

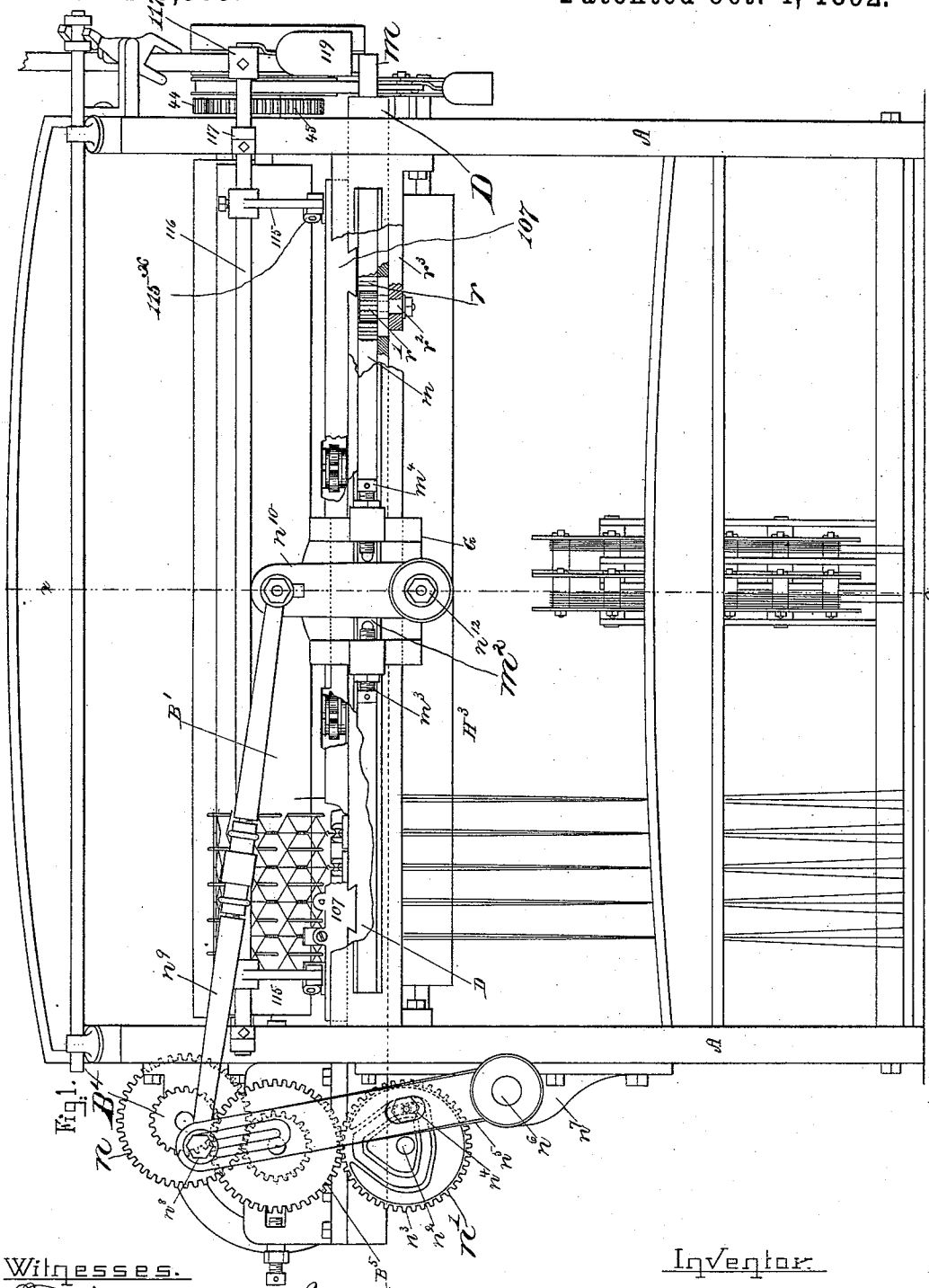
(No Model.)

