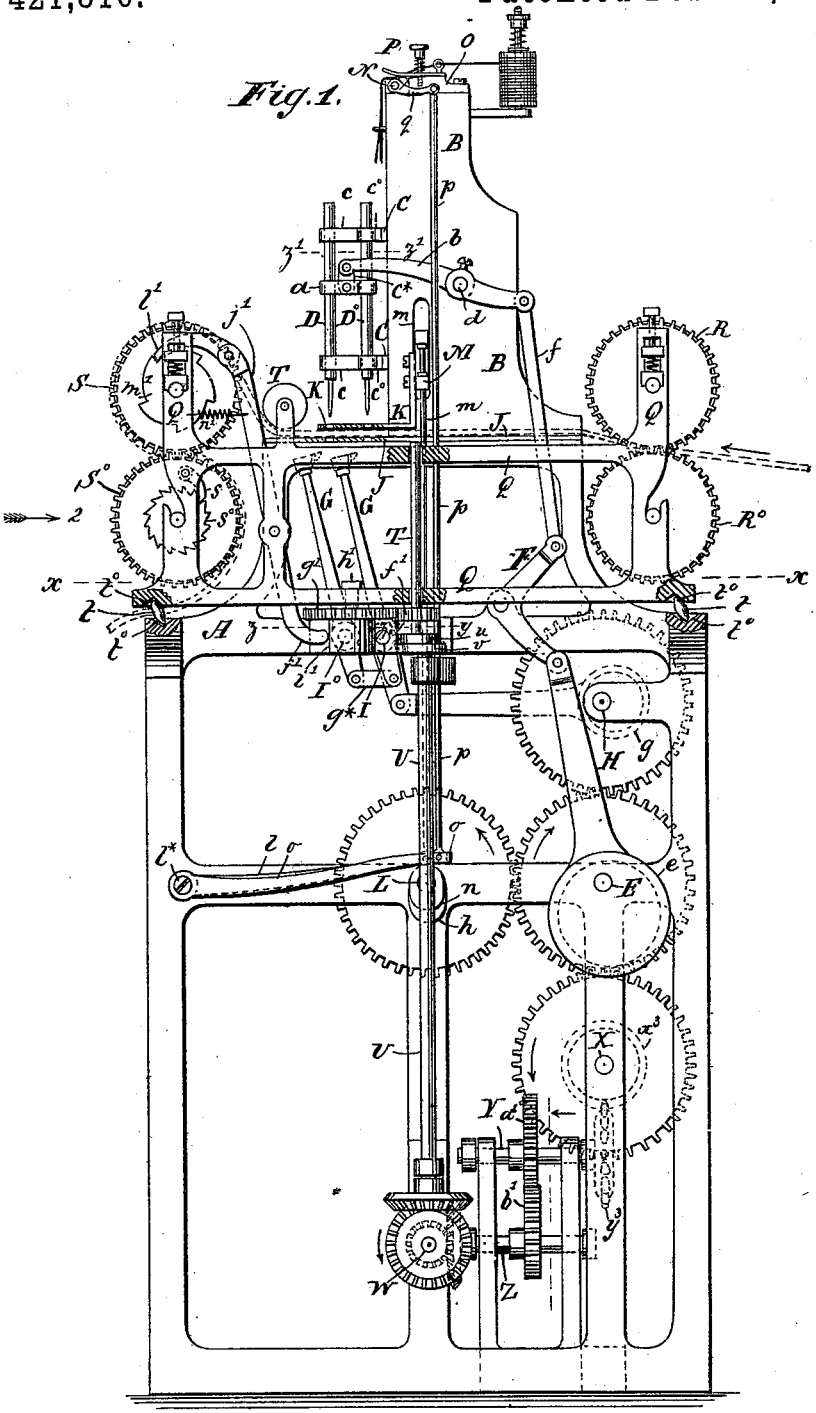
(No Model.) 3 Sheets—Sheet 1.

D. H. COLES.

SEWING MACHINE.

No. 421,816. Patented Feb. 18, 1890.

Fig. 1.



