

APPLICATION FILED APR. 17, 1911.

Patented Dec. 17, 1912.

5 SHEETS--SHEET 1.



Inventor
Nelson DeLong
by Paul & Binnie July 5

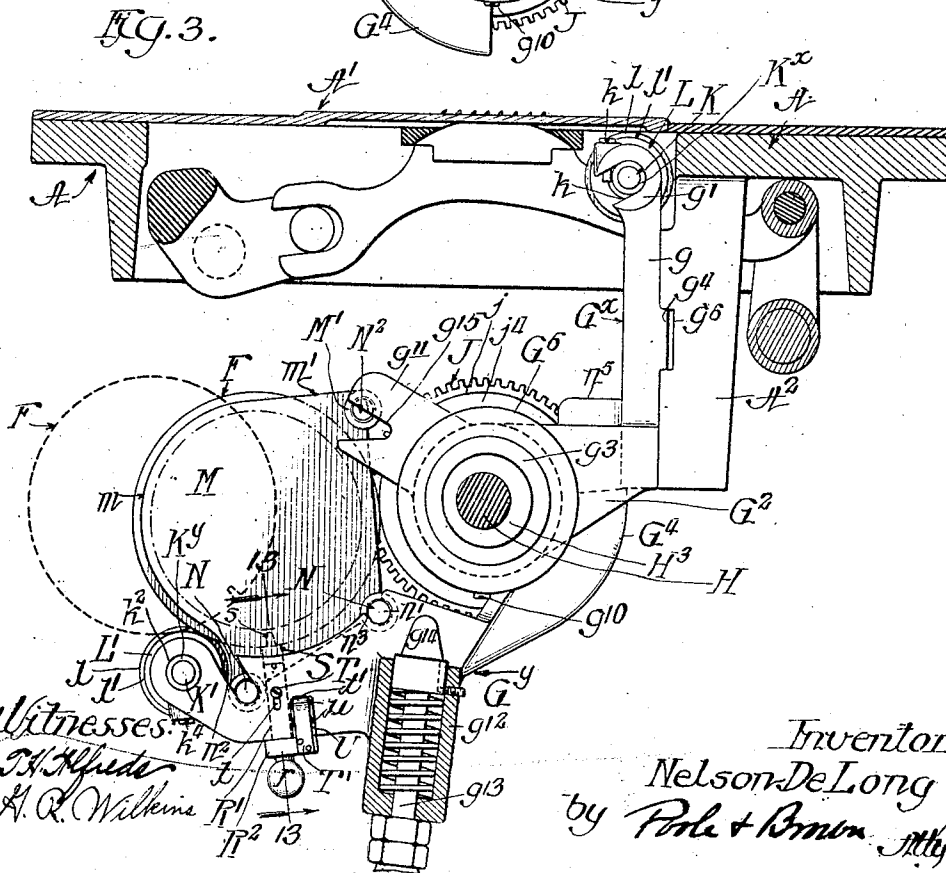
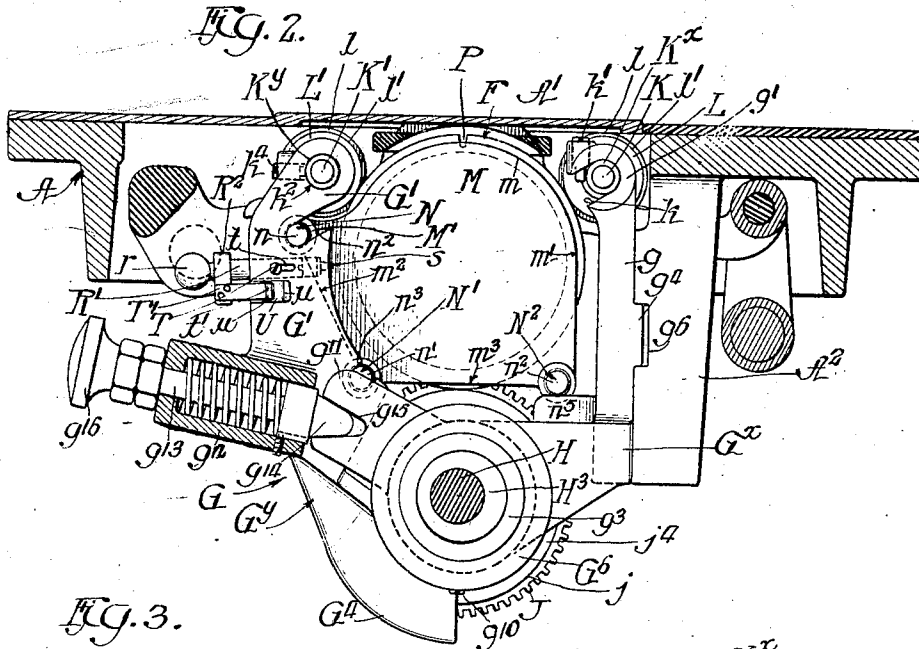
N. DE LONG.
SEWING MACHINE.

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1,047,178.

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5 SHEETS—SHEET 2.