4 Sheets—Sheet 1.

B. SCARLES.
WIRE NETTING MACHINE.

No. 483,969.

Patented Oct. 4, 1892.



Witnesses.

Fred. W. Ashworth
Fred. S. Gumbach.

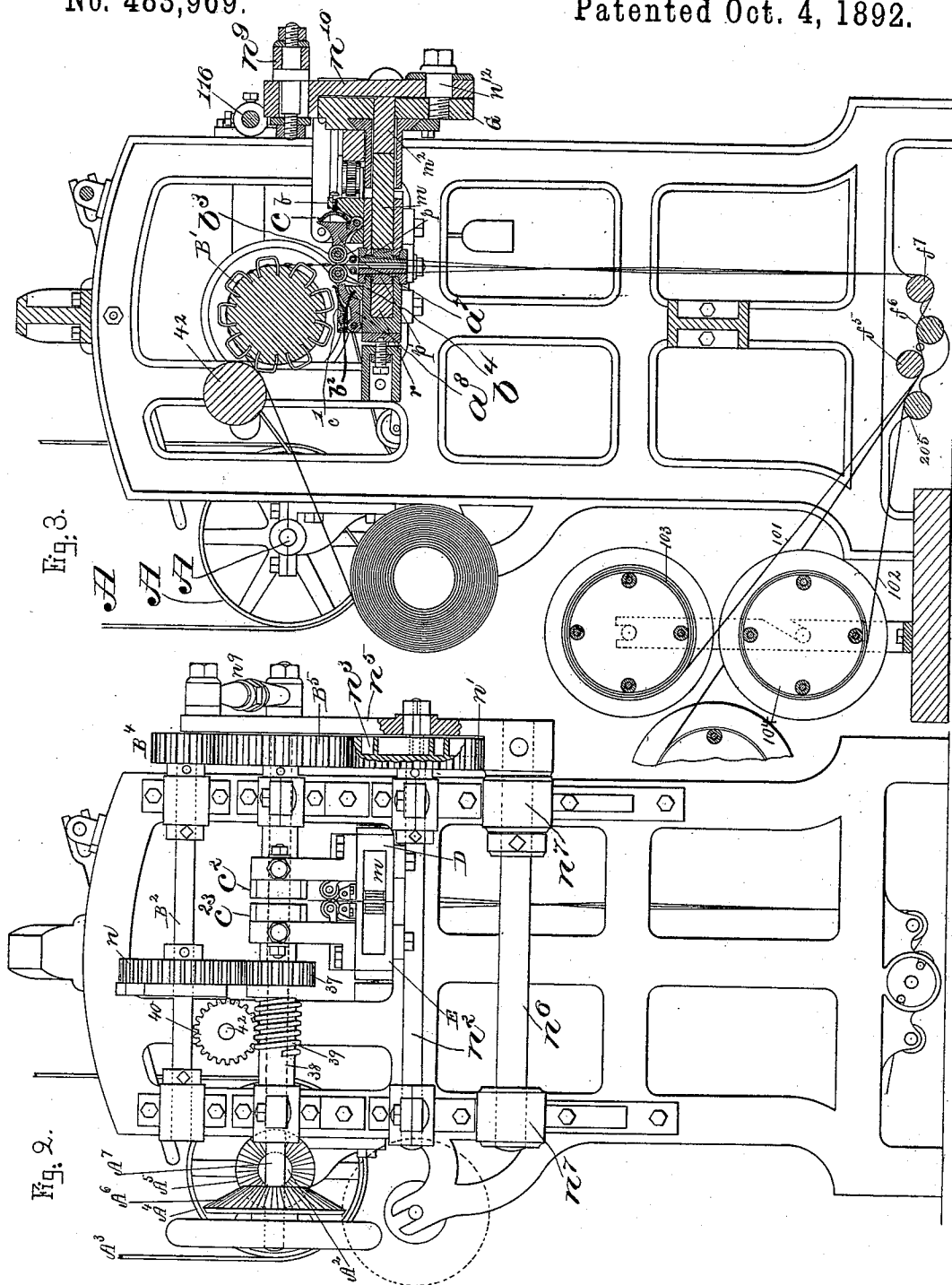
Inventor:

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B. SCARLES.
WIRE NETTING MACHINE.