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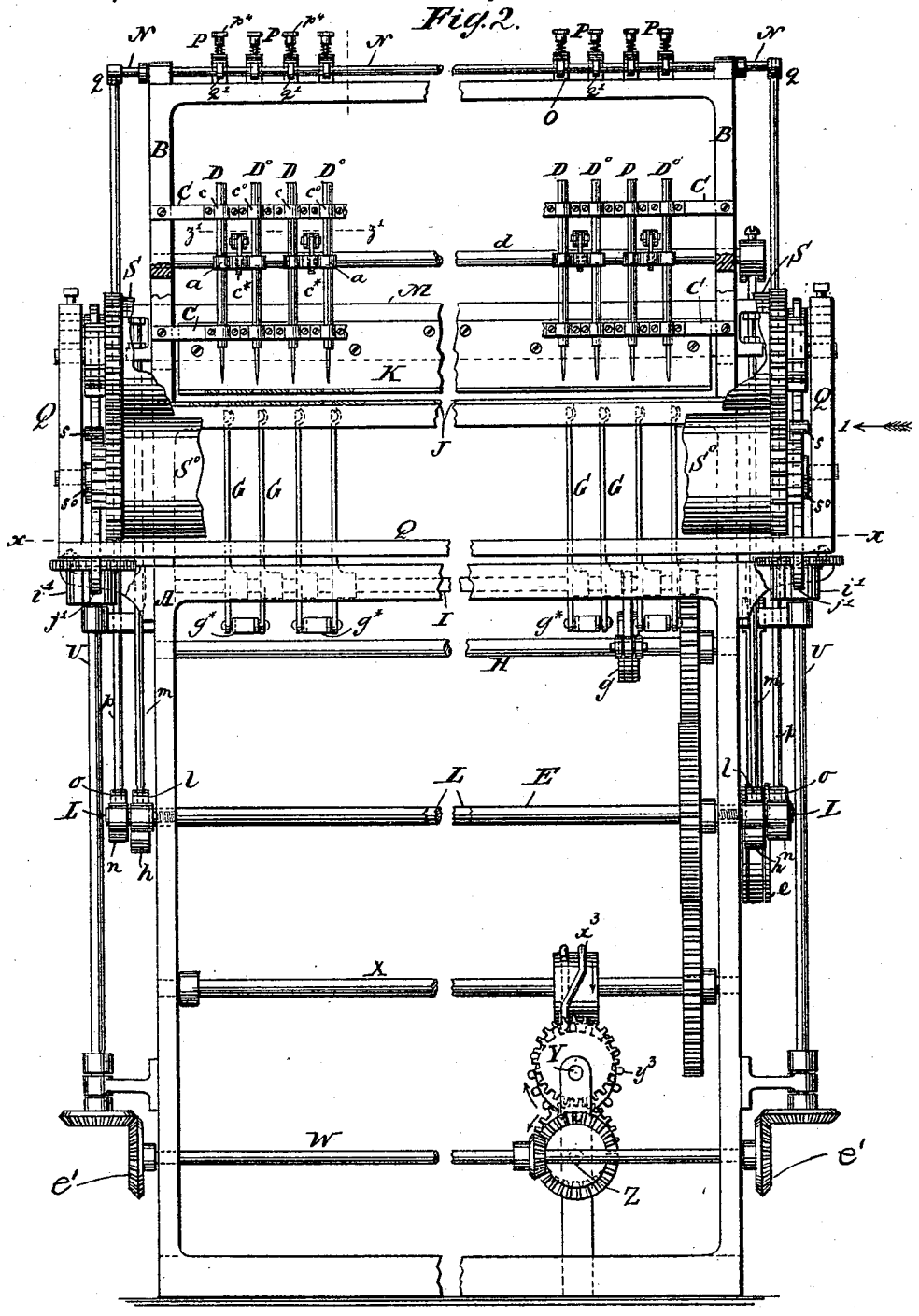
(No Model.) 3 Sheets—Sheet 2

D. H. COLES.

SEWING MACHINE.

No. 421,816. Patented Feb. 18, 1890.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

D. H. COLES.

SEWING MACHINE.

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Fig. 3.

