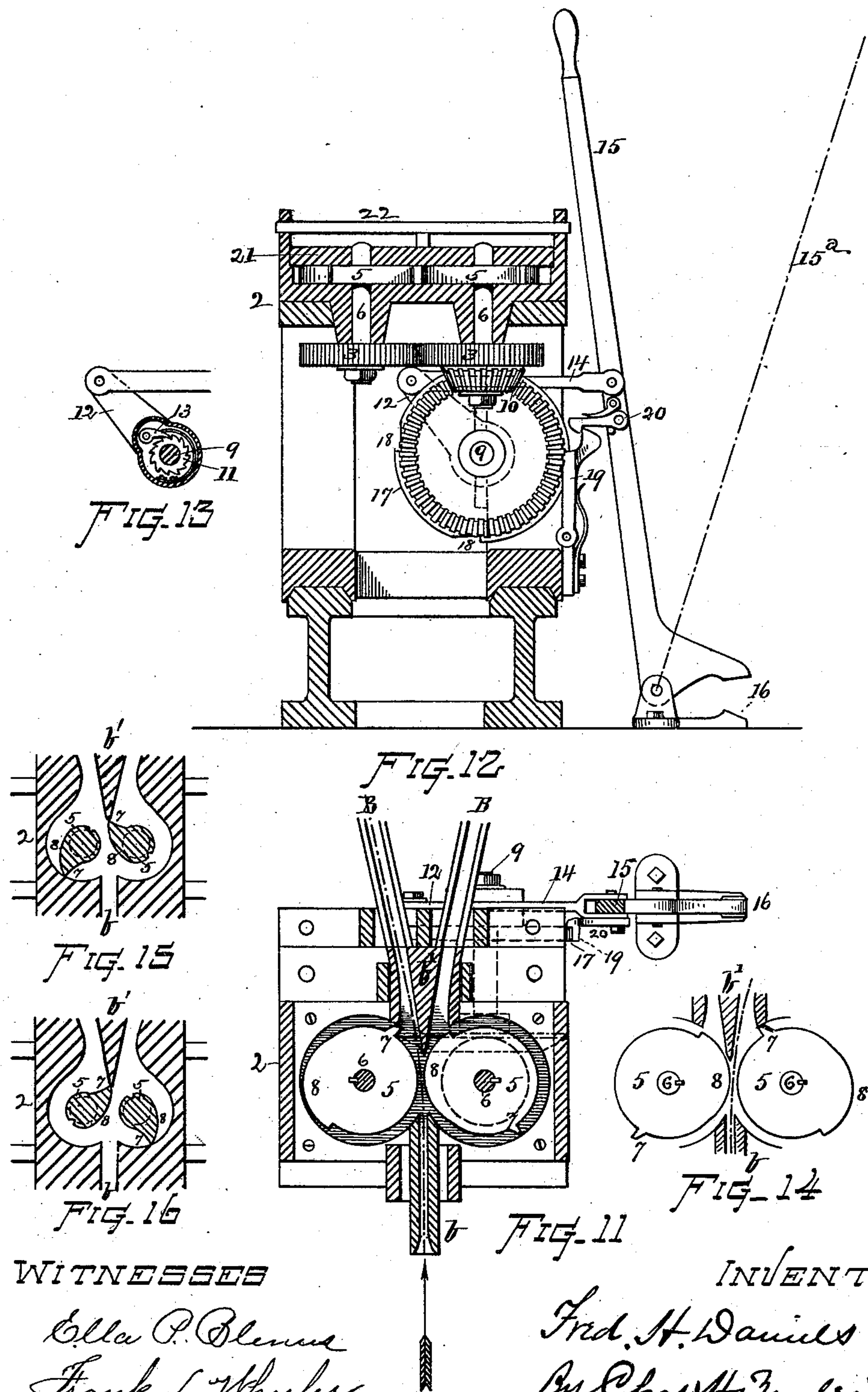
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WITNESSES

Ella P. Blum
Frank L. Wheeler

INVENTOR

Fred. H. Daniels
By Chas. H. Furleigh
Attorney

UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR REELING WIRE RODS.

SPECIFICATION forming part of Letters Patent No. 370,688, dated September 27, 1887.

Application filed February 24, 1887. Serial No. 228,689. (No model.)