No. 483,969.

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Witnesses.

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Frederick L. Greenleaf.

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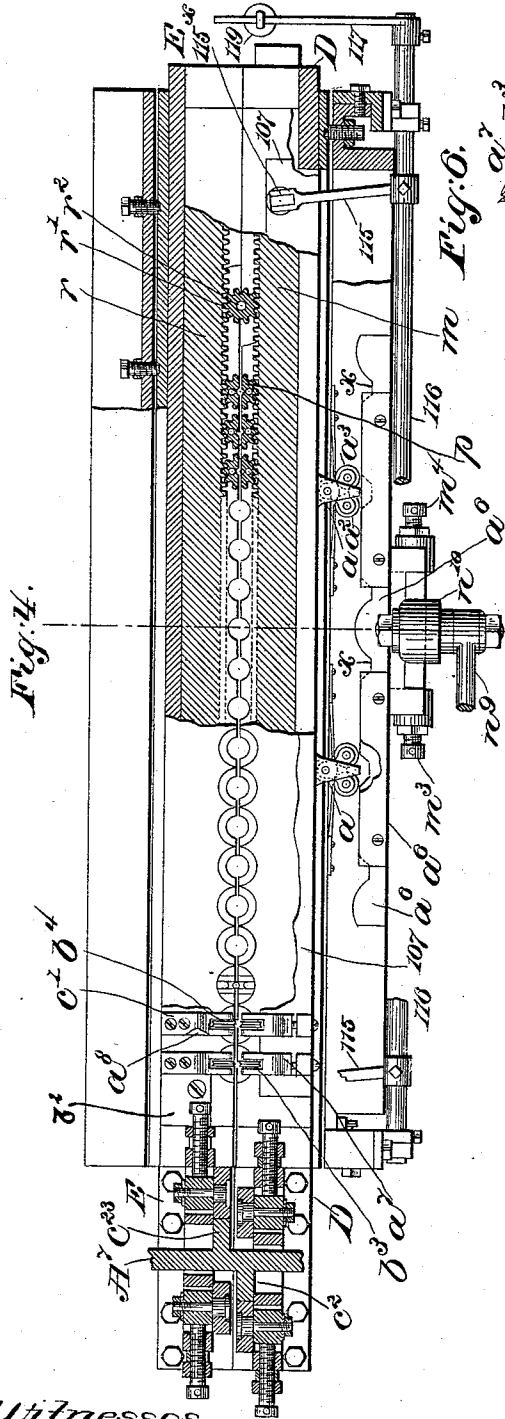


Fig. 4.

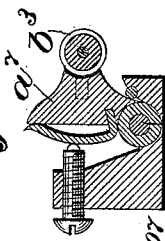


Fig. 6.

Fig. 5.

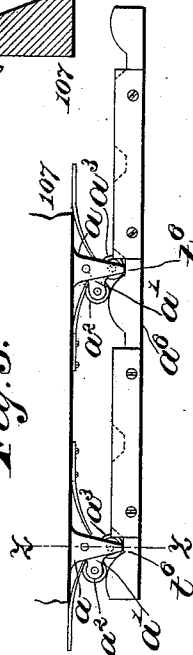


Fig. 7.



Fig. 5.

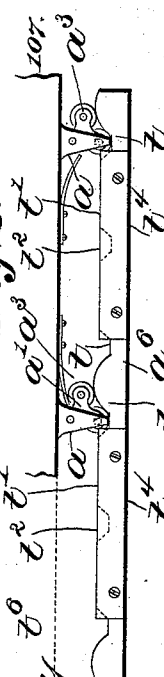
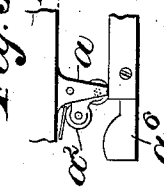


Fig. 5.



