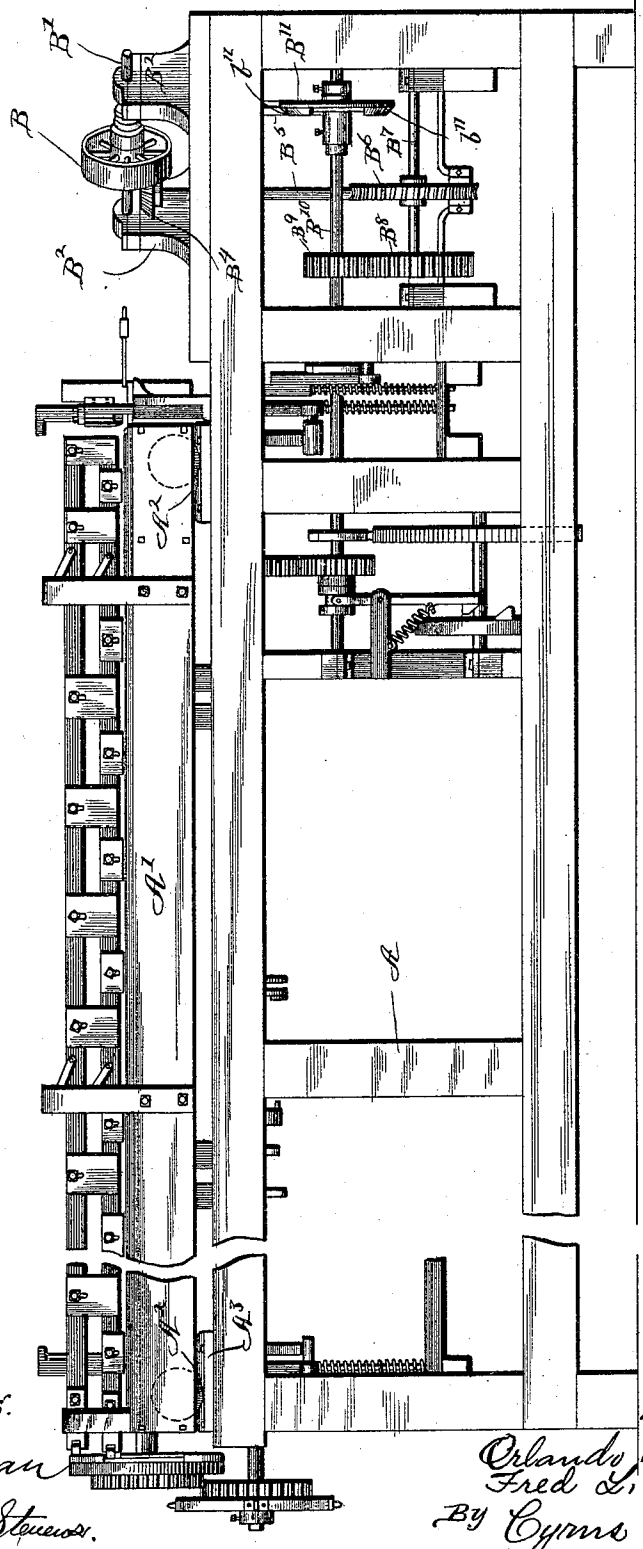
(No Model.) 9 Sheets—Sheet 1.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 480,007. Patented Aug. 2, 1892.



Witnesses.
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(No Model.) 9 Sheets—Sheet 2.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

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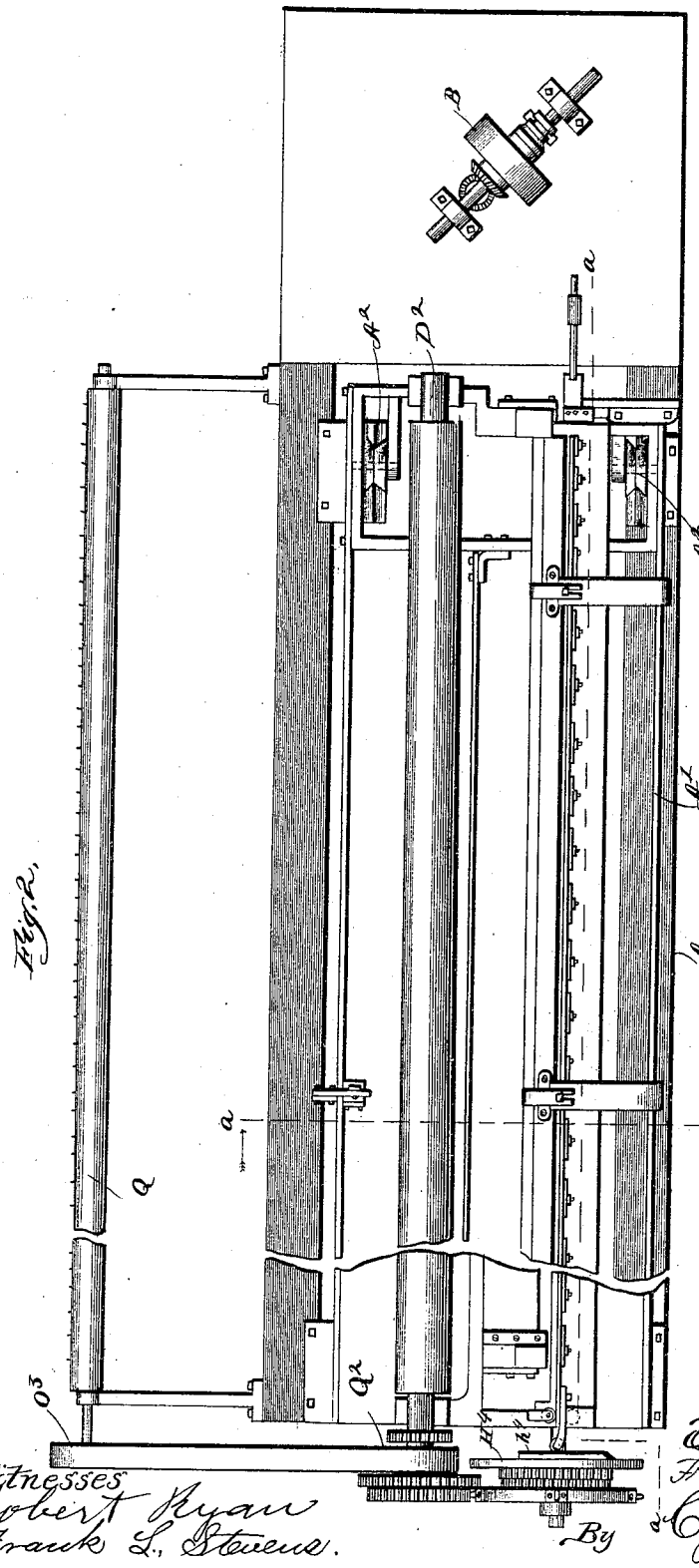

Fig. 2.

Witnesses
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(No Model.) 9 Sheets—Sheet 3.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 480,007. Patented Aug. 2, 1892.

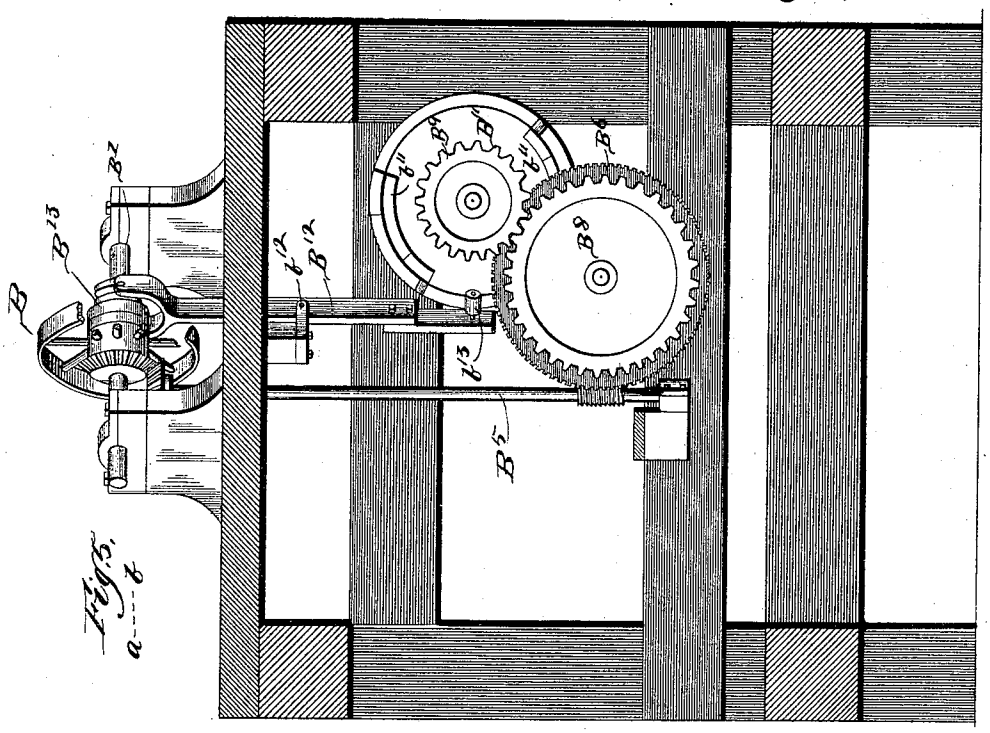
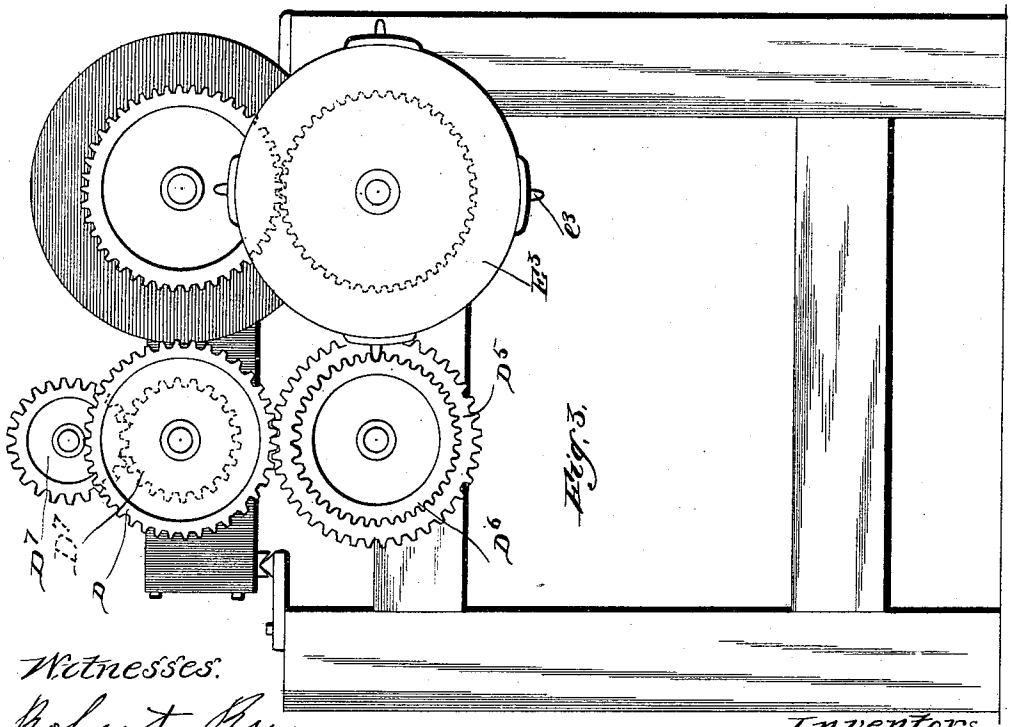