To all whom it may concern:

Be it known that I, FRED H. DANIELS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Reeling Mechanisms for Rod-Rolling Mills, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

This invention relates to the construction and method of operation in apparatus for automatically reeling or winding hot wire rods into coils as they are delivered from the reducing-train or rolling-mill, and to mechanism for simultaneously severing and switching rods, for directing separate sections thereof to the several reels.

The prime objects of my invention are, first, to provide a wire-rod-reeling device wherein the rod is coiled about a stationary central supporter or body mounted within an inclosing casing or frame by means of a traveler or delivery-eye disposed at a position beyond the periphery of said body and rotative in a circle substantially concentric with the central body and casing, and from which reeling device the completed coil can be conveniently discharged by opening the end of the casing opposite to that at which the rod is entered; second, to provide a reeling-receptacle having a movable head-plate or end-gate which can be closed for confining the coil of rod while it is being wound or deposited upon the reel and adapted for opening to permit the convenient discharge of the coiled rod bodily from the reel; third, to provide a rotating conductor by which the rod is directed to the periphery of the reel, which conductor is provided with an open side to facilitate the clearance therefrom of any obstruction or pieces of rod, in case the rod becomes broken or accidentally lodged in said conductor; fourth, to afford facilities for severing the rod at any desired position while it is continuously running forward from the rolling-mill, and at the same time switching or directing the end of the rod following the point of severance into another channel, guide, or con-

ductor from that in which the former portion of rod, or that in advance of the point of severance, had been running, so as to pass the section following to a separate reel or place of deposit; fifth, to provide a reel having a central body, about which the rod is wound by a rotating delivering eye or nozzle, having a flange over which the rod is passed to the central body, whereby the complete withdrawal of the rear end of the rod from the guide-conductor is effected and insured; sixth, to afford facilities for locking the central body to prevent its rotation while the rod is being wound thereon; seventh, to provide a casing or shell surrounding the central reel-body, which casing is provided with a recess or space for the introduction of discharging-tongs; eighth, to provide means for conveniently controlling and operating the head plates or gates of the reels for opening and closing the reel-cases as desired. These objects I attain by mechanism the nature, construction, and operation of which are explained in the following description, the particular subject-matter claimed being hereinafter definitely specified.

According to my present invention, I construct the reel with a revolving head connected to the end of the axle, which is disposed preferably in a horizontal position and supported in suitable bearings, while the revolving head is supported by rolls, so that the whole can revolve freely at the desired degree of speed, suitable gearing being arranged on the axle for imparting the rotary movement, and clutch devices provided for throwing the same into and out of action. Extending from the head, in prolongation of the axle, is a spindle or stud, upon which is mounted a circular body or rim-plate containing pins or fingers, about which the rod is to be coiled. This body is weighted at one side, while the other side is made light, so that the body will by gravity remain at stationary position, while the reel-head revolves. I arrange a circular casing or guard-shell around the body, which casing is attached to the frame and non-rotatable. At the end of the casing opposite the revolving head I arrange a movable head or end-gate, which is mounted on suitable guides, so as to slide across and close the end of the casing,

said end-gate being connected with operating mechanism whereby it can be moved to and from position for closing and opening the end space of the reel. The axle of the reel at its front end is formed hollow, and this hollow turns to one side and connects with a diagonally-disposed conductor leading from the axle to a delivering-eye of suitable form, which travels around the periphery of the rim or flange plate of the center coil-supporting body and serves for deflecting the rod in a proper manner to form the coils. Suitable driving-gearing and a clutch having front and rear friction-surfaces for engagement with said gear and with a stationary rim are connected with the reel-axle to effect the rotation of the axle and head when the friction-surfaces are coupled with the gear, and for stopping the rotative action when coupled with the stationary rim; and a hydraulic cylinder and piston is preferably combined with the clutch-operating lever for throwing the friction-surfaces into and out of contact with each other. Two or more reels are preferably employed for taking the rods from a single reducing-train or continuous rolling-mill, arranged in connection with cutting and switching devices, whereby separate sections of rod are automatically directed to the different reeling devices through guide-pipes leading from said switch to the front ends of the hollow reel-axes. Connecting-pipes are arranged for supplying pressure to the hydraulic cylinders that operate the gear-clutches and the end-gates of the reels, which pipes have suitable valves disposed at a convenient position to be under the control of an attendant, who can watch the operation of the mechanism and manipulate the valves as may be necessary in the progress of the work. In the operation the rod passes into the space within the case of the reel, and is wound around the central non-rotating body by the action of the delivery-eye revolving around the periphery thereof. When the coil is formed, the head-plate or end-gate is removed, opening the end of the reel-casing, when the coil can be conveniently removed by means of tongs or other handling implements.