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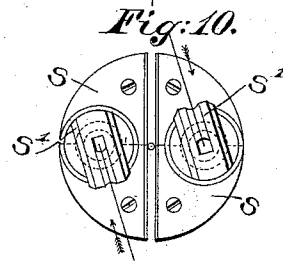
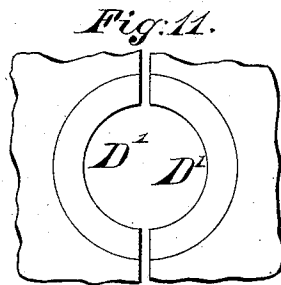
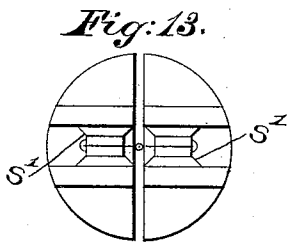
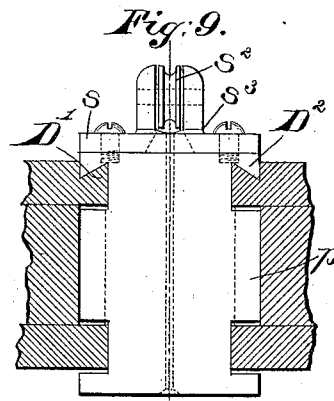
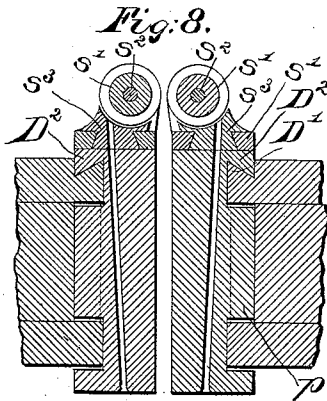
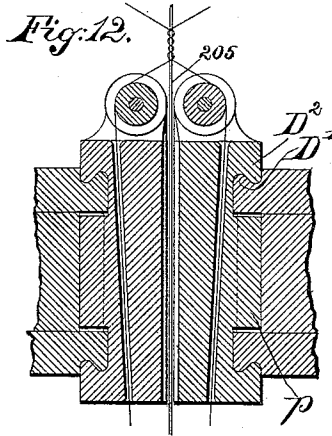


Fig. 14.

Fig. 15.

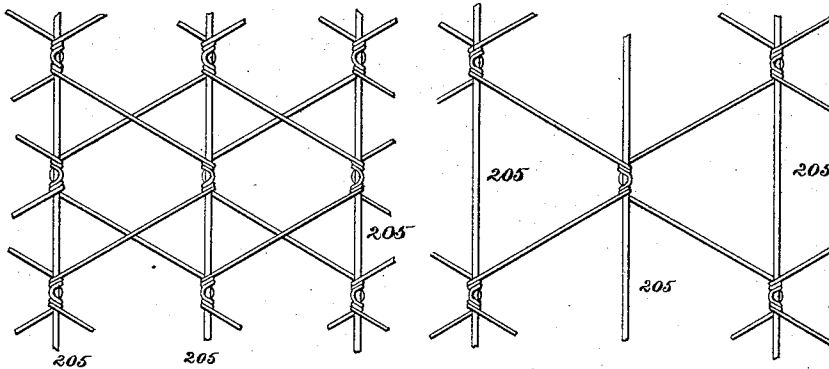
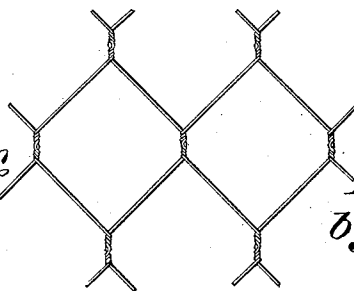


Fig. 16.



Witnesses.

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UNITED STATES PATENT OFFICE.

BENJAMIN SCARLES, OF CLINTON, MASSACHUSETTS, ASSIGNOR TO THE
CLINTON WIRE CLOTH COMPANY, OF SAME PLACE.