Fig. 3.



Witnesses.
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(No Model.) 9 Sheets—Sheet 4.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 480,007. Patented Aug. 2, 1892.

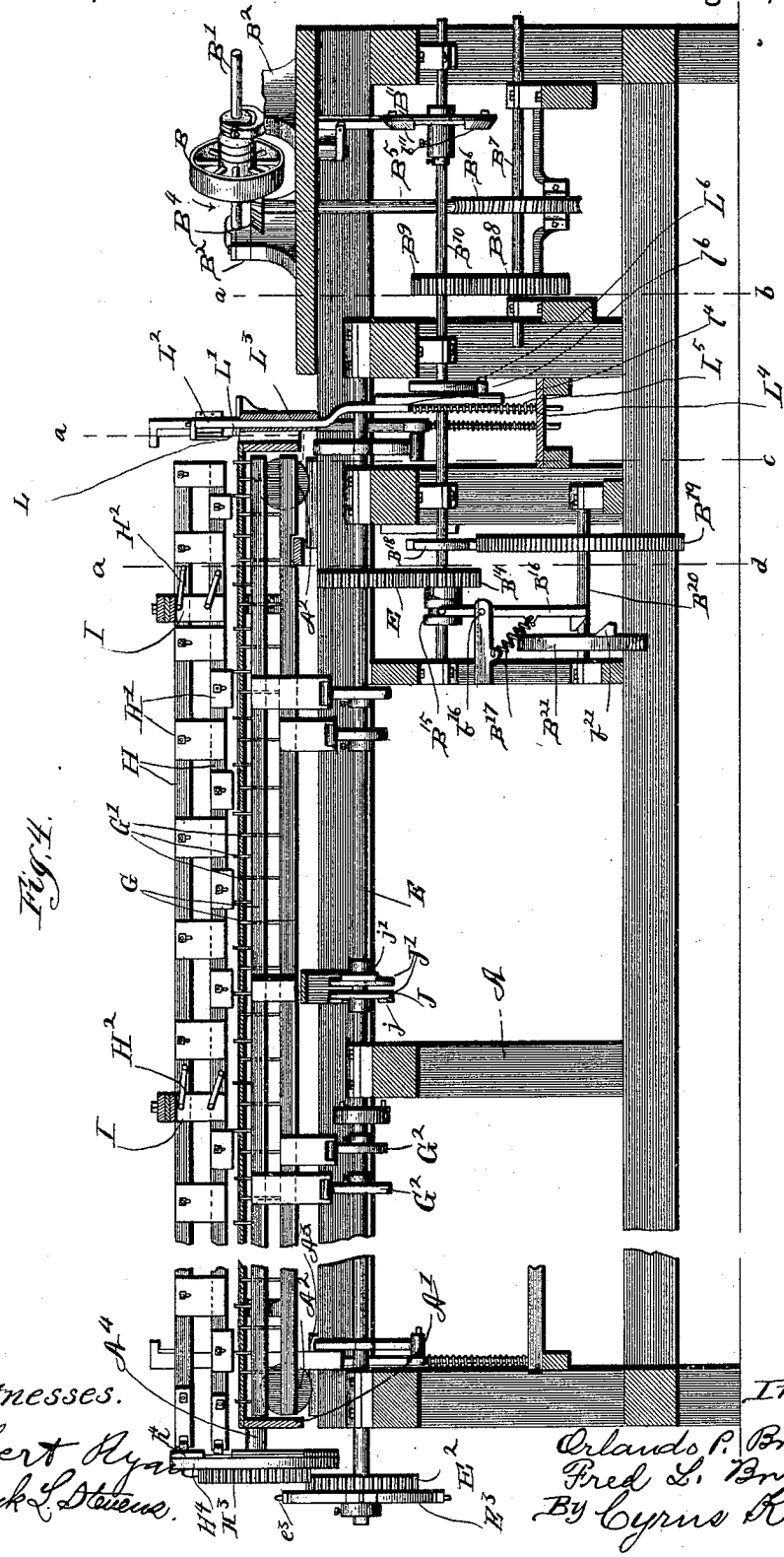

Fig. 4.

Witnesses.
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(No Model.) 9 Sheets—Sheet 5.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

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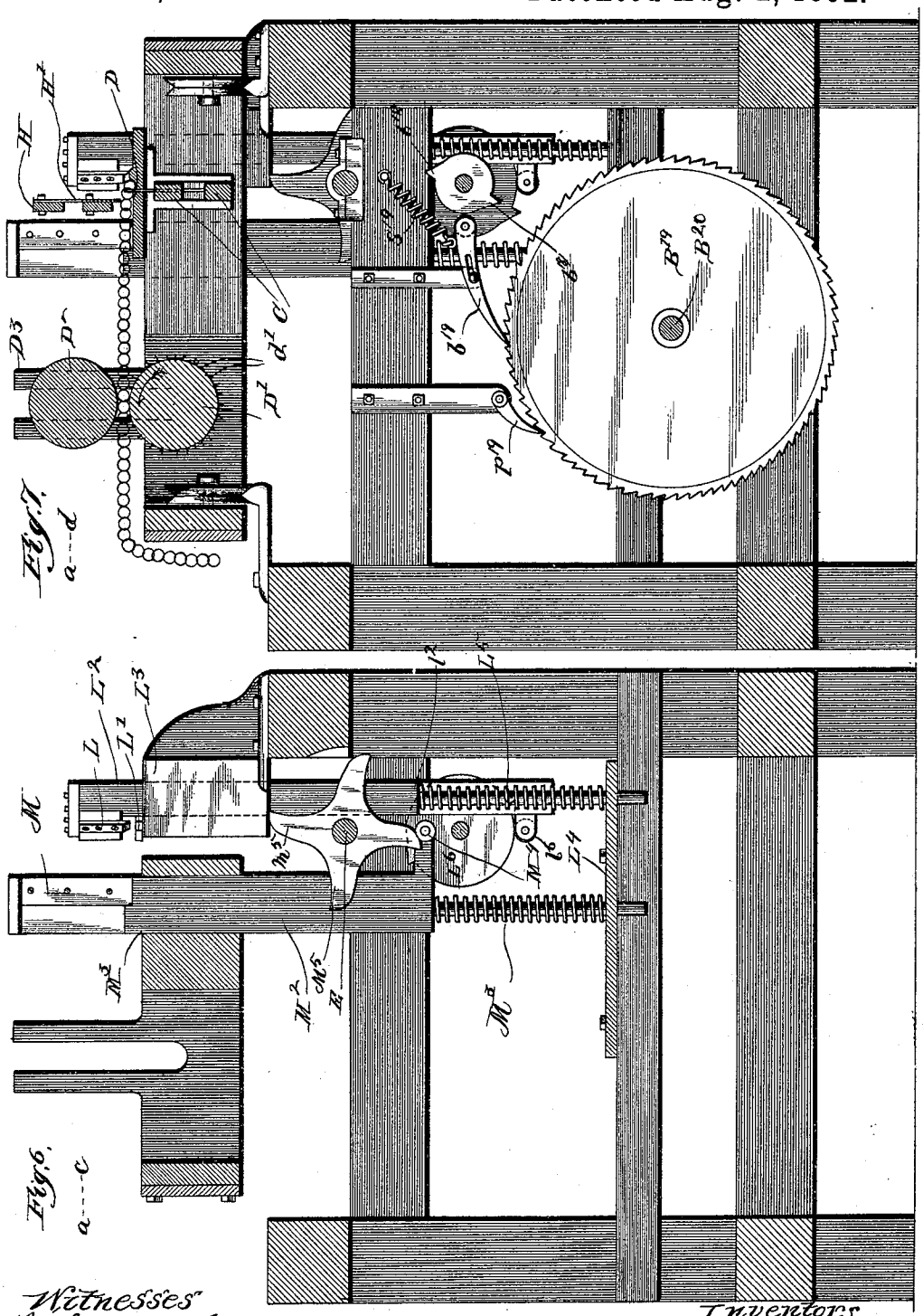

Witnesses
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(No Model.) 9 Sheets—Sheet 6.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 480,007. Patented Aug. 2, 1892.