Witnesses:

J. H. Hildebrand

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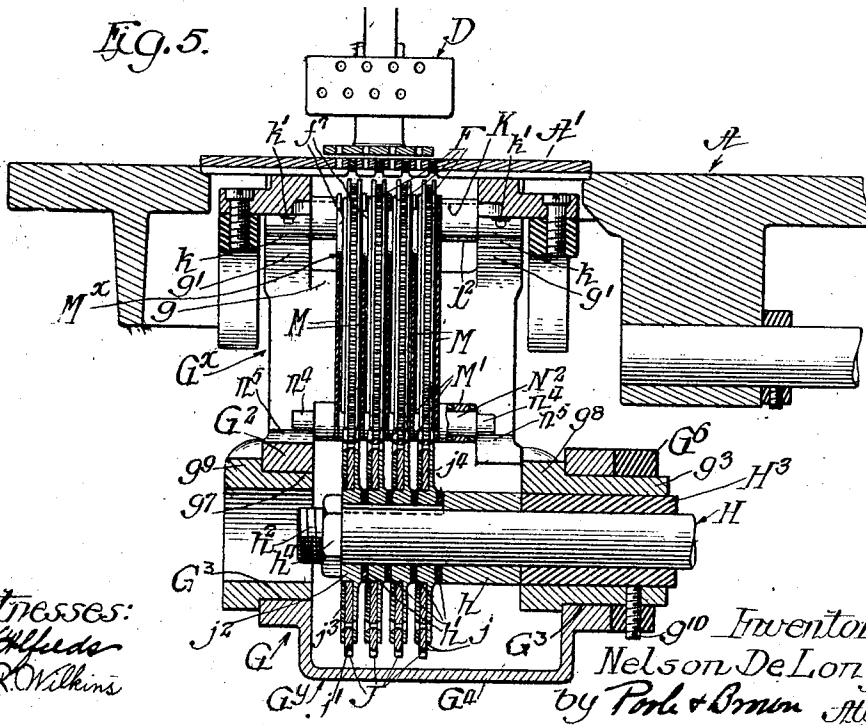
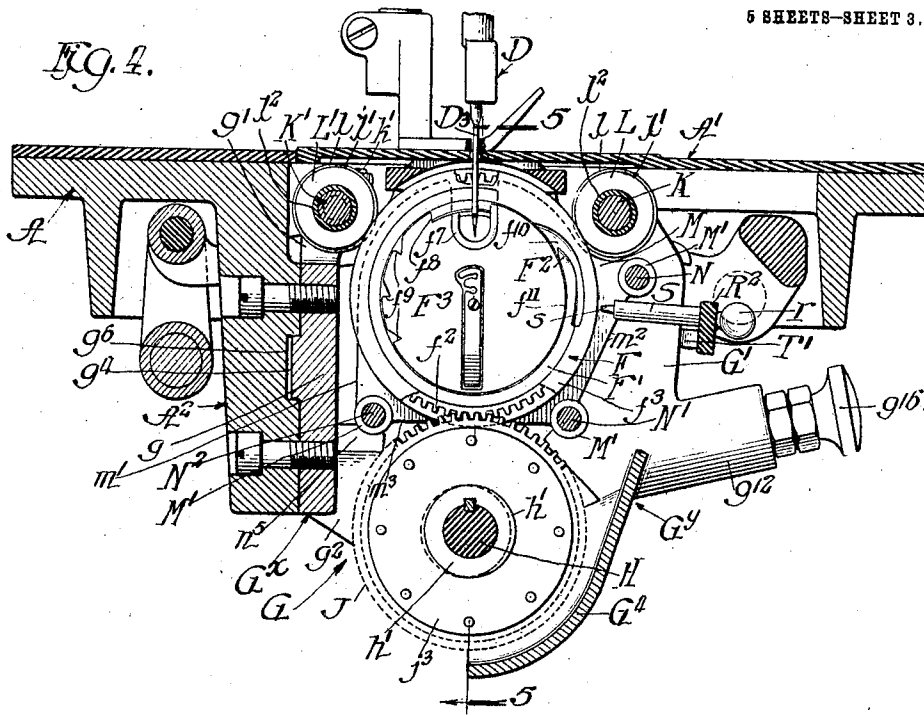
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5 SHEETS—SHEET 3.

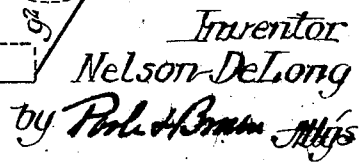


Witnesses:
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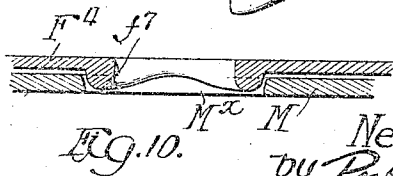
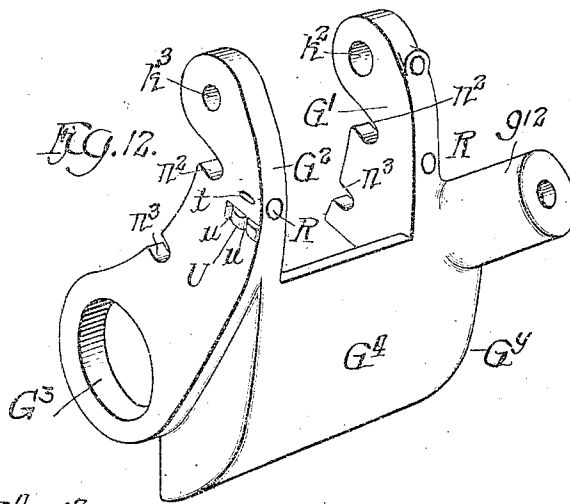
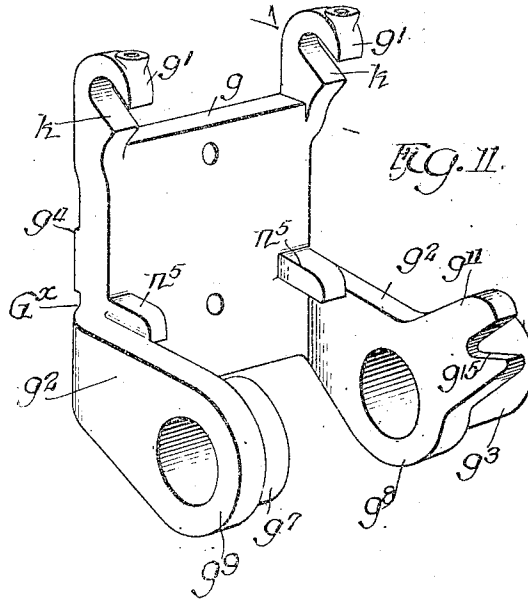
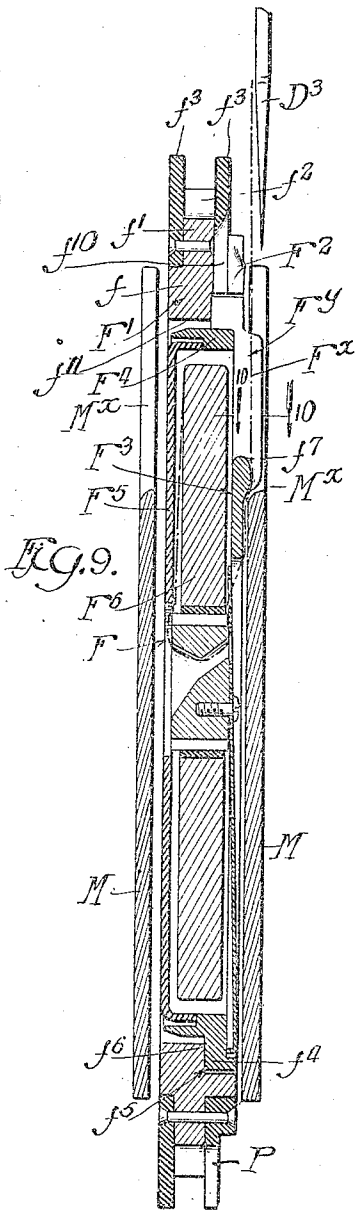
5 SHEETS--SHEET 4.