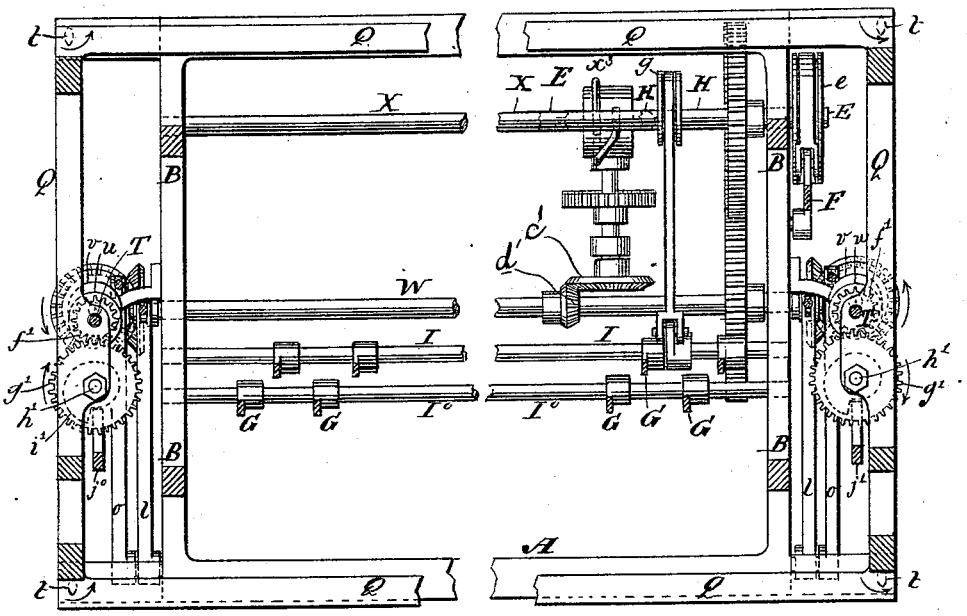


Fig. 4.

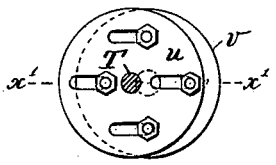


Fig. 5.

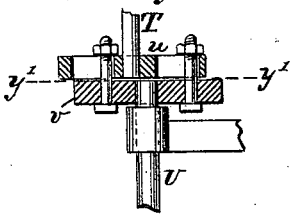


Fig. 6.

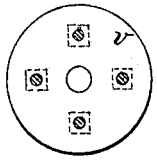


Fig. 9.

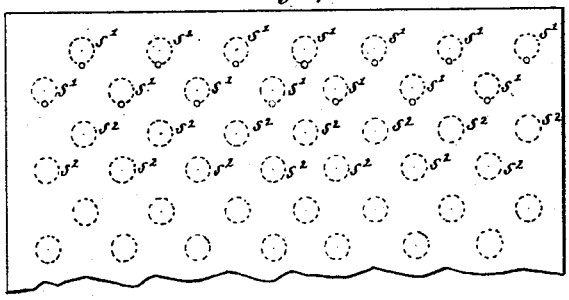


Fig. 8.

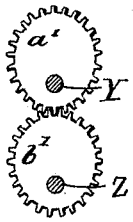


Fig. 7.

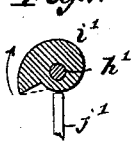


Fig. 11.

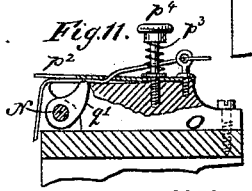


Fig. 10.

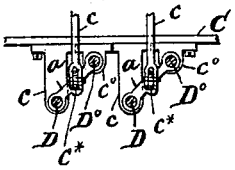
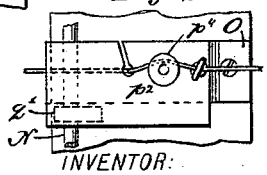


Fig. 12.



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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 421,816, dated February 18, 1890.

Application filed July 13, 1889. Serial No. 317,410. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. COLES, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to certain improvements in that class of sewing-machines which I have described in Letters Patent No. 340,863, granted to me April 27, 1886, and in which the material to be sewed is carried bodily round beneath the needle, so as to produce a line of stitches forming a closed figure, and after such closed figure has been completed the material is moved to bring a fresh portion beneath the needle for the formation of another closed figure.

The peculiar and novel devices and combinations of parts which form the subject-matter of my present invention are pointed out in the following specification and claims and illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation, looking in the direction of arrow 1, Fig. 2. Fig. 2 is a front elevation, looking in the direction of arrow 2, Fig. 1. Fig. 3 is a horizontal section in the plane *x x*, Fig. 2. Fig. 4 is a partial horizontal section in the plane *y y*, Fig. 1, on a larger scale than the previous figures. Fig. 5 is a vertical section in the plane *x' x'*, Fig. 4. Fig. 6 is a horizontal section in the plane *y' y'*, Fig. 5. Fig. 7 is a horizontal section in the plane *z z*, Fig. 1. Figs. 8 and 9 are details which will be referred to as the description progresses. Fig. 10 is a horizontal section in the plane *z' z'*, Figs. 1 and 2. Fig. 11 is a section, and Fig. 12 a plan view of the tension on a larger scale than Figs. 1, 2, and 3.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates the main frame, from which rise the standards B B, to which are secured the bars C C, and to these bars are secured brackets *c c*^{0}, which are of different height and form the guides for the needle-slides D D^0. These needle-slides are arranged in two rows, one in front of the other, as indicated in Figs. 1 and 10, and they are connected in pairs by straps *a*, each of which is firmly secured to one of the needle-slides D of the front row, and to one of the needle-slides D^0 of the rear row and connected to a lever *b*, the connection being made by a pivotal link *c**. The various levers *b* are mounted on a rock-shaft *d*, to which motion is imparted by means of an eccentric *e*, which is mounted on a shaft E in the lower part of the main frame A. This eccentric connects with a bell-crank lever F, Figs. 1 and 3, which is connected by a rod *f* with the tail of one of the levers *b*, so as to impart a rocking motion to the rock-shaft *d* and a reciprocating motion to all the needle-slides. From the description it will be seen that each of the levers *b* controls the movement of two of the needle-slides. The eccentric *e* and the bell-crank lever F are arranged in such relation to each other that the upper arm of said bell-crank lever oscillates beyond its fulcrum in either direction, whereby the needles receive the requisite movements to form the loops and to permit the shuttles to catch therein.