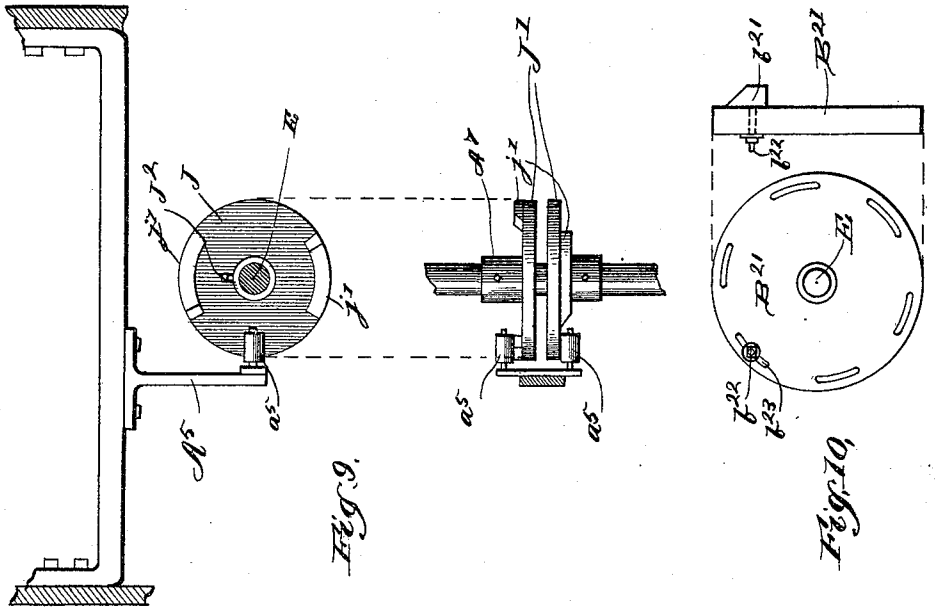

Fig. 9.

Fig. 10.

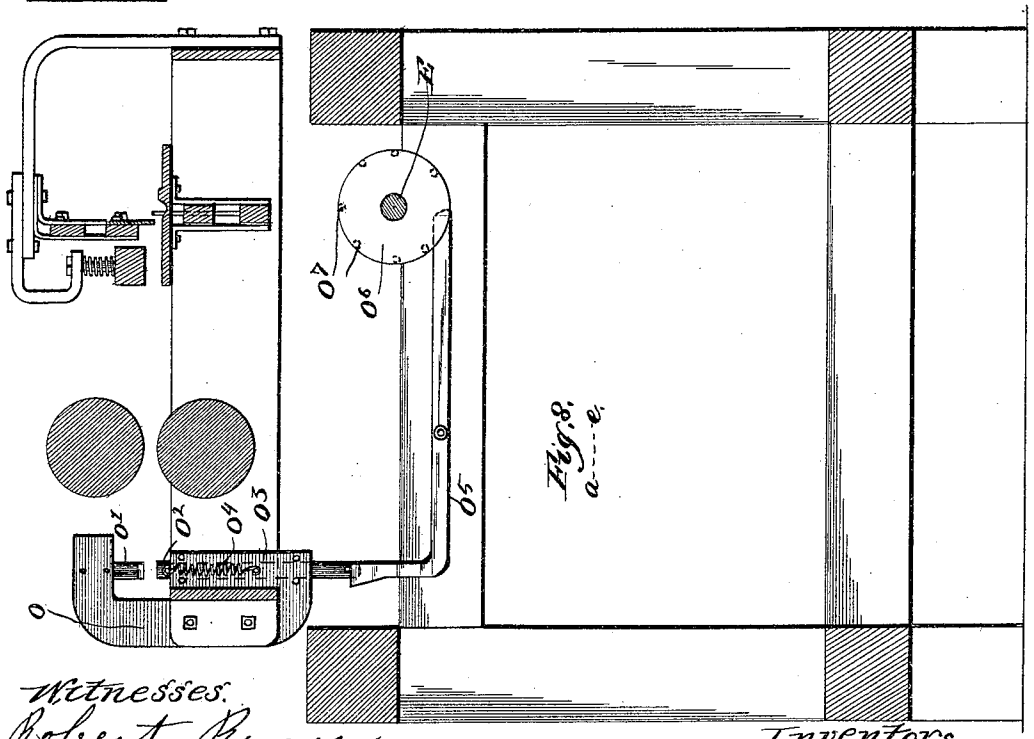

Fig. 8.

Witnesses.
Robert Ryan
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(No Model.) 9 Sheets—Sheet 7.

O. P. BRIGGS & F. L. BRYANT.

MACHINE FOR WEAVING COILED WIRE FABRIC.

No. 480,007. Patented Aug. 2, 1892.

Fig. 11.

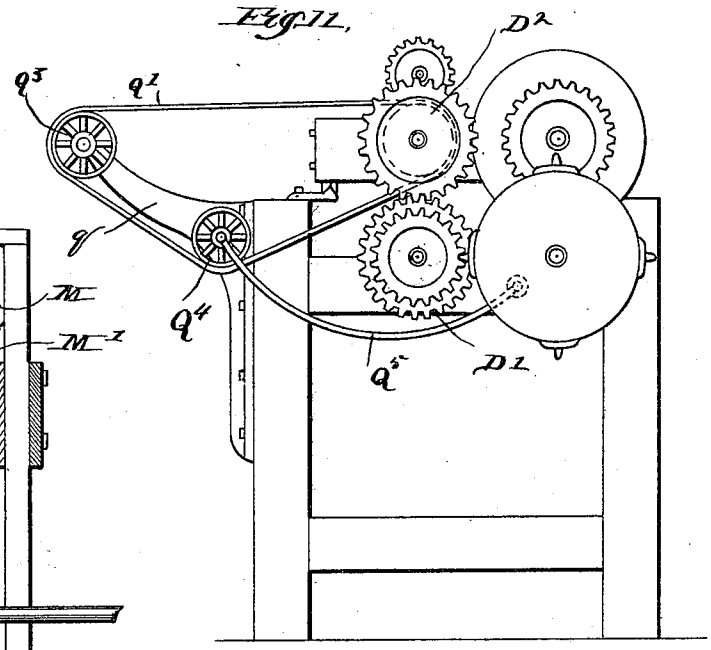


Fig. 12.

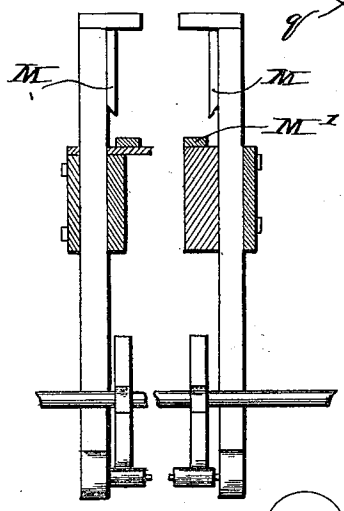


Fig. 13.

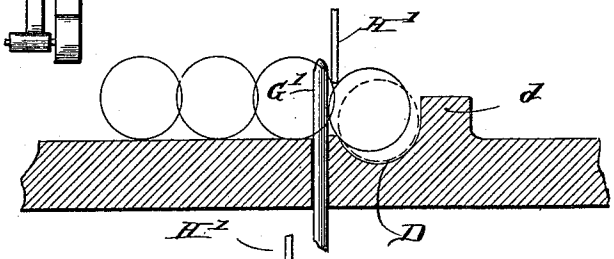
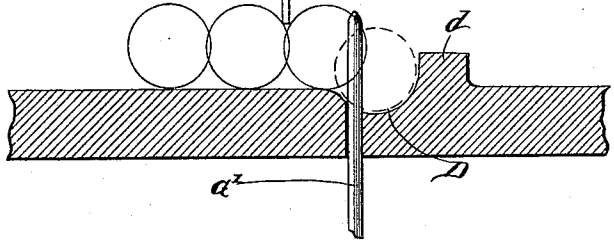


Fig. 14.



Witnesses.
Robert Ryan
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(No Model.) 9 Sheets—Sheet 8.