N. DE LONG.
SEWING MACHINE.
APPLICATION FILED APR. 17, 1911.

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6 SHEETS—SHEET 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

NELSON DE LONG, OF CHICAGO, ILLINOIS, ASSIGNOR TO KABO CORSET COMPANY, A CORPORATION OF WEST VIRGINIA.

SEWING-MACHINE.

1,047,178.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed April 17, 1911. Serial No. 621,511.

To all whom it may concern:

Be it known that I, NELSON DE LONG, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in sewing machines, and particularly to certain novel features of construction applicable to a gang-machine.

The invention is shown herein in connection with a machine provided with a plurality of rotative shuttles located in parallel vertical planes and being adapted to rotate about a common horizontal axis, each shuttle having a rotative hook which co-acts with an associated needle carried by the needle bar to form the stitch in a familiar manner.

The invention embraces features of construction by means of which the shuttle gang is supported in the machine base and by means of which the shuttles are driven and consists of the matters hereinafter described and more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a vertical sectional view of the sewing machine, the plane of the section containing the longitudinal central axis of the shaft which operates the needle-bar and the vertical axis of said needle-bar, the left end of the base and the shuttle mechanism being shown in front elevation. Fig. 2 is a view on an enlarged scale representing a transverse, vertical section through the machine base on the line 2—2 of Fig. 1. Fig. 3 is a view representing the same section but with the shuttle race open. Fig. 4 is a view representing a transverse, vertical section through the machine base on the line 4—4 of Fig. 1, said section being from a direction opposite to that from which the sections of Figs. 2 and 3 are looked at. Fig. 5 is a view representing a vertical section through the machine base on the line 5—5 of Fig. 4. Fig. 6 is a view representing a top plan view of the shuttle-gang and its supporting mechanism.

Fig. 7 is a detail view representing a left-hand end elevation of the parts shown in Fig. 6, including the separator plates, and the fixed and hinged members of the shuttle race, but with the shuttles themselves omitted. Fig. 8 is a detail view representing one of the separator plates in side elevation. Fig. 9 is a view on an exaggerated scale, representing a vertical section through the central axis of one of the shuttles. Fig. 10 is a view representing a partial horizontal section through Fig. 9 on the line 10—10. Fig. 11 is a perspective view of the fixed member of the shuttle race. Fig. 12 is a perspective view of the hinged member of the shuttle-race. Fig. 13 is a view representing a partial section in the plane indicated by the line 13—13 of Fig. 3.

In that embodiment of my invention illustrated in the accompanying drawings, referring first to the general features of the machine, A indicates the base-plate; B, the overhanging arm; C, the main driving shaft rotatively supported in said arm B; C¹, the main driving pulley rigidly secured to said shaft and adapted to be driven by a band or belt (not shown) which is operated from a power driven pulley; C², the usual hand-wheel on the shaft C; D, the needle holder carried by the reciprocating needle-bar which is operatively connected with the driving-shaft C by a pitman D¹ and a crank-arm D²; and E indicates a set of rotary take-up wheels or disks corresponding in number to the number of needles and which are rigidly connected with the outer end of an extension c of the shaft C. The parts thus far referred to are of familiar construction and operation and form no part of the present invention.

Referring now to the shuttle-gang and the means adapted for supporting and driving the same, which embrace the novel features comprising the present invention: The shuttles are mounted below the usual throat-plate A¹ and are of that type which includes a hook adapted to rotate continuously in the same direction and to carry each thread loop about the central axis of the shuttle through a complete revolution of 360 degrees.

F indicates the shuttles (see Figs. 1, 4 and 5,) of which there are four shown in the drawings, and which are mounted side by

side in parallel vertical planes in a shuttle race G located below the throat-plate A¹ and supported by a depending plate A² preferably made integral with the base-plate.