In the drawings, Figure 1 is a plan view of an apparatus constructed in accordance with my invention, portions of the view being in section, the better to show internal parts. Fig. 2 is a horizontal section showing the operating-gears for the switching-cutter mechanism. Fig. 3 is an end elevation of the reels, one of the head plates or gates being shown as opened and the other as closed. Fig. 4 is a longitudinal vertical section through the reel. (In this view the switching-cutter mechanism is omitted.) Fig. 5 is a longitudinal section through the rotating conductor, its delivery-nozzle, and a portion of the reel-shaft. Fig. 6 is an end view of the delivery-eye. Fig. 7 is a horizontal section of the same. Figs. 8, 9, and 10 are cross-sectional views illustrating forms in which the rotating conductor or guide may be made. Fig. 11 is a horizontal view of

the switching-cutter mechanism. Fig. 12 is a vertical transverse section. Fig. 13 is a detail view of the operating-ratchet. Fig. 14 is a plan view of the switching-cutters separate from their case. Figs. 15 and 16 are sectional views showing a modified form of switching-cutter at the two positions of adjustment, respectively.

In referring to parts, A denotes the finishing-rolls of the rolling-mill, which mill may be a continuous train or other suitable kind of mill for producing wire rods or similar product.

B indicates pipes or guides leading to the respective reels D from the switching and severing mechanism C, adjacent to the exit-guide *b*, through which the rod passes as it issues from the rolls A. The reels D—a pair of which are herein shown—are preferably disposed with their axes in horizontal position, and in a plane substantially corresponding with that of the roll-passes, although this is not absolutely essential to the successful operation of the apparatus. The reels are of similar construction, and are composed of a rotatable axle, *D'*, carrying a head-plate or flier-wheel, *D²*, the circumferential rim of which is sustained and guided by a series of anti-friction rolls, *d*, mounted on the supporting-frame E, while the axle *D'* is journaled in suitable bearings, *e*, and has mounted thereon a loose running-gear, G, provided at its side with a friction-rim and a longitudinally-movable clutch-sleeve, H, furnished with friction rims or surfaces *h* and *h'*, for engaging, respectively, with the friction-rim of the gear G, and with a stationary friction-rim, *e'*, fixed on the frame or journal-box *e*. Said clutch-sleeve is confined to the reel-axle by a suitable key or spline to effect rotative action when its friction-surface *h* is thrown into contact with that of the gear G, and to act as a brake for stopping the reel when the friction-surface *h'* is in contact with the stationary friction on the journal-box. The front end of the axle is made hollow or tubular, and at a position back of the gear G said hollow inclines toward one side and joins with a diagonally-disposed conductor, F, leading to a delivery eye or flier, *f*, projecting through and secured in the rim of the plate *D²*.

Projecting from the head *D²*, in prolongation of the axle, I arrange a spindle, shaft, or stud, I, upon which the central body, *D³*, of the reel is supported. The body *D³*, which is arranged to run loose on the shaft I, consists of a circular plate or annular rim, *r*, having a series of projecting pins or fingers, *s*, arranged thereon in a circle, or with a projection having a circular surface, about which the wire rod is wrapped by the revolution of the delivery-eye *f*, which eye travels around the periphery of the circular body-plate and delivers the rod past its circumferential rim, which prevents any liability of the rod becoming caught between the head-plate and non-rotating body, and also insures the withdrawal of the last end of the rod from

the guide and the winding of it onto the reel after it has lost the forward momentum imparted by the finishing-rolls of the rolling-mill. The stud or shaft on which the central body is supported is best made with a head on its outer end, and is retained in connection with the reel-axle by a pin or key, *i*, which passes through the parts, or otherwise, if preferred. Said central body is formed solid at its lower side, or provided with a counterbalance-weight, so that the body will assume and stand at a fixed position or remain non-rotative by the gravity thereof.