O. P. BRIGGS & F. L. BRYANT.

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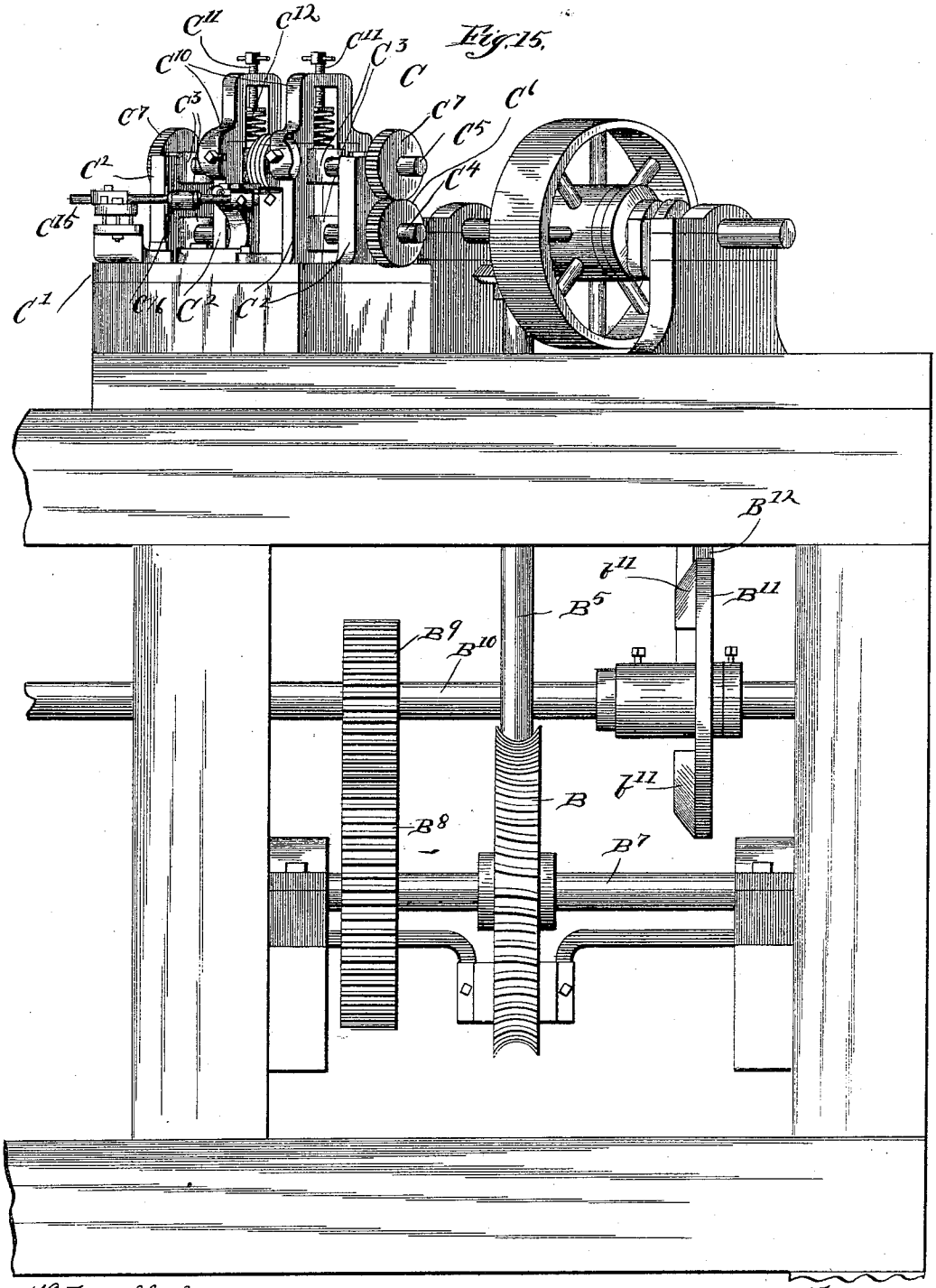

Witnesses.
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(No Model.) 9 Sheets—Sheet 9.

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MACHINE FOR WEAVING COILED WIRE FABRIC.

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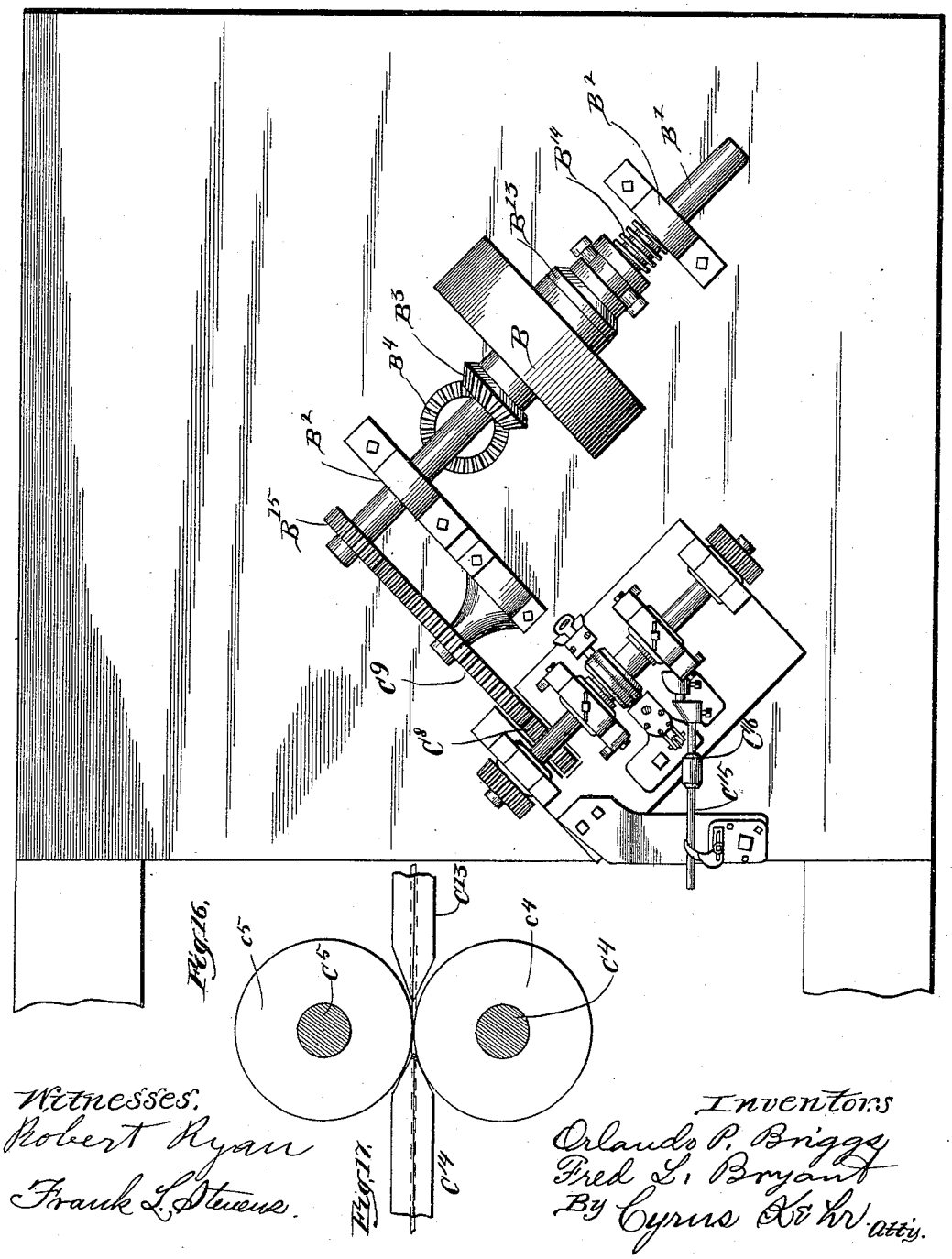

Fig. 16.

Fig. 17.

Witnesses.
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By Cyrus Miller Atty.

UNITED STATES PATENT OFFICE.

ORLANDO P. BRIGGS AND FRED L. BRYANT, OF CHICAGO, ILLINOIS.

MACHINE FOR WEAVING COILED-WIRE FABRIC.

SPECIFICATION forming part of Letters Patent No. 480,007, dated August 2, 1892.

Application filed August 29, 1891. Serial No. 404,084. (No model.)

To all whom it may concern:

Be it known that we, ORLANDO P. BRIGGS and FRED L. BRYANT, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Machines for Weaving Coiled-Wire Fabric for Bed-Bottoms; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our improvement consists in certain additions to and improvements of the machine described in Letters Patent of the United States No. 348,150, granted to Orlando P. Briggs August 24, 1886. One of the additions made to the machine described in said patent is automatic mechanism for periodically arresting the action of the fabric-shifting mechanism to allow the insertion of several coils into one coil-space to form in the fabric what is termed a "cord." Another addition to the Briggs machine is cutting mechanism at the middle of the machine for automatically transversely dividing the fabric which has been woven of a length equal to the length of two fabrics to the end that a double-length fabric need not be cut by hand or on a separate machine after being removed from the coiling-machine. Another addition to the Briggs machine consists in certain grasping and releasing mechanism for holding the last-finished or marginal coil of the fabric while a new coil is being formed and made to intertwine with the last-finished coil. In the machine illustrated in said Briggs' patent the last-finished coil hangs by gravity from the preceding coils and rests against a vertical wall and at a suitable distance above a table to allow the new coil to run forward upon said table and intertwine at each turn with the last-finished coil. This is an operative construction; but our apparatus for engaging and determining the position of the last-finished coil operates with greater precision, and therefore adapts the machine to be operated at a somewhat higher rate of speed. Among the features of variation may be mentioned the form of mechanism used for shifting the fabric longitudinally toward and from the coiler, and the specific construction of the knife-operating mechanism for cutting the coil at the end of the machine adjacent the coiler and the mechanism for intermittently operating the fabric-drawing mechanism.