The shuttle-race G comprises a fixed member G^x rigidly supported by the plate A² and a hinged member G^y, which is adapted to be swung forward and downwardly to open the shuttle-race (see Figs. 2 and 3), in order to get at the shuttles for the purpose of adjustment or cleaning, or for removing or replacing a shuttle, or for any other reason. The fixed member G^x (Fig. 11) of the shuttle-race embraces an upright member or plate g having on its rear face a longitudinal rib g¹ which engages with a horizontal slot g⁶ formed in the front face of the upright supporting plate A²; and two horizontal, forwardly projecting, longitudinally spaced arms g², g² which carry bearing sleeves g³, g⁷ at their outer ends. The hinged member G^y (Fig. 12) consists of two longitudinally spaced arms G¹, G² provided at their lower ends with apertures G³, G³ by means of which they are rotatively mounted on the bearing sleeves g³, g⁷ of the fixed member G^x and of a transversely curved apron G⁴, which partially incloses the front and bottom of the shuttle-race (see Figs. 1 and 2). The hinged member G^y is held against endwise movement in one direction by annular shoulders g⁸, g⁹ on the bearing sleeves g³, g⁷ and against endwise movement in the opposite direction by a collar G⁶ secured on the right-hand end of the bearing sleeve g³ and abutting against the right-hand face of the arm G¹. Said collar is held in fixed position by a set-screw g¹⁰ (Fig. 5).

From this description it is apparent that the hinged member G^y may freely swing upon the bearing sleeves g³, g⁷ of the fixed member G^x. When it is swung forwardly and downwardly, the lower edge of the apron G⁴ swings rearwardly and upwardly until it strikes the lower edge of the plate g of the fixed member which thus acts as a stop to limit the movement of the hinged member when the shuttle-race is opened.

One of the arms g² of the fixed member G^x (as shown in the drawings, the right-hand arm) is provided with a lug g¹¹ which projects forwardly and upwardly beyond its bearing sleeve g³. The hinged member G^y has a chambered boss g¹² carrying a spring-controlled latch in the form of a reciprocating plunger g¹³ having at its inner end a detent g¹⁴ which engages a notch g¹⁵ in the lug g¹¹ of the fixed member. The outer end of the plunger g¹³ projects through an aperture in the end of the boss and is there provided with a thumb piece or cap g¹⁶ for operating it. It is apparent that this latch will lock the hinged member G^y in position to close the shuttle-race and that the shuttle race

may be opened after the said latch is disengaged.

H indicates a shaft located below the machine base A and extending parallel to the main shaft C with its central axis in the vertical plane of, and below, the common central axis of the shuttles F. Said shaft is rotatively supported at one end in a bearing sleeve H¹ carried by a hanger H² rigidly supported by the base A and near its opposite end in the bearing-sleeve g³ of the fixed member G^x of the shuttle-race. As shown in the drawings, the shaft H is mounted in a bushing H³ which is supported by the bearing sleeve g³. At the right-hand end of said shaft is rigidly secured a pulley H⁴ which is driven by a belt C³ from a pulley C⁴ rigidly secured to the main driving shaft C.

J indicates a set of spur-gears, corresponding in number to the number of shuttles F, keyed to the shaft H which projects to the left beyond the bearing sleeve g³ below said shuttles. Each gear J is located in the vertical plane of an associated shuttle which, as will presently appear, it supports and drives. The gang of gears is held in position on the shaft H below the gang of shuttles by a spacing sleeve h located on the shaft H between the bushing H³ and the right-hand gear of the gang and the gears are held in the required spaced relation each to the other by spacing washers h¹. The end of the shaft H is threaded as indicated at h² to receive a nut h⁴ which maintains the gears against longitudinal movement on the shaft. When it is desired to remove the gears, the nut h⁴ may be unscrewed and removed through the bearing sleeve g⁷.

For a purpose presently to be described, the gears J are provided with annular shoulders j spaced radially within the pitch line of the teeth of the gears. As shown herein, the gear-teeth of each gear are formed in a flat fiber ring j¹ which is mounted on a smaller ring j² keyed to the shaft H. Said ring j² has at one end a flat annular flange j⁴ engaging one face of the fiber ring j¹, and a second flat ring j³ mounted on the opposite end of the ring j² engages the opposite face of the fiber ring j¹. The ring j³ and the flange j⁴ of the ring j² are rigidly secured to the fiber ring j¹ by rivets as shown in Fig. 5. The peripheries of the ring j³ and of the flange j⁴ provide the annular shoulders j above referred to.

Passing now to a description of the shuttles F, said shuttles are identical and a description of one will apply to all.

F¹ indicates a rotative hook carrying member and F² the hook carried thereby and adapted to form the loop in a familiar manner. Said hook-carrying member, as shown in the drawings, (see Fig. 9) comprises a ring f, provided on its periphery with a radially

projecting, annular rib f^1 having gear-teeth f^2 which are adapted to mesh with the teeth of an associated gear J; and flat rings f^3 f^3 bearing on the peripheral surface of the ring f and secured against the opposite faces of the rib f^1 . The outer faces of the flat rings f^3 f^3 are located in the planes of the faces of the ring f . Said flat-rings f^3 project radially beyond the gear-teeth f^2 and constitute spaced radial flanges on the hook carrying member which are adapted to embrace the marginal faces of the associated gear J and engage and ride upon the annular shoulders j of said gears. Each gear J thus maintains the lower part of the associated hook-carrying member in its proper vertical plane by reason of its engagement between the spaced radial flanges f^3 of the hook-carrying member, and the annular shoulders j located at each side of the plane of the teeth of said gear provide the entire support in a vertical direction, for said hook-carrying member by reason of the engagement of said shoulders with the peripheries of the flanges f^3 f^3 of said hook-carrying member. The upper parts of the hook-carrying members are maintained in the proper vertical plane by the following devices.