G G are the shuttle-drivers, which are mounted on rock-shafts I I^0, and which are connected in pairs by links *g**, Figs. 1 and 2. A rocking motion is imparted to one of the rock-shafts I, Fig. 3, by means of an eccentric *g*, mounted on a shaft H.

J is the work plate or table, which is firmly secured between the standards B B, and K is the presser-plate, to which a rising and falling motion is imparted by means of cams *h h*. These eccentrics are mounted on the shaft L, and they act on levers *l l*, Figs. 2 and 3, which swing on studs *l**, secured in the side of the main frame A, and from the free ends of these levers extend rods *m m*, which connect with the slide M, to which is secured the presser-plate K. The slide M is guided in slots *m*^{0}, Fig. 1, in the standards B, Fig. 1, and as the cams *h* turn the presser-plate K is raised, and then permitted to sink down so that it bears upon the material to be sewed by its own gravity. On the shaft L, outside of the cams *h*, are also mounted cams *n n*, which act on levers *o o*, Figs. 1, 2, and 3, which swing on the same studs *l** on which also swing the levers *l l*. From the free ends of the levers *o o* extend rods *p p*, which connect with levers *q q*,

mounted on the ends of a rock-shaft N. This rock-shaft has its bearings in the upper ends of the standards B B, which are connected by a traverse O, on which are mounted the tensions P, one for the thread of each needle. These tensions consist of friction-plates p^2, each of which is depressed upon the traverse O by a spring p^3, wound round the shank of an adjusting-screw p^4 in a manner well known to those skilled in the art. The thread for each needle passes beneath one of the friction-plates p^2, and is pressed down upon the traverse O so as to produce the required tension. (See Figs. 11 and 12.) On the shaft N are mounted toes q', which serve to raise the friction-plates p^2 so as to release the threads from all tension at the moment the material to be sewed is being moved from one line of sewing to another.