In the accompanying drawings, Figure 1 is a front elevation of a machine embodying our improvement, the coiler being in part omitted. Fig. 2 is a plan of the same machine. Fig. 3 is an elevation of the end of the machine opposite the coiler or left end of the machine as viewed in Fig. 1. Fig. 4 is a vertical longitudinal section of the machine in line *a a* of Fig. 2. Fig. 5 is a section in line *a b* of Fig. 4. Fig. 6 is a section in line *a c* of Fig. 4. Fig. 7 is a section in line *a d* of Fig. 5. Fig. 8 is a section in line *a e* of Fig. 2. Fig. 9 is a detail view showing the mechanism for imparting longitudinal movement to the fabric-supporting mechanism. Fig. 10 is a detail view of the cam-wheel for suspending the operation of the fabric-shifting mechanism. Fig. 11 is an end view of the machine, illustrating the manner of controlling the reel. Fig. 12 is a detail of the trimming-knives located at the ends of the machine. Fig. 13 is a detail transverse section showing the margin of the fabric and the means for engaging and supporting the same in proper relation to the course of the coil being projected from the coiler. Fig. 14 is a similar view showing the last instead of the next to the last coil engaged by the reciprocating pins. Fig. 15 is a larger front elevation of the head of the machine, showing the coiler complete. Fig. 16 is a plan of the portion of the machine shown in Fig. 14. Fig. 17 is a detail section of the wire-forcing rolls.

In said drawings, A is a frame upon which the operative parts of the machine are supported. Said frame is twice as long as the length of an ordinary woven-wire fabric plus the space required for the coiler and gearing. If the machine be made for coiling the length of only one fabric, this frame may obviously be correspondingly shorter.

A′ is a horizontal carriage supported by wheels A^2, arranged at each corner of said

frame and resting in ways A^3, fixed upon the frame A parallel to the length of said frame. The same result may be obtained by applying the wheels A^2 to the frame A and the ways A^3 to the carriage A'. The object of said wheels and ways is to provide a limited longitudinal reciprocation of the carriage A', as and for the purposes hereinafter set forth.

B is a band-wheel mounted loosely upon a driving-shaft B', which shaft is supported in bearings B^2, suitably located upon one end of the frame A.

B^3 is a bevel-gear loosely surrounding the shaft B' and secured to the wheel B, and B^4 is a bevel-gear meshing into the bevel-gear B^3 and surrounding and keyed to the worm-shaft B^5, which worm-shaft engages the worm gear-wheel B^6 and imparts rotation to the latter. The worm-gear B^6 surrounds and is keyed to a horizontal shaft B^7, and upon said shaft B^7, at one side of the worm gear-wheel B^6 and keyed to said shaft, is a spur-gear B^8, meshing into a small spur-gear B^9, mounted upon and keyed to the horizontal shaft B^{10}. Surrounding the shaft B^{10} is a cam-wheel B^{11}, provided with two cam-faces b^{11}.

B^{12} is a clutch-lever pivoted between its ends, as at b^{12}, and having its upper end in engagement with a clutch B^{13}, which is keyed to the shaft B' and adapted to engage the band-wheel B, so that motion may be transmitted from said band-wheel to said shaft B'. The relation of said band-wheel, clutch-lever B^{12}, and cam-wheel B^{11} is such as that when the clutch B^{13} is thrown into engagement with the band-wheel B the lower end of the arm B^{12} will be in the path of the cam-faces b^{11} and ready to be moved by the latter when they pass said end. Said end may be provided with an anti-friction roller b^{13}, placed in such position as to make contact with the cam-faces b^{11}. The said clutch is held normally in engagement with said band-wheel by an expanding coiled spring B^{14}.

From the foregoing it will be seen that if the band-wheel B is rotated continuously the gears B^3 B^4, worm-shaft B^5, worm-gear B^6, shaft B^7, spur-gears B^8 and B^9, shaft B^{10}, and cam-wheel B^{11} will be operated continuously, while the clutch-lever B^{12}, clutch B^{13}, and shaft B' will be operated intermittently, and that the interval during which the shaft B' rotates will hold the same ratio to the interval during which it does not rotate as the ratio of the spaces between the cam-faces b^{11} holds to the length of said faces. For example, if the length of each cam-face is only one-tenth of the space between the two cam-faces the interval during which the shaft B' does not rotate will be only one-tenth as long as the period during which it does rotate. The object in providing these continuous and intermittent movements is to afford means for periodically arresting the action of the coiler and at the same time providing continuously-moving parts, which may be treated as a source of movement for other portions of the machine, which are to operate during the suspension of the operation of the coiling mechanism.

C is the coiler. As any suitable form of coiler may be used in connection with the other parts of the machine, and as the particular coiler illustrated in this specification is not our invention jointly, but contains improvements which are the invention of Fred L. Bryant, one of the parties hereto, it is deemed sufficient to herein describe said coiler only as to its general features. From the base C' rise four bearing-posts C^2, each of which has extending from its upper end downward through its middle a space in which are the bearing-blocks C^3. Said bearing-blocks C^3 form bearings for the horizontal parallel shafts C^4 and C^5, C^4 designating the lower of said shafts and C^5 the upper of said shafts. Said shafts are geared to each other by spur-gears C^6 and C^7, applied, respectively, to the shafts C^4 and C^5.

C^8 is a spur-gear located upon the shaft C^4 and meshing into the other spur-gear C^9, suitably supported between the shafts C^4 and C^5, and in turn meshing into a spur-gear B^{15}, mounted upon the shaft B'. Upon the middle of the shafts C^4 and C^5 are located wire-forcing rolls c^4 and c^5, respectively, which rolls bear upon each other and are turned when said shafts are rotated. The two middle posts C^2 terminate above in arches C^{10}, and a vertical screw C^{11} extends downward through each such arch and bears upon an expanding spring C^{12}, which spring in turn bears upon the bearing-block C^3, located in the adjacent bearing-post C^2. The lower bearing-blocks C^3 have fixed positions in the lower portions of the channels or vertical spaces in the posts C^2, so that the positions of the spur-gears C^6 and the wire-forcing roll are unyielding. Driving the screw C^{11} downward will cause the spring C^{12} to press the adjacent upper bearing-block C^3 downward upon the shaft extending through said bearing-block, and said shaft will be pressed down so that the upper wire-forcing roll and the spur-gears upon said shafts will be forced together.

C^{13} is a guide for leading the wires f to the wire-forcing rolls, and C^{14} is a guide to lead the wire from the forcing-rolls to the coil-forming spindle C^{15}. Said coil-forming spindle has around it a spiral passage and a shell C^{16}. The wire is forced through said spiral passage between said spindle and said shell and is thereby transformed into a coil, which passes off over the end of the spindle C^{15} into the channel D, to be hereinafter described.

D is a channel formed in the upper portion and lengthwise of the carriage A' in line with the spindle C^3, so as to receive the coil projected from the coiler C, and at the side of said channel is a wall d to aid in retaining said coil.

D' is a roller mounted upon and extending

lengthwise of the frame A′ at the rear of the channel D and arranged to be rotated, as will be hereinafter described.

D^2 is a roller located above and parallel to the roller D′ and having its journals resting loosely in vertical guideways D^3, so that it will rest by gravity upon the roller D′ or upon the woven-wire fabric F when the latter lies between said rollers. The roller D′ is rotated in the direction indicated by the arrow, and, together with the roller D^2, serves to draw the coiled fabric away from the line in which the coils are formed. A non-rotary bar or plate may be substituted for the roller D^2, as is described in said Briggs patent. The surface of the roller D′ may also be provided with pins d' for positively engaging the fabric.

The shaft B^{10}, which has already been described as rotating continuously, has surrounding it loosely the spur-gear B^{14}, and adjacent to said spur-gear a clutch B^{15} surrounds said shaft and is adapted to engage with said spur-gear and cause the latter to receive rotation from said shaft. Beneath, parallel to, and extending along the entire length of the carriage A′ is a shaft E, which receives motion from the spur-gear B^{14} through the spur-gear E′, with which it meshes and which surrounds and is keyed to the shaft E. The clutch B^{15} is normally in engagement with the spur-gear B^{14}, so that the shaft E is normally in rotation and ceases to rotate only when said clutch is disengaged from the spur-gear B^{14}. A clutch-lever B^{16} engages said clutch B^{15} and is pivoted between its ends at b^{16}, and a contracting coiled spring B^{17} is joined by one end to said clutch-lever and by the other end to a stationary portion of the machine in such relation as to normally hold the clutch B^{15} in engagement with the spur-gear B^{14}.

B^{18} is a cam-wheel surrounding and keyed to the shaft B^{10} and having the cam projections b^{18}.

B^{19} is a relatively large ratchet-wheel located beneath the cam-wheel B^{18} and mounted around a shaft B^{20}, upon which shaft is mounted a cam-wheel B^{21}, having the laterally-directed cam face or faces b^{21}. A shiftable pawl b^{19} is arranged between said ratchet-wheel and said cam-wheel B^{18}, with one end bearing upon the periphery of said ratchet-wheel and the other end drawn into the path of the cam projections b^{18} by a coiled spring s^{19}. (See Figs. 4 and 7.) A gravity-pawl p^{19} also bears upon the periphery of said ratchet-wheel adjacent to the pawl b^{19} and prevents reverse movement of said ratchet-wheel and the parts thereto connected. From the foregoing it will be seen that a series of rotations of the shaft B^{10} will rotate the ratchet-wheel B^{19}, shaft B^{20}, and cam-wheel B^{21} sufficiently to bring one of the cam-faces b^{21} into engagement with the free end of the clutch-lever B^{16}, whereby said end is forced outward from said cam-wheel B^{21}, while the opposite end of said clutch-lever is forced away from the spur-gear B^{14}, whereby the clutch B^{15} is drawn out of engagement with the spur-gear B^{14}, so that said spur-gear becomes stationary and movement is no longer transmitted to the spur-gear E′ and shaft E.