WIRE-NETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 483,969, dated October 4, 1892.

Application filed October 22, 1891. Serial No. 409,632. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN SCARLES, of Clinton, county of Worcester, State of Massachusetts, have invented an Improvement in Wire-Netting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object to so improve machines for the production of wire-netting that a longitudinal strengthening-strand may be introduced and run through each mesh, if desired. The machine described in United States Patent No. 433,633, granted to me August 5, 1890, shows means for introducing such longitudinal strand into a particular line of meshes, and a strand might be introduced in any one line of meshes, but not in all. The machine described in the said patent had the faces of its twisting-segments cut partially away for the passage of a strand-wire to the center of motion of the segments in only one direction, the said segments being each provided with a lug to contact with the face of an opposite segment, the said lugs being a necessity to enable the segments to be kept seated in their bearings in the sliding carriages. To enable strand-wires to interchange with the mesh-wires from right to left, and vice versa, so as to put a strand-wire in each line of meshes, it is necessary to provide a clear open space for the strand-wires between the faces of the twisting-segments, and to enable this to be done I have devised means to loosely connect the twisting-segments with the sliding carriages and yet permit the said segments to pass readily from one to the other carriage, as required. The means of connection which I prefer is some sort of a track to co-operate with a shoe, one being on the carriage and the other on the segment.

15 In ordinary wire-netting machines, and in fact in all such machines known to me, the mesh-wires are delivered from holes in the tops of the twisting-segments. In practice the wires are subjected to very considerable strain and drag on the tops of the segments, thus rapidly cutting and wearing away the said openings. To obviate this rapid wear

on the segments, I have provided them with sheaves or rolls, over which the wires may travel freely without friction, the said sheaves when worn being readily renewed. The size of the mesh in the direction of the length of the netting is controlled by the speed of the mesh-roll, and when the speed is slow the meshes are wider across the net than in the length thereof. The sheaves referred to should, for the best results, be free to not only rotate about their own horizontal axes, but also to turn about vertical pivots, thus preventing any liability of the wire slipping laterally off the sheave under great strain. To obviate this, the axis of the sheave may be mounted on a collar or sleeve surrounding the wire-passage, said collar being free to turn about said wire-passage by the action or strain of the wire on the sheave.

20 The improvements referred to may be incorporated in a machine such as represented in United States Patents Nos. 433,633 and 380,664, wherein the mesh-wires are twisted one about the other in usual manner, or the mesh-wires may be twisted together, as represented in United States Patent No. 387,739, and I have herein chosen to illustrate my said improvements as applied to a machine adapted to twist the wires as provided for in the latter patent.

25 In the Patent No. 387,739, while the reverse twist was being put in the wires were held between long jaws having pins extended between the wires, the said pins preventing any possibility of the netting being moved or fed along, and consequently the rotation of the mesh-roll was suspended while the so-called "reverse twist" was taking place, thus materially lessening the productive capacity of the machine, which is a serious fault when it is remembered that to enable wire fencing to be largely used it must be made as economically as possible. I have therefore devised means whereby the pins mentioned are dispensed with, yet the strands twisted together in one direction are firmly clamped while the reverse twist is being put in, and the mesh-roll continues to work during the reverse twisting. Instead of the pins I employ clamps capable of moving with the wire-netting in the direction of the feed of the netting by the

mesh-roll and at a speed determined by the speed of said roll. For fine wires the clamp may be composed of rolls, and these rolls may be mounted on levers or fingers adapted to turn about a fulcrum, such movement being at times desired—as, for instance, when a joint in the wire comes between the clamp-rolls. For very heavy wire-netting I may, in place of the clamp-rolls, substitute clamp-dogs, as will be described. I have devised novel means for actuating the bars, in which are mounted the levers or fingers containing the clamping-surfaces.