Q is a circularly-movable cloth-supporting carriage, in which are mounted two pairs of rollers R R^0 S S^0, each pair being geared together and being subjected to the action of a spring, so that they press upon the material which passes through between them. The material to be sewed is passed through between the rollers R R^0, thence over the work-table J and over the roller S, then through between the rollers S S^0 and out beneath the roller S^0, as indicated in Fig. 1, a guide-roller T^2 being provided to keep the material down upon the work-table. The roller S^0 is mounted loosely on its shaft, and retained thereon by a pawl s and ratchet-wheel s^0, so that it can be turned in one direction in order to keep the material taut in its passage over the work-table. The cloth-supporting carriage Q rests loosely upon the main frame A, and in order to be able to turn the same round in a circle with the least possible friction I place between the main frame A and the carriage double-pointed pins t t, which rest in cavities t^0 t^0 in the upper surface of the main frame and in the lower surface of the cloth-supporting carriage, Fig. 1. The rotating movement of the roller-carriage Q is produced by two vertical arbors T T, Figs. 1 and 3, which rise from disks u u and pass through holes in the side bars of the cloth-supporting carriage, as seen in Fig. 1. The disks u are secured eccentrically to disks v, which are mounted on vertical arbors U, Figs. 1, 2, and 5, and in order to be able to increase or decrease the eccentricity of the arbors T the bolts which serve to secure the disks u to the disks v pass through slots in the disks u. (See Figs. 4 and 5.) The arbors U have their bearings in brackets secured to the sides of the main frame A, Fig. 2, and they are geared together with a horizontal arbor W, to which a rotating motion is imparted from a shaft X through intermediate shafts Y Z, Fig. 1. On the shaft X is mounted a cam x^3, which gears into a cog-wheel y^3, mounted on the shaft Y, so that for each revolution of the shaft X the shaft Y is turned for the space of one tooth of the cog-wheel y^3, the cam x^3 being so formed that this movement is accomplished during about one-third of the revolution of the shaft X, leaving the shaft Y at rest during the remaining two-thirds of the revolution of the shaft X. If this cog-wheel y^3 has sixteen teeth, the shaft Y makes one revolution for each sixteen revolutions of the shaft X. The motion of the shaft Y is transmitted to the shaft Z by gear-wheels a' b', which are eccentric or elliptical, Fig. 8, so that the shaft Z makes the same number of revolutions as the shaft Y, but its motion is irregular, being slowest when the wheels a' b' are in the position shown in Fig. 8, when it is gradually increased until the shafts Y Z have completed one-half a revolution, and then the motion of the shaft Z is gradually decreased. On the shaft Z is mounted a bevel-wheel c', which gears into a pinion d', mounted on the shaft W, and this shaft is geared together with the vertical arbors U by bevel-wheels e' e' of equal diameters. The diameter of the pinion d' is one-half of the diameter of the bevel-wheel c', so that the shafts W U make two revolutions to each revolution of the shaft Z and to each sixteen revolutions of the shaft X. The shafts X, E, and H are geared together, so that they revolve with the same velocities, and by each revolution of the shafts E and H the needles and shuttles are moved so as to produce a stitch. By each revolution of the arbors U T the cloth-supporting carriage Q is caused to move horizontally in a circle or circular path, and during this motion two series of circular seams s' s', Fig. 9, are produced, each of said seams being formed of eight stitches of gradually-increasing length, as will be readily understood from the position of the wheels $a'b'$, Fig. 8. On the second revolution of the arbors U T a second series of stitches is thrown into the circular seams s' s', the length of these stitches being gradually decreasing, which change is produced by the eccentric-wheels a' b', as above stated, so that the first series of eight stitches is strengthened by the second series of eight stitches. After the first series of circular seams s' s', Fig. 9, has been completed, it is necessary to move the material to be sewed forward, so as to bring the sewing-lines for the second series of circular seams s^2 s^2 under the needles. This feed-motion is produced by the following means: On each of the vertical arbors T is mounted a pinion f', which gears into a cog-wheel g', mounted on a stud h', Figs. 1 and 2, which is firmly secured in the roller-carriage Q. To each of the cog-wheels g' is firmly secured a cam i', Figs. 1, 3, and 7, which acts upon a lever j'. This lever has its fulcrum on a pivot k', and it carries a pawl l', which engages a ratchet-wheel m', firmly connected to the roller S. The cog-wheel g' has twice as many teeth as the pinion f', so that for each two revolutions of the vertical arbor T the cog-wheel g', together with the cam i', makes one revolution. As the cam i' turns in the direction of the ar-

rows shown near the same in Figs. 3 and 7, the lever j' is forced back in the direction of arrow 4, Fig. 1, and the pawl l' is moved to engage a fresh tooth of the ratchet-wheel m', and as soon as the point of the cam i' releases the lever j' the latter is caused to return to its normal position (shown in Fig. 1) by the action of a spring n', and the roller S is caused to turn for the space of one tooth of the ratchet-wheel m'. This motion takes place instantaneously during the time the needles are raised and the arbors T are stationary. At the same instant the tensions P are released and the material to be sewed is moved so as to bring the sewing-lines for the second series of seams s^2 s^2, Fig. 9, beneath the needles. In order to be able to accomplish this feed-motion without causing the threads to break, it is necessary that the tensions P shall be automatically released at the proper time.

It will be noticed from the foregoing description that by the machine as above described and illustrated in the drawings two rows of circular seams s' s' are produced simultaneously; but it will be readily understood that my invention is also applicable to a sewing-machine with a single row of needles, or, in fact, to a sewing-machine with a single needle.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a sewing-machine, the combination, with the stitch-forming devices and with the main frame A, of the cloth-supporting carriage Q, the cavities t^0 t^0 in the main frame and in the carriage, the pointed supports t, placed in said cavities, and means for imparting to the carriage a circular motion, substantially as described.

2. In a sewing-machine, the combination of two rows of needle-slides, one in front of the other, a series of straps, each of which is made to connect one of the needle-slides of the front row with one of the needle-slides of the rear row, and actuating-levers connected to these straps, substantially as described.

3. In a sewing-machine, the combination, with the stitch-forming devices, of the carriage Q, the eccentrically-connected arbors engaging said carriage, and mechanism for imparting to the arbors step by step two complete revolutions, said mechanism comprising the eccentric-wheels a' b', for varying the steps of the motion imparted to the arbors, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DAVID H. COLES.

Witnesses:
W. HAUFF,
ERNST F. KASTENHUBER.