K K^1 (see Figs. 2 and 6) indicate horizontal shafts located in a horizontal plane above the common central axis of the shuttles F and spaced, respectively, at equal distances in front of and at the rear of the vertical plane containing said shuttle-axis. The rear shaft K^1 is rotatively mounted in longitudinally spaced lugs g^1 projecting upwardly from the plate g of the fixed member G^x of the shuttle-race and the forward shaft is rotatively mounted at the upper ends of the arms G^1 G^3 of the hinged member G^y . Said shafts are removable from their respective supports. As shown in the drawings, the rear shaft K has reduced ends journaled in bushings K^x K^x which are held rigidly in notches k k formed in the lugs g^1 , said notches opening forwardly and downwardly and the said bushings being retained therein by set-screws k^1 k^1 . The shaft K has reduced ends one of which is journaled in an aperture k^3 formed in the arm G^2 and the other of which is journaled in a bushing K^y held rigidly by a set-screw k^4 in an aperture k^2 in the arm G^1 . By loosening the set-screw, the shaft K, which is of the same diameter as its bushing K^y , may be withdrawn longitudinally through the larger aperture k^2 .

L L^1 indicate sets of disks which are rotatively mounted on the shafts K K^1 , respectively, there being a disk L and a disk L^1 for each shuttle. Each of said disks has a radially extending annular rib l which is adapted to engage between the flat rings f^3 constituting the flanges of the associated hook carrying ring F^1 , and annular should-

ers l^1 l^1 located at each side of the plane of the rib l , which shoulders have bearing contact with the peripheral edges of said flat rings f^3 . Said disks L and L^1 are spaced on their respective shafts to correspond with the spacing of the shuttles F and are held in said spaced relation by spacing washers l^2 . The shafts K K^1 are so located and the diameters of the disks L L^1 so proportioned that said disks engage the peripheries of the rotative hook-carrying rings in the manner described at points located above the horizontal diameters of the shuttles, which points, together with the points at which the gears J and their annular shoulders j engage said rings, divide the peripheries of the rings into substantially equal parts. The shuttle is thus given lateral support at three points, which support maintains it in the vertical plane determined by said points.

Between the shuttles and at each end of the gang of shuttles are located separating plates M. Each of said plates has an upper side m formed in the arc of a circle of substantially the radius of the hook-carrying rings F^1 , a rear vertical side m^1 , and a front outwardly inclined side m^2 . The bottom m^3 of said plate is horizontal. Said plate M is provided with apertures m^4 m^5 m^6 , located, respectively, at the intersection of the bottom side m^3 and the forward side m^2 , and at the other ends of said sides. Said plates M are assembled on rods N N^1 N^2 which extend respectively through the apertures m^6 , m^4 , m^5 . Spacing washers M^1 hold the plates in proper spaced relation. The rods N and N^1 have reduced ends n n^1 which are supported, respectively, in rearwardly and upwardly opening notches n^2 n^3 formed in the rear edges of the arms G^1 , G^2 of the hinged member G^y of the shuttle-race, the inner face of each arm engaging against the shoulders formed by the parts of said rods of larger diameter. The rod N^2 also has reduced ends n^4 which rest on forwardly projecting fixed lugs n^5 formed on the vertical plate g of the fixed member G^x of the shuttle race and having horizontal upper faces. The shoulders formed by the part of larger diameter of the rod N^2 abut against the opposing vertical faces of the lugs n^5 and hold said rod against longitudinal movement.

Each of the plates M except the one located at the right of the gang of shuttles is located in the plane of movement of an associated needle D^3 and is provided on its upper side m with a deep wide notch M^2 adapted to provide room for the descent of said needle.

F^2 indicates the cop-holders of the shuttles. Said cop-holders are located within the rotary hook-carrying members F^1 and each comprises a body member F^4 and a cap F^5 which form an inclosed chamber to hold the

thread cop F^6 in a familiar manner. The body of the cop-holder has an annular, radially extending rib f^4 which is located in a recess f^5 in one face of the ring F^1 , the inner face of said rib bearing against the shoulder f^6 formed about the inner periphery of the ring by the recess. A boss f^7 is formed in the vertical wall of the cop holding body F^4 near its top. Said boss projects into the plane of the adjacent separator plate M and engages laterally against the vertical sides of the notch M^2 of said plate in such manner that the plate will hold the cop-holder against rotation with the hook-carrying member within which it is located. The bottom of the boss f^7 does not bear on the bottom of the notch M^2 but a space is left between the two so that the thread F^x from the thread cop may run easily between the two. Within the boss f^7 , the body of the cop holder is cut away to provide an upwardly opening notch F^8 .

In the peripheral edge of the rear wall of the body member F^4 of the cop holder adjacent to the notch or opening F^8 therein is formed a hook f^8 having its operative face turned toward the point of the hook F^2 , said hook serving to engage a part of the loop and hold it while the hook F^2 engages the other and carries it around the cop holding member in a familiar manner. Additional hooks f^9 spaced in a circumferential direction toward the left, (as shown in Fig. 4,) from the hook f^8 are provided in said cop holder so as to insure the catching of the thread by the rear wall of the cop holder in case it should not be caught on the first hook f^8 . The hook carrying member F^1 (see Figs. 4 and 9) is cut away below the hook, as indicated at f^{10} and the thread loop is adapted to be carried about the cop holder through an opening f^{11} between the peripheral edge of said cop holder and the inner circumference of said hook carrying member at a point adjacent the hook.

A detailed description of the operation of the shuttle is not here necessary as its operation is well known to those familiar with the art. As the needle descends the loop is caught by the hook F^2 and as said hook passes the hooks f^8 f^9 , one strand of said loop is caught on one of the latter named hooks while the other strand is carried by the hook F^2 around with it in its rotation, one strand of the loop passing through the opening f^{11} , and when the thread is drawn up by the needle and after the hook F^2 has made a complete revolution, escapes through said opening, thus in effect passing the cop holder through the loop and looping the needle thread about the thread from the cop holder. In the machine shown herein, the gearing is such that the shuttle will make two complete revolutions for one reciprocation of the needle, thus providing more time for

the operation of the needle, and obviating the tendency to break the thread when the needle is drawn up.