In the Patent No. 387,739 the rack-bar for rotating the twisting-segments derived its rotation from a crank and pitman, the crank rotating continuously; but in this present invention in order to accommodate the peculiar clamping mechanism and continuous rotation of the mesh-roll I have devised means whereby the pitman for actuating the rack-bar is driven from a radius-bar moved by a cam, as will be described.

Figure 1 in front elevation represents a sufficient portion of a wire-netting machine to enable my invention to be understood, some parts of the machine being partially broken away to show other parts at the rear, the mesh-wires and strand-wires being but partially shown to thus obviate confusion of lines in the drawings, the reels carrying the wires being omitted, except at the center of the machine, it being expected that in practice the reels will extend from one to the other end of the machine and that the machine will be supplied from one to its other end with wires, as represented at the left in Fig. 1. Fig. 2 is a left-hand end elevation of the machine shown in Fig. 1, the reels being omitted. Fig. 3 is a section on the line *z*, Fig. 1, it being supposed, however, that the machine is fully supplied with twisting-segments, especially in the said line. Fig. 4 is a detail in plan view, broken out at different places, of carriages, rack-bars, segments, clamps, &c., to be referred to; Figs. 5, 5^a, and 5^b, three details showing different positions for the parts instrumental in actuating the wire-clamping devices which are effective during the reverse twisting operation. Fig. 6 is a sectional detail showing one of the clamping-surfaces. Fig. 7 is a modified form of clamping-surface; Fig. 7^a, a section on the line *z z*, Fig. 5. Fig. 8 is an enlarged sectional detail taken through a pair of segments to show the tracks which retain the segments upon the carriages and also the swiveling features of the sheaves. Fig. 9 shows an inner side view of one of the segments shown in Fig. 8. Fig. 10 is a top view of the segments shown in Fig. 8. Fig. 11 is a top view of the carriages to illustrate their segment-tracks. Figs. 12 and 13 are respectively a section and top view of segments wherein the rolls do not rotate about the centers of the mesh-wires. Figs. 14 and 15 show pieces of netting such as may be made on the machine to be described, and Fig. 16 shows a

piece of netting such as may be made by omitting the strand-wires.

Referring to the drawings, the framework A, the rolls *f*⁷ *f*⁶ *f*⁵, the reels 103 and 104 for the mesh-wires 101 102, and the strand-wire 205, coming from a like reel, (shown partially in Fig. 3,) the mesh-roll B', the roll 42, having the gear 40 engaged by the worm 39 on the sleeve 38, loose on the shaft A⁷, the said sleeve having a pinion 37, the beveled gear A⁶, engaged by the beveled gear A⁵, fast on the shaft A², having a belt-pulley A⁴, adapted to be rotated by a belt A³, the shaft B², having fast upon it a pinion B⁴, engaged by a gear B⁵, fast on the shaft A⁷, the cams C² C³, fast on the shaft A⁷ (see Figs. 2 and 4) and adapted to act upon roller-studs carried by the sliding carriages E D to reciprocate them, the rack-bar *m*, contained within the sliding carriage D, the gear 44 on the shaft 42, it engaging the pinion 45 on the shaft of the mesh-roll B', (shown in Fig. 1 as provided with pegs for but a portion of its length,) the rock-shaft 116, having the depending arms 115, swivel-jointed at 115^x to the jaw-bar 107, having a tongue-and-groove connection with the surface of the carriage D, upon which it is mounted, the said tongue-and-groove connection being shown in Fig. 1, the arm 117, fast on the rock-shaft 116 and provided with a weight 119, and the means for actuating the take-up roll are and may be all substantially as in the said Patent No. 387,739. The gear 37, loose on the shaft A⁷ and common to the said Patent No. 387,739, in practice was in said patent engaged and rotated intermittently by a mutilated gear; but herein the said gear 37 is engaged by a gear *n*, fast on the shaft B², so that the sleeve 38 has a continuous motion, the worm 39, in engagement with the worm-gear 40 on the shaft 42, effecting a continuous rotation of the mesh-roll. Herein the gear B⁵, common to the said patent, is made to engage and rotate a gear *n*', mounted on a shaft, or it may be a stud *n*², the said gear having a cam-groove *n*³, represented as having four throws, two on each half, the said groove receiving a proper roller or other stud *n*⁴, connected with a radius-bar *n*⁵, shown as fast on a suitable shaft or stud *n*⁶, mounted in suitable bearings *n*⁷, the upper end of the said radius-bar being slotted and having adjustably connected to it by a bolt *n*⁸ one end of a connecting-rod *n*⁹, the opposite end of which is adjustably connected with an arm *n*¹⁰, having its fulcrum on a stud-bolt *n*¹², (shown best in Fig. 3,) held in a depending portion of an auxiliary slide G, which is substantially the same as the auxiliary slide designated by like letter in the patent referred to, the said slide being adapted to be reciprocated upon a dovetailed track at the front side of the frame.