Surrounding the central body and at the required distance therefrom for providing an annular chamber or space for the coil of wire I arrange an external guard-casing or cylindrical shell, *D*⁴, the length of which corresponds with the length of the coil-receiving pins *S*, and which is preferably non-rotatable and rigidly fixed to its supporting-frame *E* or to other suitable supports. The casing *D*⁴ is preferably made slightly conical or inwardly-tapering toward the reel-head *D*¹, while the circle of fingers or surface *S* of the central body preferably tapers in the opposite direction. These parts might, however, if desired, be cylindrical; but I prefer the conoidal form as best suited to facilitate the discharge of the coiled rods.

K denotes the movable head or end gate for closing the outer end of the external reel-casing. Said gate in the present instance is arranged to slide vertically on guideways *K*¹ and to descend into a pit or chamber beneath the floor on which the reel apparatus stands. The front face of the gate is made to fit closely to the end of the casing *D*⁴ and to the ends of the pins *S* of the central body, *D*³, and said body is provided with a lug, *J*, which enters a groove, *j*, formed in the face of the sliding end-gate, whereby said body is confined from any rotative movement when the gate is closed. The upper part of said groove *j* is made broad, and it is tapered downwardly, so that the lug *J* will be directed to a central position in case the body were rocking or slightly turned to one side when the end-gate approached its position for closing the case.

L indicates a hydraulic lifting mechanism, consisting of a cylinder and piston for opening and closing the end-gate. This mechanism is best arranged so that the piston-rod *L*¹ acts direct upon the gate without intervening devices.

While I prefer to arrange the end-gate to move downward into a pit formed beneath the floor on which the reel stands and to operate by means of a hydraulic cylinder and piston, I do not desire to confine my invention to this exact position and to such mechanical devices for effecting the movement of the gate, as it is obvious that the gate might be inverted and be operated from above instead of below, or, again, from one side of the reel, and that it could be lifted and depressed by a screw, a rack and pinion, or other well-known me-

chanical power in equivalent action to that above described.

The conductor *F* is best made with an opening, *O*, along one side, through which any obstruction or pieces of broken rod can be removed. The form of this conductor with an open side is illustrated in the sectional views, Figs. 8, 9, and 10. If preferred, the conductor could be made tubular or as an open trough, or in other equivalent shape. The conductor is retained in place by means of cap-plates *F*¹ *F*², secured to the axle and reel-head plate. (See Figs. 5, 6, and 7.)

The delivery-eye *f* is preferably made separate from the conductor *F*, and is formed in two parts, as indicated, said eye being cast on a chill, so as to give it wearing capacity. It is retained in place on the peripheral rim of the reel-head by means of the removable cap-plate *F*¹, which embraces an enlargement or flange formed on the eye-pieces, and which cap-plate is attached to the rim by fitting it to a corresponding recess, where it is held by means of screws, as at *f*². (See Figs. 6 and 7.)

The gear *G* of the reel-axle meshes with a gear, *G*¹, on a driving-shaft, *G*², common to both reels, which shaft is operated by a belt and pulleys, *M M*¹, from the rolling-mill driving-shaft *N*, or, if desired, in any other convenient manner.

*H*¹ indicates the hydraulic cylinder and piston in connection with the operating arm *H*² of the clutch *H*, whereby said clutch is shifted for starting and stopping the reel.

*h*³ and *l* indicate connections or pipes for supplying pressure to the respective hydraulic cylinders *H*¹ and *L*. These pipes are controlled by suitable valves, *V*, located at any convenient position in relation to the reeling mechanism, and operated in any well-known manner as employed in hydraulic machines now in use.

In the mechanism *C*, for directing the sections of rod to the respective reels, I prefer to employ combined cutting and switching plates or heads 5, having means for simultaneously severing the rod and deflecting the end, so as to direct it into the channel or guideway opposite to that in which the rod was previously running without interfering with or stopping the movement of the rod. Said mechanism is constructed and combined with the rolling-mill, as illustrated in Figs. 1 and 2 and 11 to 13, inclusive. Two rotative disks or cutter-heads 5 are inclosed within a casing or frame, 2, and are respectively mounted on parallel shafts 6, which are geared together, so that the two cutting disks or heads will turn in unison with each other. The exit-guide *b* from the finishing-rolls *A* is disposed to direct the rod centrally between the heads 5, while at the opposite side of the heads is a double guideway having a central point, *b*¹, flanked by channels which respectively connect with the guide-pipes *B*, leading to the separate reels.