The cam-faces b^{21} may be secured to the cam-wheel B^{21} in such manner as to be both removable and readily adjustable, to the end that the number of cords in a fabric may be increased or decreased and the spaces between the cords varied. For example, if the said cam-faces are equally spaced upon said cam-wheel the cords in the fabric will be equally spaced; but if two or more of said cam-faces are placed near each other in adjacent radii of the cam-wheel the cords in the fabric will be correspondingly grouped. Thus if it is desired to place in the fabric first one cord and later two cords standing near each other a cam-face b^{21} is first located alone and then two other cam-faces b^{21} are located near each other at a suitable distance from the first of said cam-faces. Said cam-faces are thus made removable and adjustable by being secured to said cam-wheel B^{21} by a bolt B^{22}, extending from each such cam-face through a slot b^{22} in said wheel.

At the left end or foot of the machine a mutilated gear E^3 surrounds and is secured to the shaft E. Said mutilated gear has upon its periphery four equidistant teeth e^3. The roll D′ has at the foot end of the machine a spur-gear D^4, which meshes into an idle-gear D^5, which is secured to a fixed horizontal shaft projecting from the foot end of the carriage A′. Upon the same shaft and joined to the spur-gear D^5 is a spur-gear D^6, which is in plane with the mutilated gear E^3 and of proper diameter to have its teeth reach into the path of the teeth e^3 of said mutilated gear. The rolls D′ and D^2 may or may not be provided with intermeshing gears D^7. It will now be seen that with each quarter rotation of the mutilated gear E^3 the rolls D′ and D^2 will be rotated through a few degrees. The extent of this rotation of said rolls is sufficient to move a point in the circumference of one of said rolls through a distance equal to the diameter of one of said coils of the fabric, the precise distance being attained by establishing the proper ratio of difference between the mutilated gear E^3 and the spur-gear D^4. The length of the intervals between these partial rotations of the rolls D′ and D^2 is dependent upon the velocity of the mutilated gear E^3, and this velocity is dependent upon the ratio of difference between the mutilated gear E^3 and the gears intervening between said mutilated gear and the band-wheel B.

In starting the operation of the machine the fabric F is managed by the operator until enough has been formed to be properly engaged by the mechanism of the machine. Then the marginal or last-finished coil is held parallel to and partially in the groove D by the pins G′ of the pin-bars G and one of the

knife-bars H, the pins G′ of one of said pin-bars standing in the coil next to the marginal or final coil and bearing against both of said coils, and the lower edges of the sections H′ of one of the knife-bars H being pressed into the groove or channel between the final coil and the coil next to the final coil, and the rolls D′ and D² tending to draw the fabric away from said pin-bar and knife-bar. (See Fig. 7.) By this means every marginal coil is brought with great accuracy into the desired relation with the coiling-axis, or the line which coincides with the axis of the new coil as the latter is being projected from the coiler, so that every turn of the marginal coil is in the precise position best adapted to allow the new coil to intertwine at each rotation with said turn. The groove or channel D is thus in accurate relation with every turn of the final coil, and the new coil in being projected forward through said groove is guided at every turn into precise relation with each turn of the final coil. As soon as a coil is completed and cut adjacent to the coiler the pin-bar G and the knife-bar H then in engagement with the fabric must be released, in order that the fabric may be drawn away from the coiling-axis by the fabric-drawing mechanism, and at the same time the other pin-bar G and the other knife-bar H must be brought into proper relation to engage the coil succeeding the one which was last engaged by said pin-bar and knife-bar. This is accomplished by alternating the elevation of said pin-bars with one another and said knife-bars with one another. Immediately after the last-finished coil is cut adjacent to the coiler, the pin-bar then in engagement is lowered and the knife-bar then in engagement is raised, while immediately following these changes, the other pin-bar ascends and the other knife-bar descends, so that both move into the path of the coil succeeding the one last engaged and arrest the movement of said first-mentioned coil, whereby the movement of the entire fabric is arrested.

As an alternative construction the pins G′ may rise through the carriage A′ into the channel D and engage only the marginal coil at the side of the wire of the latter and hold said coil in fixed relation to said groove, as shown in Fig. 14, while the knife-bars are located a little rearward, so that the knife-sections H′ may press between the marginal coil and the coil next behind the marginal coil. When this construction is adopted, the forward end of the new coil will have to reach around each turn of the marginal coil and also around each pin G′, as indicated by the dotted circle in Fig. 13.

The upper pin-bar G is located beneath and has its pins G′ rising through the openings *g* in the top of the carriage A′. The lower pin-bar G is located beneath the upper pin-bar and has its pins G′ rising through openings *g′* in the upper pin-bar between the pins G′ of the upper pin-bar and through openings *g* in the top of the carriage A′. Each of the pin-bars G has a vertical support resting upon a cam G² on the shaft E, the extended portions of the cams receiving the supports from one pin-bar alternating in radial relation with the extended portion of the cams supporting the other pin-bar, so that as the shaft E is rotated the pin-bars G are alternately elevated, whereby the pins on the respective bars G are alternately extended upward through the top of the carriage A′ into the path of the coils of the fabric, one set of said pins always rising through the top of said carriage, while the other set of said pins is being drawn downward through said top.

G³ G³ are depending arms attached by their upper ends to the carriage A and close to the sides of the pin-bars and serve to so confine the bars G as to allow the latter to move only in a vertical plane. (See Figs. 7 and 8.)

The knife-bars H are placed one above the other and secured to the brackets I by means of links H², one end of each link being hinged to one of said brackets and the other end being hinged to one of said bars, whereby said bars may be moved in a vertical plane after the manner of a parallel ruler. In this relation both knife-bars will, unless restrained descend and rest between the coils of the fabric F or upon the top of the carriage A′. The mechanism controlling these bars allows them to thus alternately descend by gravity.

A spindle A⁴ extends outward from the foot end of the carriage A′ parallel to the shaft E, and bears a spur-gear H³ and a cam H⁴, having cam-faces *h⁴* on the side toward the carriage A′, one of said cam-faces being at a sufficient distance from the spindle A⁴ to make contact at each rotation with the end of the upper knife-bar H, and the other of said cam-faces being at a sufficient distance from said spindle A⁴ to make contact with the other end of the other knife-bar H at each rotation, and said cam-faces being located at opposite sides of the spindle A⁴, so that while one is in engagement with its knife-bar the other will be out of engagement with its knife-bar and allow the same to rest by gravity between the coils of the fabric, as already described.

The mechanism leading from the shaft E to the pin-bars G and from said shaft to the knife-bars H and from said shaft to the rolls D′ and D² are properly timed with reference to each other to produce the necessary simultaneous action.

The manner of periodically shifting the carriage A′ toward and from the coiler is in the main the same as described in said Briggs patent. An arm A⁵ extends from said carriage toward the shaft E and there supports two rollers *a⁵*, one extending to each side of the periphery of a cam J and each presenting to said cam a face to which the line of movement of the carriage is substantially perpendicular. Said cam J differs from the cam shown by said Briggs patent in that it is du-

plex, being composed of two disk-form sections J′, each loosely surrounding and separately adjustable upon the shaft E by means of set-bolts J^2 and having on the face toward the adjacent roller a^5 one or more cam-faces j', the cam face or faces on the one section J′ alternating in radial spacing with that of those on the other section. The sections J′ of the duplex cam J are separated sufficiently to cause each roller to be pressed laterally by the passing of the cam-face on the adjacent cam-section, while the other roller is drawn into the path of a cam-face on the other cam-section, so that when said other cam-face J′ is rotated past the second roller the movement is reversed. Thus the carriage A′ is alternately shifted upon the ways A^3 a distance equal to the difference between the distance between the rolls a^5 and the thickness of the cam J from the plane of the cam-faces at one side of the cam to the plane of the cam-faces at the other side of said cam. This distance may be varied by shifting the cam-sections of the cam J. The precise path of reciprocation of the carriage A′ may also be varied in location by bodily shifting the cam J toward and from the head of the machine upon the shaft E. The distance through which said carriage reciprocates should be equal to about one-half the distance between the turns of the coils on the fabric F, in order that such turns may always be brought out of the spiral path through which the new coil is projected to the end that the new coil may run forward in its path and intertwine at each turn with the marginal or last-finished coil without hitting the latter. The radial position of the cam-faces j' with reference to the shaft E is to be so adjusted as to cause one of said cam-faces to operate immediately after the operation of the knife which cuts the coil adjacent to the coiler.

L is a knife for cutting the wire adjacent to the coiler as often as a coil is completed.