The connecting-rod *n*⁹ will preferably be made in two parts, so as to be adjustable as to its effective length.

The rack-bar *m* has a forwardly-projecting

of the wire with the segments at the open ends of the passages. These rolls, located, as represented, beyond or outside the open ends of the delivery-passages for the mesh-wires, are also of very great value when certain classes of wires are being used, for by passing the wires once around the rolls or sheaves, the latter act to "swage," as it is called, or straighten the wires, thus making a netting very smooth and uniform. The rolls are also of very great utility, for they enable galvanized wire to be worked successfully, as they obviate wearing the galvanized coating. It is not intended, however, to limit this invention to the particular shape of the sheave or delivery-roll or to the mounting of the delivery-rolls so that they will swivel, for the said rolls without the swiveling feature are a very great benefit.

I have shown in the modification, Figs. 12 and 13, the rolls as having their journals mounted in fixed bearings upon the upper ends of the twisting-segments.

It is not intended to limit the use of the tracks for the segments, or the delivery-rolls, or the two racks to a machine for uniting wires by a reverse twist; but the same may be used when the mesh-wires come from cop-tubes, as represented in United States Patent No. 433,633. I have, however, herein shown the mesh-wires as united by reverse twisting, and the mesh-wires are so twisted reversely at each juncture about a strand-wire; but should I desire I may leave out one or more strand-wires 205 at any desired point.

In the patent referred to, after the first part of the twist in a mesh had been put in a pin carried by a clamp-jaw entered between the mesh-wires, and the twisting-segments were reversed in their motion, putting in the reverse twist; but, as stated, when the pin was in working position the motion of the mesh-roll had to be suspended during the reverse twist to enable the strands to be held firmly when the reverse twist was to be put into the mesh-wire, and to not necessitate stopping the rotation of the mesh-roll I have provided movable clamping-surfaces, which, when the wire is of smaller diameter or not very heavy, may be a pair of rolls b^3 b^4 , one having a groove and the other a projection to fit the groove, as best represented in Fig. 4 and in the enlarged detail, Fig. 2^a. The rolls or movable clamping-surfaces b^3 are represented as mounted upon levers or fingers a^7 , pivoted at a^{7x} on the jaw 107, adapted to be moved forward and backward or toward and from the wires being twisted, as in United States Patent No. 387,739, referred to. The rolls b^4 are represented as mounted on fingers or levers a^8 , pivoted on suitable ears or stands erected on the carriage E. The jaw 107 is moved forward to clamp the mesh-wires between the rolls b^3 and b^4 after the said wires have been twisted in one direction, the rolls or clamps engaging and holding the said wires as the reverse twist is being commenced.

The jaw-bar 107 (see Figs. 4 and 5) at its outer edge has, as represented, two lugs a , on which are pivoted levers a' , each having, as shown, two antifriction-rolls a^2 and a^3 , springs a^4 and a^5 acting on said levers to normally keep them in the central position Fig. 4, but permitting them to turn about their pivots on the lugs a to enable the said rollers to enter notches in a push-bar a^6 , attached to and sliding in unison with the rack m and the auxiliary slide G, said bar, as herein shown, having six cam-recesses.