The heads 5 are each provided with a cutting tooth or point, 7, and with a bulge or de-

flecting-surface at 8, and they are so disposed in relation to each other that the tooth or bulged portion on the separate disks approaches the intermediate line or track of the rod alternately. These two cutting-heads are operated by intermittent action, embracing a half-revolution at each movement, and stopping at such position that the bulge or deflecting-surface of one head will deflect the rod into the opposite space or channel from that toward which it was deflected by the other. Thus in Fig. 11 the cutter-heads are shown in one position with the rod (indicated by dotted and broken lines) deflected to the left-hand guiding-pass, while in Fig. 14 the heads are shown in their other position, or after making a half-revolution, with the rod deflected to the right-hand guiding-pass. In the rotative action of the head the cutting-tooth 7, as it passes the central plane of the axles, cuts against the opposite head and severs the rod, and immediately following the cutting action the bulging portion of the head forces the rod to the opposite side of the switch-point b' , so that it passes into the guiding-channel opposite that in which the rod had previously been running, the cutting and switching being effected without stopping the continuous forward motion of the rod running from the rolls.

The cutting and switching heads 5 are inclosed top and bottom by their supporting-frame, so that the rod cannot escape from passing between them, and the partial rotative action of the heads should be sufficiently quick to give a peripheral speed substantially corresponding to the speed at which the rod issues from the guide b . The cutting mechanism is in the present instance operated by a shaft, 9, connected to one of the cutter-axles 6 by means of suitable gears, 10. Upon said shaft is fixed a ratchet-wheel, 11, and loosely mounted thereon a swinging arm, 12, carrying a spring-pressed pawl, 13, which engages the ratchet-teeth by forward movement and passes over them by backward movement of the arm. A link, 14, connects the arm with a lever, 15, disposed at convenient position for the attendant. Said lever 15 is preferably provided with a stop or stops, 16, for limiting its movement. An escapement-wheel, 17, is fixed on the shaft 9 and provided with notches 18, which engage a spring-pressed stop-latch, 19, attached to the supporting-frame or other rigid part, and arrest the movement of the said shaft and parts operated thereby when the cutting and switching heads 5 are at proper positions for action.

Attached to the lever 15 is a spring-pressed latch, 20, that locks over a suitable lug or projection on the stop-latch 19 and pulls it from the notch of the escapement-wheel 17, when said lever 15 is drawn back, releasing and letting said stop fly forward in time to catch the next notch of the wheel 17, so that the cutter-heads will be moved but one step at a single movement of the lever.

For operating the cutting and switching mechanism, the attendant simply draws back the lever 15 to the position indicated by dotted line 15^a, Fig. 12, which movement, transmitted through the ratchet devices and gearing, effects the half-revolution of the cutting-heads, severing and directing the rod from one side to the other as it runs through the guides. When the cutting-point 7 is brought into contact with the product or rod running from the mill, the inherent force of the rod carries forward the cutters at a speed equaling the speed of the rod and effects the severing and switching of the rod without the application of other power. This will be the case even if the momentum and force of the lever 15 are only sufficient to bring the cutting-points against the surface of the rod, as the relief of the ratchet, by reason of the teeth of the ratchet-wheel 12 sliding forward under the spring-pawl 13, will permit forward rotation of the cutters and gearing in advance of the movement of the ratchet-arm. Hence the mechanism can be operated for cutting and switching heavy rods or bars as they come out of a rolling-mill as well as for small rods, since with the larger-sized product the force for operating the cutter is chiefly derived from the momentum of the rod, and not by the exertion of the attendant handling the lever, while for small rods the force required for cutting and switching could of course be easily imparted by the attendant with the hand-lever.

In Figs. 15 and 16 I have shown a modified form of the cutting and switching heads and their inclosing-case. Cutters of this form may be used for heavy rods and be operated by gearing substantially as above described, or arranged in any manner for effecting equivalent action.

The operating devices for effecting rotation of the cutting-heads may, if desired, be connected with the driving-shaft of the mill or reel mechanism so as to be moved by power instead of by hand.

The cap-plate 21 over the cutter-heads 5 is preferably retained in place by a braking-bar, 22, and wedge, so that in case the passage through the guides becomes choked the cover will be forced off without doing other damage to the mechanism.