L′ is a stationary block over which the wire passes and against which the wire is cut by said knife L. Said knife L is attached to a vertically-reciprocating bar L^2, confined above in the guide L^3 and extending below through a guide-plate L^4. The lower end of said bar is surrounded by an expanding coiled spring L^5, which has its lower end bearing upon said guide-plate and its upper end resting against a shoulder l^2, and the expansion of said spring keeps said bar and said knife normally elevated away from the block L′. From a point below the level of the shaft B^{10} an anti-friction roller l^6 is supported by said bar L^2 and extends laterally beneath a cam L^6, surrounding the shaft B^{10}. As the extended portion of said cam passes between said shaft B^{10} and said roller l^6 the latter and the bar L^2 and knife L are forced downward, so as to cut, and when said extended portion is passed out of engagement with said roller the latter and said bar and knife are allowed to rise in response to the expansion of said spring L^5. The extended portion of said cam L^6 is so turned radially upon the shaft B^{10} as to cause the knife L to operate immediately after the forcing-rolls of the coiler have rotated a sufficient number of times to project a coil of the desired length.

M M are trimming-knives similar to the cutting-knife L, one being located at each end of the machine back of the pin-bars G and knife-bars H. A block M′, similar to the block L′, is arranged in opposition to each knife M. Each knife M is supported by a vertically-reciprocating bar M^2 and extends through a guideway M^3 above and through the guide-plate L^4 below and is surrounded at its lower end by an expanding spring M^4, which rests at its lower end upon the guide-plate L^4 and at its upper end against a shoulder m^3. From a point on said bar M^2 below the level of the shaft E a roller M^5 extends laterally beneath the cam M^6, which has four extensions m^6, which in passing engage the roller M^5 and depress it and the bar M^2 and knife M, and when passed said roller is released, so that it and said bar and knife may rise in response to the expansion of the spring M^3. The function of said knives M is to cut each coil of the finished fabric as the latter passes toward the rollers D′ and D^2, in order that the fabric may be trimmed even at its ends.

The machine illustrated by the drawings being of sufficient length to coil a fabric twice as long as is needed for one bed-bottom, said fabric must be cut at or near the middle, and in order that the same need not be done after the removal of the fabric from the machine we have devised automatic cutting mechanism to cut the fabric at or near the middle while the fabric is passing away from the machine. At the middle of the rear of the carriage A′ a knife-arch O rises from said frame and carries the downward-directed knife O′. The upright portion of said arch is flat and has one edge directed forward and the other rearward, in order that the two sections into which the fabric is being cut need separate only a little to pass said arch.

O^2 is a vertically-reciprocating knife confined in a guideway O^3 on the carriage A′ and held normally in the elevated position by a contracting-spring O^4, having its upper portion attached to said knife and its lower end to a stationary portion of the carriage A′. The lower end of said knife is attached to one end of a tilting lever O^5, the other end of which lever extends into the path of cam-pins O^7 upon a cam-wheel O^6, surrounding the shaft E. Said cam-pins depress the free end of the lever O^5, and thus cause the other end to raise the knife O^2, and said cam-pins are preferably of such number as will cause said knife to make a separate cut for each coil of the fabric as the latter passes said knife.

We have found it advantageous to use a guide-bar P immediately behind the knife-bars H and pin-bars G and above the fabric F and the top of the carriage A′ to hold the fabric down uniformly in the same plane im-

mediately above the top of the carriage A′, in order that the fabric may always be in the same relation to the pins G′ and the knife-edges of the knife-bars H. Said bar P is supported from above by attachment to the arches I by bolts P′, passing loosely through said arch and surrounded by an expanding coiled spring, which causes said bar to bear slightly and yieldingly upon the fabric F.

Q is a reel located at the rear of and parallel to the rollers D′ and D^2 and suitably supported from the frame A by brackets *q* or otherwise, Figs. 2 and 11, which may be used to receive the fabric F after leaving said rolls D′ and D^2. Said reel is turned by a belt Q′, surrounding a band-wheel Q^2 on the shaft of the roll D^2 or D′, and the band-wheel Q^3, surrounding the shaft of the reel Q. As a given velocity of the reel Q will gradually increase the drawing of the reel upon the fabric as the quantity of fabric upon the reel increases, it is desirable that the velocity of the reel be gradually reduced as the work progresses. Provision is made for this by arranging the belt Q′ so loosely as to cause it to slip when the desired tension of the fabric between the rolls and the reel Q has been attained and to again turn said reel when sufficient of the fabric has passed between the rolls D′ and D^2 to again slacken the tension of the fabric between said rolls and said reel. A uniform tension of the belt Q′ is attained by means of the tightening-wheel Q^4, which rests idly upon the belt Q′ and is confined in such position by an arm Q^5, journaled at one end to said wheel Q^4 and hinged by the other end to the frame A. It will be seen that the reel Q may be omitted and the fabric allowed to fall upon the floor or upon any other support that may be arranged at the rear of the machine. It will be seen, also, that when the reel Q and the rolls D′ and D^2 are present in the machine there is a double fabric-drawing mechanism, but that the reel Q has no influence in drawing the fabric at the coiling-axis, for the rolls D′ and D^2 are positively geared to the shaft E and have therefore a positive and restricted motion, and the fabric can move away from the coiling-axis only as permitted and caused by the rolls D′ and D^2. If the rolls D′ and D^2 should be omitted and the reel Q subsequently belted to some other moving portion of the machine, then said reel would draw the fabric directly from the coiling-axis. We have also in practice allowed the fabric F to hang by gravity directly over the rear of the machine without engagement by the rolls D′ D^2 and shift away from the coiling-axis as often as released by the pins G′ and knife-edges H′; but this means of operating is not as satisfactory as mechanism which acts with greater force and greater uniformity. It will be seen, also, that two distinct mechanisms are provided for engaging and releasing the marginal coil and that each of these mechanisms is duplex. The pins G′ and the bars G, supporting said pins, are in themselves a mechanism for grasping and releasing the marginal coil, as there are two bars each having its own set of pins alternating in elevation and engagement. Hence this mechanism is duplex. Each of these pin-bars and the pins thereon constitutes a reciprocating mechanism for engaging and releasing the marginal coil. It is to be noted, also, that the marginal coil is engaged by the pins G′ in either of the arrangements shown by Figs. 13 and 14. The bars H and the knife-edges thereon constitute a mechanism for engaging and releasing the marginal coil, and they are reciprocating mechanism for this purpose, and each such bar and the knife-edges thereon constitute a reciprocating mechanism for engaging and releasing the marginal coil.

We claim as our invention—

1. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a stationary coiler, a longitudinally-movable carriage in line with said coiler, fabric engaging and releasing mechanism supported by said carriage, and trimming mechanism supported upon the ends of said carriage and suitably connected with the driving mechanism of the machine, substantially as shown and described.

2. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a stationary coiler, of a longitudinally-movable carriage in line with said coiler, fabric engaging and releasing mechanism supported by said carriage, and trimming mechanism supported by said carriage at the ends and at the middle thereof and suitably connected with the driving mechanism of the machine, substantially as shown and described.

3. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a carriage arranged in line with said coiler and automatically-reciprocating devices supported by said carriage for engaging and releasing the marginal coil of the fabric, the reciprocation of said devices being toward and from said marginal coil, substantially as shown and described.

4. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a carriage arranged in line with said coiler, reciprocating mechanism supported by said carriage for engaging and releasing the marginal coil of the fabric, and mechanism also supported by said carriage for drawing the fabric from said reciprocating, engaging, and releasing mechanism, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

5. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a series of pins for engaging the marginal coil of the fabric at the side of the wire of said coil toward said fabric, said pins being suitably connected to a part of the machine periodically reciprocating in a direction parallel to the coiling-axis, whereby the sides

of said pins and said coil are reciprocated in a direction parallel to the coiling-axis, substantially as shown and described.

6. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a series of pins arranged to engage the marginal coil of the fabric at the side of the wire of said coil toward said fabric, and a support for said pins, and mechanism for periodically reciprocating said support in a direction parallel to the coiling-axis and subsequently in a direction at right angles to the coiling-axis, substantially as shown and described.

7. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a series of pins for engaging the marginal coil of the fabric at the side of the wire of said coil toward said fabric, said pins being suitably connected to a part of the machine periodically reciprocating in a direction parallel to the coiling-axis, whereby the sides of said pins and said coil are reciprocated in a direction parallel to the coiling-axis, and a reciprocating knife-edge for engaging the marginal coil, and automatic mechanism for actuating said knife-edge, substantially as shown and described.

8. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with a coiler, of a series of pins arranged to engage the marginal coil of the fabric at the side of the wire of said coil toward said fabric and a support for said pins, and mechanism for periodically reciprocating said support in a direction parallel to the coiling-axis and subsequently in a direction at right angles to the coiling-axis, and a reciprocating knife-edge for engaging the marginal coil, and automatic mechanism for actuating said knife-edge, substantially as shown and described.

9. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of automatically-reciprocating devices for engaging the marginal coil of the fabric at the side of the wire of said coil toward the fabric and holding the same in fixed relation to the coiling-axis while a new coil is being projected, the reciprocation of said devices being toward and from said marginal coil, substantially as shown and described.

10. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of a support for the coil being projected from the coiling mechanism and reciprocating mechanism for engaging the marginal coil of the fabric at the side of the wire of said coil toward said fabric and holding the same in a fixed position adjacent to the support for the new coil, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

11. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of a channel for the coil being projected from the coiling mechanism and reciprocating mechanism for engaging the marginal coil of the fabric at the side of the wire of said coil toward the fabric and holding the same in a fixed position adjacent to the channel for the new coil, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

12. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of a channel for the coil being projected from the coiling mechanism and reciprocating mechanism located at a higher level than said channel for engaging the marginal coil of the fabric at the side of the wire of said coil toward the fabric and holding the same in a fixed position adjacent to the channel for the new coil, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

13. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a channel for receiving the new coil and reciprocating mechanism for engaging the marginal coil of the fabric at the side of the wire of said coil toward the fabric and holding the same in a fixed position adjacent to said channel, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

14. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism and means for drawing the fabric away from the coiling-axis, of reciprocating mechanism for engaging the marginal coil of the fabric and holding the same in a fixed position while a new coil is being projected from the coil-forming mechanism, the reciprocation of said mechanism being toward and from said marginal coil, substantially as shown and described.

15. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with mechanism for forming the coils, of means for drawing the fabric away from the coiling-axis and a series of movable pins adapted to engage the marginal coil of the fabric while a new coil is being formed and release the same and engage the new marginal coil of the fabric prior to the forming of a second new coil, substantially as shown and described.

16. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two series of movable pins adapted to alternately engage the marginal coil of the fabric while a new coil is being formed, substantially as shown and described.

17. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of a reciprocating pin-bar and a series of pins located upon said pin-bar and adapted to engage the marginal coil of the fabric at the side of the wire

of said coil toward the fabric, substantially as shown and described.

18. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with mechanism for forming the coils, of a reciprocating pin-bar and a series of pins supported by said pin-bar and adapted to engage the marginal coil of the fabric at the side of the wire of said coil toward the fabric, and a coil-receiving channel adjacent to said pins, substantially as shown and described.

19. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars, each bearing a series of pins adapted to alternataly engage the marginal coil of the fabric, substantially as shown and described.

20. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars, each bearing a series of pins adapted to alternately engage the marginal coil of the fabric, and a coil-receiving channel located adjacent to said pins, substantially as shown and described.

21. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of an automatically-reciprocating knife-bar adapted to engage the marginal coil of the fabric at the side of said coil toward the fabric, substantially as shown and described.

22. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a knife-bar for engaging the marginal coil of the fabric at the side of said coil toward the fabric, and a coil-receiving channel located adjacent and parallel to said knife-bar, substantially as shown and described.

23. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two automatically-reciprocating knife-bars adapted to alternately engage the marginal coil of the fabric at the side of said coil toward the fabric, substantially as shown and described.

24. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two automatically-reciprocating knife-bars adapted to alternately engage the marginal coil of the fabric at the side of said coil toward the fabric, and a coil-receiving channel located adjacent and parallel to said knife-bars, substantially as shown and described.

25. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of an automatically-reciprocating knife-bar adapted to engage the marginal coil of the fabric at the side of said coil toward the fabric, and automatic mechanism for drawing the fabric from the coiling-axis, substantially as shown and described.

26. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a knife-bar for engaging the coil of the fabric at the side of said coil toward the fabric, and a coil-receiving channel located adjacent and parallel to said knife-bar, and automatic mechanism for drawing the fabric from the coiling-axis, substantially as shown and described.

27. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two automatically-reciprocating knife-bars adapted to alternately engage the marginal coils of the fabric at the sides of said coils toward the fabric, and automatic mechanism for drawing the fabric from the coiling-axis, substantially as shown and described.

28. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two automatically-reciprocating knife-bars adapted to alternately engage the marginal coil of the fabric at the side of said coil toward the fabric, and a coil-receiving channel located adjacent and parallel to said knife-bars, and automatic mechanism for drawing the fabric from the coiling-axis, substantially as shown and described.

29. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a series of movable pins adapted to engage the marginal coil of the fabric, automatic mechanism for moving said pins, and an automatically-reciprocating knife-bar adapted to co-operate with said series of pins in engaging and retaining the marginal coil in a fixed position, substantially as shown and described.

30. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a reciprocating pin-bar and a series of pins supported by said pin-bar and adapted to engage the marginal coil of the fabric, an automatically-reciprocating knife-bar adapted to co-operate with said pins in engaging the marginal coil of the fabric, and a coil-receiving channel adjacent and parallel to said pins and said knife-bar, substantially as shown and described.

31. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars, two series of pins, one supported by one of said pin-bars and the other by the other of said pin-bars and adapted to alternately engage the marginal coil of the fabric, and an automatically-reciprocating knife-bar adapted to co-operate with said pins in engaging the marginal coil of the fabric, substantially as shown and described.

32. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars, two series of pins, one supported by one of said pin-bars and the other by the other of said pin-bars and adapted to alternately engage the marginal coil of the fabric, and an automatically-reciprocating knife-bar adapted to co-operate with said pins in engag-

ing the marginal coil of the fabric, and a coil-receiving channel located adjacent and parallel to said pins and knife-bar, substantially as shown and described.

33. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars and two series of pins, one being supported by one of said pin-bars and the other by the other of said pin-bars and adapted to alternately engage the marginal coil of the fabric, and two automatically-reciprocating knife-bars adapted to alternately co-operate with one of said series of pins in engaging the marginal coil of the fabric and retaining the same in a fixed position, substantially as shown and described.

34. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two reciprocating pin-bars and two series of pins, one being supported by one of said pin-bars and the other by the other of said pin-bars and adapted to alternately engage the marginal coil of the fabric, and two automatically-reciprocating knife-bars adapted to alternately co-operate with one of said series of pins in engaging the marginal coil of the fabric and retaining the same in a fixed position, and a coil-receiving channel located parallel and adjacent to said pins and knife-bars, substantially as shown and described.

35. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a series of pins for engaging the marginal coil of the fabric, and means for shifting said series of pins in a direction parallel to said marginal coil, and an automatically-reciprocating knife-bar adapted to engage the marginal coil of the fabric, substantially as shown and described.

36. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a series of pins for engaging the marginal coil of the fabric, and means for shifting said series of pins in a direction parallel to said marginal coil, and an automatically-reciprocating knife-bar adapted to engage the marginal coil of the fabric, and a coil-receiving channel located adjacent and parallel to said pins and knife-bar, substantially as shown and described.

37. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of fabric supporting and shifting mechanism, automatic mechanism for operating said fabric supporting and shifting mechanism, and automatic mechanism for at intervals disengaging said mechanism for operating said fabric supporting and shifting mechanism, substantially as shown and described.

38. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of reciprocating pins for holding the marginal coil while the new coil is being formed and intertwined therewith and then releasing said marginal coil, automatic mechanism for shifting said pins, and automatic mechanism for periodically arresting the action of the mechanism for shifting said pins, whereby said pins are left in engagement with the marginal coil while an increased number of new coils are projected into the same coil-space and made to intertwine with the marginal coil, substantially as shown and described.

39. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of pins and a knife-bar for engaging the marginal coil and retaining the same in a fixed position while a new coil is being formed and made to intertwine with said marginal coil, automatic mechanism for moving said pins and knife-bar out of engagement with said marginal coil and into engagement with the new marginal coil, and automatic mechanism for preventing said first-mentioned mechanism for causing said pins and knife-bar to disengage said marginal coil until an increased number of new coils have been projected into the same coil-space and made to intertwine with said marginal coil, substantially as shown and described.

40. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a series of pins for engaging the marginal coil of the fabric, a pin-bar supporting said pins, and a shaft extending parallel with said pin-bar and having cams for reciprocating said pin-bar, substantially as shown and described.

41. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of two pin-bars, each bearing a series of pins adapted to alternately engage the marginal coil of the fabric, and cams for engaging said pin-bars and alternately moving said series of pins into engagement with the final coil of the fabric, substantially as shown and described.

42. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism, of a suitable support for the fabric and a knife-bar for engaging the final coil of the fabric and holding the same in a fixed position, said knife-bar being secured to a relatively fixed support, so as to move by gravity in one direction with reference to the marginal coil of the fabric, and a cam for periodically forcing said knife-bar in the opposite direction with reference to said marginal coil, substantially as shown and described.

43. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with the coil-forming mechanism and a suitable support for the fabric, of two knife-bars arranged to alternately move by gravity in one direction with reference to the marginal coil of the fabric, and a cam for alternately moving said knife-bars in the opposite direction with reference to the marginal coil of the fabric, substantially as shown and described.

44. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism and mechanism for carrying the fabric transversely, of automatic cutting mechanism located between the ends of the space to be occupied by the fabric, substantially as shown and described.

45. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with automatic mechanism for engaging the marginal coil of the fabric and a relatively fixed wall located at one side of the path of the fabric, of a yielding presser-bar O, located at the side of the fabric opposite said relatively stationary wall and having a flat face to press upon said fabric to keep the latter in the same plane, substantially as shown and described.

46. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a longitudinally-shiftable carriage for receiving the fabric, said carriage having two faces to which the line of movement is substantially perpendicular, two cam-faces, and a suitable support and suitable driving mechanism therefor, one pair of said faces extending between and being adapted to be engaged by the other of said pairs of faces, and said faces being adjustable with reference to each other, substantially as shown and described.

47. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination, with coil-forming mechanism, of a shiftable fabric-support adapted to be shifted toward and from the coil-forming mechanism and having faces to which the line of movement of said support is substantially perpendicular, and a duplex adjustable cam J, arranged to make engagement with said faces, and automatic means for rotating said cam, substantially as shown and described.

48. In a machine for weaving coiled-wire fabric for bed-bottoms, the combination of automatic means for coiling the wire and passing the running wire through the final coil of the fabric, automatic means for feeding the fabric, and automatic means for intermitting this feed whenever extra wires are to be inserted into any part of the fabric, substantially as shown and described.

In testimony whereof we affix our signatures, in presence of two witnesses, this 22d day of August, 1891.

ORLANDO P. BRIGGS.
FRED L. BRYANT.

Witnesses:
AMBROSE RISDON,
CHAS. L. AMES.