To remove the shuttles from the race, for repairs or renewals, the detent g^{14} is withdrawn from the notch g^{15} in the lug g^{11} of the fixed member of the shuttle race whereupon the hinged member G^7 is rotated downwardly into the position indicated in Fig. 3. In this movement of the hinged member G^7 , the shuttles roll about the gears J and the spacing plates M and the shaft K^1 with its supporting disks L^1 are withdrawn with said hinged member. The shuttles, either one or more, may be then lifted out of the race and replaced.

In replacing the shuttles, as will be readily understood, it is necessary for them to be assembled in a certain definite angular relation to each other so that they will each properly cooperate with their associated needles, and to this end I provide in the flanges f^3 of each shuttle, a notch P (see Figs. 2 and 9) which are similarly placed in the several shuttles. In the arms G^1 G^2 of the hinged member G^7 I provide transverse apertures R (see Fig. 12) in which are located reciprocating rods R^1 , to the outer ends of which are connected a cross bar R^2 having a handle r . Made integral with said cross bar are a plurality of rods S which are each located in the plane of a shuttle and which have detents s adapted for engagement with the notches P of said shuttles. In the arms G^1 G^2 are slots t adapted to receive pins T secured to the rods R^1 and acting as a limiting stop to limit the forward and rearward movement of said rods. Springs T^1 secured to the outer faces of the arms G^1 G^2 have spaced detents t^1 , t^2 adapted for cooperation with a notched lug U having notches u , u , so as to hold said rods yieldingly in their rearward or forward positions. The rods S are used to locate the shuttles in proper angular relation in the following manner: When the shuttles are placed in the race, the bar R^2 is pushed to its innermost position, in which the detents s are adapted for engagement with the notches P of the shuttles. In assembling said shuttles in the race, before the hinged member G^7 is swung into closed position, each shuttle is placed in the race so that its notch P engages the detent s . Each shuttle is then engaged with the proper gear teeth of the gears J . After all the shuttles are assembled in the race, the bar R^2 , by means of the handle r , is withdrawn to its outermost position, thus disengaging the detents s from the associated notches P of the shuttles. The hinged member is then swung into place, the shuttles rolling on their respective gears until they are brought into the position indicated in Figs. 2 and 4.

It is apparent from the description of the manner of mounting and supporting the space plates M, that they may be withdrawn in assembled relation when the hinged member-G^v is in open position. The flanges f^s, projecting beyond the gear teeth of the shuttle and embracing the gear teeth of the gears J, shroud both gears and prevent any danger of the thread catching the gear teeth.

The continuous peripheral engagement between the rotative shuttle and the rotative supporting devices, one of which is provided with means for driving the shuttle, as hereinbefore stated, overcomes many of the disadvantages incident to sewing machines employing a rotative shuttle and especially, to such machines of the gang type, as heretofore more commonly constructed, as will appear from the following: In such sewing machines, of the rotative shuttle type, the rotative shuttle was provided with peripheral openings to form hooks, and where only one shuttle was employed the shuttle was directly driven by a shaft. But, on the other hand, when two or more shuttles or a gang of shuttles were employed, they had to be driven by a peripheral drive, because, if a shaft drive were used, the thread would be wound about the shaft in the looping of the same by the shuttles. This objectionable feature was avoided by the peripheral drive. But as the shuttles were provided with peripheral openings, as above stated, one gear could not be used to drive the shuttle, because when one of the peripheral openings came at the point of contact between the gear and the shuttle, the two would be thrown out of mesh. Two or more gears were, therefore, used with each shuttle, and so angularly spaced with respect to each other, and to the peripheral openings in the shuttle, that the openings would not, at the same time, come at the points of contact between the gears and the shuttle. In my improved construction, by reason of the fact that the shuttles are provided with hooks on the side faces of the same, thus doing away with the peripheral openings and giving the shuttle a continuous peripheral surface, one gear may be employed to drive each shuttle, thereby avoiding the necessity of a plurality of gears for each shuttle, and consequently an expensive and complicated construction of the parts. Furthermore, in the prior construction, lack of smoothness in action and a considerable amount of noise or "clicking" is caused by the peripheral openings in the shuttles passing over the gears. This will be readily appreciated, when it is considered that each shuttle in the gang is provided with two or more peripheral openings, and each shuttle drive, by two or more gears. Multiplying

the noise made in the operation of one shuttle by the number of shuttles in the gang will afford an indication of the volume of noise produced by the machine as a whole. By reason of the continuous peripheral engagement between the shuttle and its driving gear in my machine, irregularity of action and noise is entirely eliminated. Moreover, in the employment of the peripheral openings in the shuttle, as in the prior construction, when one of the openings comes at the point of contact between one of the gears and the shuttle, said gear is, for an instant, thrown out of mesh with the shuttle, but the other gears, constituting the other members of the drive for the shuttle, continue to rotate the shuttle with the result that the tooth on the shuttle at the side of the opening, which is at the point of contact, is forced against the teeth of the gear, which is at the time out of mesh. This produces a hammering or pounding, and to such a degree that it vibrates the whole machine. If such a machine be operated at a high rate of speed, so as to make 3,000 to 4,000 stitches per minute, the pounding would be so great that it would tend to shatter the shuttle, break the gears and would also injure the other parts of the machine. In my device, however, the continuous peripheral engagement of the shuttle with its supporting devices produces a smooth action and does away with any such pounding. It follows, therefore, that a high speed may be maintained with my machine and 3,000 to 4,000 stitches per minute may be successfully made. Moreover, in the prior construction, with the peripheral openings in the shuttle to form the hooks, the gear teeth on the shuttle terminate at each side of the openings and the thread, in being caught by the hooks, is liable to become entangled in the gear teeth. By providing the hooks on one side of the shuttle, as in my device, there is no danger of the thread being caught by the gear teeth on the shuttle. Furthermore, in my device, when the shuttle-race is opened by swinging the hinged member thereof downward, the shuttles will roll smoothly about the driving gear and one of the supporting devices mounted on said hinge member, for the reason that the engagement between the shuttle and the driving gear and the supporting device is continuous.