In the operation of my improved reeling apparatus, the rod, as it issues from the rolls A, passes between the cutting and switching heads 5, and through one of the guide-pipes b , into the hollow axle of the reel, and thence, by way of the open-sided conductor F, to the delivery-eye f , by means of which it is deflected to one side, and is, by the revolution of the head, wrapped around or coiled about the central body, D³, the rotative speed of the head-plate D and mill-rolls being so proportioned that the rod will be taken up and coiled at substantially the same speed as that at which it is delivered from the rolls A.

In case the rod is made from a heavy bloom or billet, or of such length that it is desirable

to have it cut up and coiled in sections, then when a sufficient amount has been run onto one of the reels the attendant draws back the lever 15, thereby bringing the cutting and switching mechanism into action to sever the rod and to direct the succeeding section thereof to the second reel. The first reel is then stopped, if desired, by shifting the clutch H, and the end-gate K is lowered for opening the end of the casing to give access to the interior of the coiling-receptacle. The attendant then seizes the coil by means of gripping-tongs and withdraws it from off the central body of the reel, to be conveyed to any desired place of deposit. A slot or space, *n*, is provided in the outer casing to permit the convenient introduction of the tongs for lifting the coil from the central reel-body. The removal of the coil from the first reel is effected during the time the second reel is being filled, and vice versa. After removing the coil the end-gate is again raised to position for closing the casing, and the reel is then ready to be put in motion for receiving and reeling another section of rod. By this means rods of any length can be rolled and convenient sections or amounts thereof for handling severed and reeled into separate coils, according to the principle explained in my former Letters Patent, No. 351,364.

The combined cutting and switching heads 5 can be employed for cutting and switching rods and similar rolling-mill product, in combination with mechanism of other construction than that herein shown for receiving and reeling the same, and a reeling mechanism, such as described, may be employed in connection with any of the well-known styles of switching devices heretofore employed, in case it is not necessary to divide the rods into sections for reeling.

If desired, the reels may be disposed with their axial lines radiating from the point *b'* of the switch device in lieu of being placed parallel to each other, thus avoiding the bend in the guide-pipe B at its junction with the reel-axle.

If preferred, the flier or revolving head *D*², with the delivery-eye *f*, can be continued in motion while the coil is being discharged from off the central body, *D*³, since said central body, being counterweighted at one side, remains at the given stationary position without reference to whether said head is in motion or otherwise. This is a feature of considerable importance in cases where the rolling-mill is run at very high speed, or when rolling short sections of rod, since it avoids loss of time by the stopping and starting of the rotating head and maintains a speed at all times sufficient to coil or wind up the rod as fast as it issues from the rolling-mill.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for reeling wire rods, a revolving head or flier carrying a rod-delivery guide, and a non-rotatable body axially

supported upon and projecting from said guide-carrying head, in combination with a non-rotatable casing surrounding said body, but unattached thereto, and means to facilitate the removal of the coiled rod from the end of the casing opposite to that at which the rod is delivered therein.

2. In an apparatus for reeling wire rods, a reel composed of a non-revoluble receptacle, a revoluble delivering device at one end of said receptacle, a central non-rotatable body, about the periphery of which the rod is wound by revolution of said delivering device, and a movable end-gate at the opposite end of said receptacle, which can be closed while receiving the wire-rod coils and opened to facilitate the removal of the coiled rod from the central body.

3. In a wire-rod-reeling mechanism, the combination of a receptacle within which the rod is received and coiled, a non-revoluble central body or series of stationary coil-supporting fingers, and an end-gate adapted to be opened to facilitate the discharge of the completed coil.

4. In a wire-rod-reeling mechanism, in combination with a revoluble head carrying a delivery eye or guide through which the rod is delivered, a central body axially supported in connection therewith upon a stud or shaft in prolongation of the axis of rotation, and having a counter-weight at one side, whereby said body is caused to assume a given stationary position, substantially as set forth.

5. In an apparatus for reeling wire rods, a reel composed of an external casing, a revolving head carrying a delivery-eye, and a central non-rotatable body having a circular base-flange adjacent to the revolving head, and a removable end-gate for closing the end of the casing opposite to said revolving head.

6. In an apparatus for reeling wire rods, the combination of a stationary exterior casing, a revoluble head or flier carrying at or near its periphery a delivery-eye, through which the rod passes into said casing, a central non-rotatable counterweighted body mounted on a stud or shaft in prolongation of the axis of the revolving head, a movable end-gate mounted in guideways to slide across the end of said casing, and a power mechanism under control of the operator for shifting said end-gate to open and close the reel, substantially as set forth.