From the above, it will be evident that the continuous peripheral engagement between the shuttle and its driving and supporting members has many advantages not possessed by the sewing machines of the rotative shuttle type, as heretofore constructed.

While in describing one embodiment of my invention I have referred to certain de-

tails of mechanical construction and arrangement, it is to be understood that I do not limit myself thereby, except as pointed out in the appended claims.

5 I claim as my invention:—

1. In a sewing machine, a rotative shuttle comprising a rotative hook-carrying member and a cop-holder, and a plurality of rotative supporting devices adapted for continuous peripheral engagement with said rotative hook-carrying member, one of said rotative supporting devices being provided with means for driving said hook-carrying member.

2. In a sewing machine, a rotative shuttle comprising a rotative hook-carrying member and a relatively fixed cop-holder, and a plurality of rotative supporting devices adapted for peripheral engagement with said rotative hook-carrying member, one of said rotative supporting devices being provided with means for driving said hook-carrying member.

3. In a sewing machine, a rotative shuttle comprising a rotary hook-carrying member and a relatively fixed cop-holder, and a plurality of rotative supporting devices adapted for continuous peripheral engagement with said rotative hook-carrying member, one of said rotative supporting devices being provided with means for driving said hook-carrying member.

4. In a sewing machine, a rotative shuttle comprising a relatively fixed cop-holder and an annular rotative hook-carrying member, said hook-carrying member being constructed to pass the thread-loop within the hook-carrying member and about the cop-holder, and a rotative supporting and driving device adapted for peripheral engagement with said hook-carrying member.

5. In a sewing machine, a rotative shuttle comprising a rotative hook-carrying member and a relatively fixed cop-holder, a plurality of rotative supporting devices adapted for peripheral engagement with said hook-carrying member, one of said rotative supporting devices being provided with means for driving said hook-carrying member, and a movable member adapted for the support of one of said rotative supporting devices.

6. In a sewing machine, a rotative shuttle comprising a rotative hook-carrying member and a relatively fixed cop-holder, a plurality of rotative supporting devices adapted for peripheral engagement with said hook-carrying member, one of said rotative supporting devices being provided with means for driving said hook-carrying member, and a hinged member adapted for the support of one of said rotative supporting devices.

7. In a sewing machine, a plurality of spaced rotative shuttles each comprising a

rotative hook-carrying member and a cop-holder, and a plurality of sets of rotative supporting devices, the rotative supporting devices of each set being adapted for peripheral engagement with one of said rotative hook-carrying members, one of said rotative supporting devices of each set being provided with means for driving its associated hook-carrying member.

8. In a sewing machine, a plurality of longitudinally spaced rotative shuttles each comprising a rotative hook-carrying member and a relatively fixed cop-holder, a plurality of sets of rotative supporting devices, the rotative supporting devices of each set being adapted for peripheral engagement with one of said rotative hook-carrying members, one of said rotative supporting devices of each set being provided with means for driving an associated hook-carrying member, and a plurality of spacing plates separating said shuttles, each spacing plate and cop-holder being provided with engaging parts adapted for holding said cop-holder in fixed relation relative to its associated hook-carrying member.

9. In a gang sewing machine, in combination with the shuttles, a plurality of spacing plates separating said shuttles, a movable member adapted for the support of said plates and a stop member adapted to limit the movement of said plates when moved into operative position.

10. In a gang sewing machine, in combination with the shuttles, a plurality of spacing plates separating said shuttles, a hinged member adapted for supporting said plates, and a stop member adapted to limit the movement of said plates when said hinged member is swung into operative position.

11. In a sewing machine, in combination with the shuttles, a race comprising a fixed member and a hinged member, said fixed member being provided with apertured hubs upon which said hinged member is journaled, a shaft extending through the aperture in one of said hubs, a plurality of gears feathered to said shaft adapted for driving said shuttles, and means for confining said gears on said shaft, said means being removable through the aperture in one of said hubs of the fixed member.

12. In a sewing machine, in combination with the shuttles, a race for said shuttles comprising relatively movable members, a plurality of sets of rotative supporting devices, each set being adapted for peripheral engagement with one of said shuttles, two of each set of said rotative supporting devices being carried by one of said members and the third one of the set being carried by the other member.

13. In a sewing machine, a rotative annular shuttle comprising a rotative hook-car-

rying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear-teeth, a rotative gear arranged vertically below said shuttle adapted for driving said shuttle and provided with annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, and rotative disks having ribs engaging between the shrouds of said gear-teeth at points above the horizontal diameter of said shuttle and annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth.

14. In a sewing machine, a rotative annular shuttle comprising a rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear teeth, a rotative gear arranged vertically below said shuttle and having a central horizontal axis and adapted for driving said shuttle and provided with annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, and rotative disks having ribs engaging between the shrouds of said gear-teeth at points above the horizontal diameter of said shuttle, annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, the rotative axis of one of said disks being fixed, and a hinged member rotatable about the central horizontal axis of said gear adapted for supporting the other disk.

15. In a sewing machine, in combination with the base, a rotative annular shuttle comprising a rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear-teeth, a rotative gear arranged vertically below said shuttle and having a central horizontal axis and adapted for driving said shuttle and provided with annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, and rotative disks having ribs engaging between the shrouds of said gear-teeth at points spaced each side of the vertical diameter of said shuttle and above the horizontal diameter of said shuttle, and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, one of said disks being carried by the base, a member hinged about the central horizontal axis of said gear adapted for carrying the other of said disks, and means carried by said hinged member for holding said cop against rotation.