7. In a wire-rod-reeling mechanism, the combination of the central body and the movable end-gate provided with an interlocking lug and groove, whereby said central body is retained from rotative action by said end-gate when said end-gate is closed, substantially as set forth.

8. A reeling mechanism having a central non-rotatable body provided with a circular flange at *r*, a delivery eye or guide revoluble about the periphery of said flange delivering the rod thereover and wrapping it about said body, substantially as set forth.

9. In a wire-rod-reeling mechanism, a revoluble head supported on a hollow axle and carrying the delivery-eye in its peripheral rim, the diagonally-disposed conductor connecting said hollow axle and delivery-eye, and the driving-gear and clutch-sleeve mounted on said axle, in combination with the non-rotatable casing, central body, and movable end-gate, substantially as set forth.

10. In a mechanism for reeling wire rods, the combination, with the coiling-receptacle and the rotating head-plate having an axle tubular at its front end, of a longitudinal slotted conductor extending from said axle to the head-plate, and the independent delivery-eye fixed in the rim of said head-plate, substantially as hereinbefore set forth.

11. The combination, with the revoluble reel-head and its rotating axle, of the guiding-conductor detachably secured to said head and axle by removable cap-plates, substantially as described.

12. In a rod-reeling mechanism, the combination, with the rotating head or flier, of the detachable delivery-eye *f* and means for detachably securing said eye within said flier or head-plate, substantially as set forth.

13. In an apparatus for reeling wire rods, a coil-receptacle within which the wire is coiled, having a slot in its peripheral rim for the introduction of tongs or discharging implements to facilitate the removal of the coiled rod therefrom, substantially as set forth.

14. In a wire-rod-reeling mechanism, the combination, with a reel center or body about which the rod is coiled, of an external casing or guard surrounding said body having a longitudinal opening at one side, substantially as and for the purpose set forth.

15. The combination of two reels, *D D*, having stationary external casings and rotatable heads and axles, the operating gears and clutches mounted on said axles, the driving-gears *G'* and shafts *G''*, common to said reels, the supporting-bearings *e*, provided with friction-rims *h'*, hydraulic clutch-actuating mechanism *H''*, and controlling-valves *V*, substantially as and for the purpose set forth.

16. The combination, with a rolling-mill and a plurality of conducting-guides, of a cutting mechanism having facilities for severing the rod or product while it issues from the rolls and simultaneously switching the severed end of the rod to the guide opposite that in which the rod has been previously running.

17. The combination, with a rolling-mill, of a pair of intermittently-revoluble combined cutting and switching heads having means for severing the rod and for directing the leading end of the following section to the right or left while the rod is advancing.

18. A cutting and switching mechanism having rotating cutter-heads provided with cutting-points and deflecting-surfaces, in combination with a double guideway, into the respective passes of which the rod is deflected by the respective cutter-heads alternately, substantially as set forth.

19. The combination of the combined cutting and switching heads mounted on parallel shafts, the connecting-gears intermeshing to rotate said shafts and heads in unison, operating mechanism, and escapement devices adapted to revolve said heads by intermittent steps to effect the cutting and automatic switching of the rod or bar to the right and left while traveling, substantially as set forth.

20. The combination of the revoluble heads having cutting-points and deflecting-surfaces, a guide for directing the rod or product between said heads, a double pass-guard for receiving the product from between said heads, means, substantially as described, for moving the cutting-points of said heads into contact with the advancing rod, and relief devices which permit free forward action of the heads with the advance of the rod, substantially as set forth.

21. The combination, with the cutting and switching heads, their shafts and connecting-gearing, of the operating-ratchet 11, swinging arm 12, carrying pawl 13, the operating-lever 15, connected with said arm, the escapement-wheel 17, and stop-latch 19, substantially as and for the purpose set forth.

22. The combination of the rolling-mill *A*, a plurality of automatic reeling mechanisms, as *D D*, the delivery-guide *b*, and guides *B B*, leading to the respective reels, and a combined cutting and automatic switching mechanism disposed at the junction of said guides, and means for intermittently operating the combined cutting and switching devices, for the purpose set forth.

Witness my hand this 18th day of February, A. D. 1887.

FRED H. DANIELS.

Witnesses:

CHAS. H. BURLEIGH,
ELLA P. BLENUS.