16. In a sewing machine in combination with the base, a rotative annular shuttle comprising a rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear teeth, a rotative gear arranged vertically below said shuttle and

having a central horizontal axis and adapted for driving said shuttle and provided with annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, rotative disks having ribs engaging between the shrouds of said gear-teeth at points spaced each side of the vertical diameter of said shuttle and above the horizontal diameter of said shuttle, and annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, one of said disks being carried by the frame, a member hinged about the central horizontal axis of said gear adapted for carrying the other disk, means carried by said hinged member for holding said cop against rotation, and means for locking said hinged member in closed position.

17. In a sewing machine, in combination with the base, a rotative annular shuttle comprising a rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear teeth, a rotative gear arranged vertically below said shuttle and adapted for driving said shuttle and provided with annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, rotative disks having ribs engaging between the shrouds of said gear-teeth at points located respectively in front of and at the rear of said shuttle and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, one of said disks being carried by the frame, a hinged member adapted for carrying the other disk, and a plate carried by said hinged member and provided with a notch for the descent of the needle, said cop holder having a boss extending into said notch and adapted to coast therewith to prevent the rotation of said cop-holder.

18. In a sewing machine, a plurality of longitudinally spaced rotative shuttles, each comprising an annular rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear-teeth, a plurality of longitudinally spaced rotative gears arranged vertically below said shuttles, each adapted for driving one of said shuttles and provided with annular shoulders adapted for peripheral engagement with the shrouds of the gear-teeth, two sets of longitudinally spaced rotative disks having ribs engaging between the shrouds of said gear-teeth at horizontally spaced points above the horizontal diameters of said shuttles, and annular shoulders adapted for peripheral engagement with the shrouds of said shuttle teeth.

19. In a sewing machine, a plurality of longitudinally spaced rotative shuttles, each comprising an annular hook-carrying member and a cop holder surrounded thereby,

said rotative hook-carrying member having shrouded gear teeth, a plurality of longitudinally spaced rotative gears arranged vertically below said shuttles and each having a central horizontal axis, each adapted for driving one of said shuttles and provided with annular shoulders adapted for peripheral engagement with the shrouds of the gear-teeth, two sets of longitudinally spaced rotative disks having ribs engaging between the shrouds of said gear-teeth at horizontally spaced points above the horizontal diameters of said shuttles, and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, one set of said disks having a fixed axis of rotation, a hinged member adapted to be rotated about the central horizontal axis of said gears carrying the second set of disks, and means carried by said hinged member adapted to hold said cop holding members against rotation.

20. In a sewing machine, in combination with the base, a plurality of longitudinally spaced rotative shuttles each comprising an annular rotative hook-carrying member and a cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear-teeth, a plurality of longitudinally spaced rotative gears arranged vertically below said shuttles each having a central horizontal axis and each adapted for driving one of said shuttles and provided with annular shoulders adapted for peripheral engagement with the shrouds of the gear-teeth, two sets of longitudinally spaced rotative disks having ribs engaging between the shrouds of said gear-teeth at horizontally spaced points above the horizontal diameters of said shuttles, and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, fixed means for rotatively supporting one set of disks in the base, a hinged member adapted to be rotated about the central horizontal axis of said gears carrying the second set of disks, and a plurality of plates for spacing said shuttles carried by said hinged member, said plates and cop holders having engaging parts adapted to prevent the rotation of said cop holders.

21. In a sewing machine, in combination with the base, a plurality of longitudinally spaced rotative shuttles each comprising an annular rotative hook-carrying member and a cop holder surrounded thereby, said rotative hook-carrying member having a plurality of shrouded gear teeth, a plurality of longitudinally spaced gears rotatively mounted in the base vertically below said shuttles and each having a central horizontal axis, each gear being adapted for driving

one of said shuttles and being provided with annular shoulders adapted for peripheral engagement with the shrouds of the gear-teeth, two sets of longitudinally spaced rotative disks having ribs engaging between the shrouds of said gear-teeth at horizontally spaced points above the horizontal diameters of said shuttles and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, fixed means for rotatively supporting one set of disks in the base, a hinged member adapted to be rotated about the central horizontal axis of said gears carrying the second set of disks, and means carried by said hinged member adapted for engagement with said shuttles to hold the same in a fixed angular position when assembling them.

22. In a sewing machine, in combination with a base, a plurality of longitudinally spaced rotative shuttles each comprising an annular rotative hook-carrying member and a fixed cop holder surrounded thereby, said rotative hook-carrying member having shrouded gear-teeth, a plurality of longitudinally spaced rotative gears arranged vertically below said shuttles and each having a central horizontal axis, said gears being journaled in the base and being adapted for driving said shuttles and provided with annular shoulders adapted for peripheral engagement with the shrouds of the gear-teeth, two sets of longitudinally spaced rotative disks having ribs engaging between the shrouds of said gear-teeth at horizontally spaced points above the horizontal diameters of said shuttle, and having annular shoulders adapted for peripheral engagement with the shrouds of said gear-teeth, fixed means for rotatively supporting one set of disks in the base, a hinged member adapted to be rotated about the central horizontal axis of said gears carrying the second set of disks, a plurality of plates for spacing said shuttles carried by said hinged member, said plates and cop holders having engaging parts adapted to prevent the rotation of said cop holders, three rods upon which said spacing plates are assembled, two of said rods being supported in open notches formed in said hinged member and fixed stops adapted to engage the ends of said third rod when said hinged member is in closed position.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 29th day of March A.D. 1911.

NELSON DE LONG.

Witnesses:

GEORGE R. WILKINS,
T. H. ALFREDS.