The mesh-wires need to be clamped only while the second or reverse half of the twist is being effected therein, and the surfaces between which the wires are at such time held must hold the wire with sufficient force to prevent the first part of the twist from being untwisted, and, as herein provided for, the said clamping-surface must also be able to move in the direction of the travel of the netting under the action of the mesh-roll.

In the form in which my invention is herein embodied I have devised means (the cam n^3) to divide each complete right and left movement of the rack into two steps, and between the first and second steps of the rack-bar the carriages are moved to shift or redistribute the twisting-segments, each pair of said segments in each operative position being rotated first in one and then in an opposite direction to put in the first and then the second part of the mesh-twist, the second part or half being always the reverse of the first part or half; but the last half of each mesh-twist is always in the same direction as the first half of the next mesh-twist to be made in the direction of the length of the netting. After the first part of each twist has been put in the jaw-bar 107 on the carriage D is moved toward the jaw-bar b^2 , fixed on the carriage E, the clamping-surfaces b^3 and b^4 (shown as rolls) being used if the wire being twisted is not very stiff, the said wire being firmly clamped while the second part of the mesh-twist is put in in a direction opposite the first half, the roll-like surfaces turning as the net is moved by the mesh-roll, and if during this time a knot caused by joining two ends of the wires should come between the said rolls or surfaces the pivoted levers carrying the said rolls or surfaces will rise, the springs c and c' (shown in Figs. 3 and 6) permitting them to rise and throwing them down quickly on the passage of the knot. If the wire is quite stiff, the rolls b^3 and b^4 , mounted on studs held in ears of the levers a^7 a^8 , are removed, and in their place I substitute the modified form of clamp b^5 , (shown in Fig. 7,) it having a stud b^9 to enter a hole (shown by dotted lines, Fig. 6) in the clamp-carrying lever, one such clamp for each lever, the said clamps engaging the wires snugly by their V-shaped mouths and rising with the net, they being disengaged from the wire when the jaw 107 is retracted by the weight 119.

Referring to Figs. 4 and 5, showing the le-

arm m^2 , (shown best in Fig. 3,) which enters substantially and snugly a slot in the auxiliary slide G. The auxiliary slide has stop-screws $m^3 m^4$, which may be turned in or out more or less, according to the amount of lost motion desired between the arm n^{10} and the said stop-screws, and as the radius-bar n^5 is vibrated by the cam the arm n^{10} is also vibrated, and by its contact with the stop-screws moves the auxiliary slide more or less, taking the rack-bar m in unison with it, so that the latter, in engagement with the teeth of the twisting-segments p , rotate the latter. The segments are substantially alike, and each has a series of teeth to be engaged by the said rack-bar. Herein I have added to the machine a second rack-bar and have marked the same r , it being made operative through the rack-bar m and an intermediate pinion r' on a suitable stud r^2 , (shown in Fig. 1 by breaking away the front carriage and rack-bar m ,) the said stud being held in a fixed part r^3 of the frame.

Herein each carriage E D is provided about the semicircular bearings for the necks of the twisting-segments with a track, as D' , (represented best in Fig. 11,) said tracks receiving segmental shoes D^2 , forming parts of the twisting-segments, the construction of the tracks or guides being such that the faces of the twisting-segments are kept from contact or separated sufficiently to enable the said segments, when their faces are parallel with the inner faces of the sliding carriages and the carriages are being shifted to the right or left, to pass over the strand-wires. When the said twisting-segments are rotated to travel from one into the other carriage, the shoes D^2 will follow on the tracks D' from one to the other carriage, and during this movement the teeth of the twisting-segments will remain properly in mesh with the teeth of the rack-bars employed to actuate them.

It is not intended to limit this invention to the exact means herein shown to retain these twisting-segments in operative position with relation to the carriages, so that they may be actuated by the racks, and instead of the particular shoes and tracks shown many other equivalent contrivances might be employed—that is to say, it is immaterial whether the projection constituting the shoe come from the segment and enter the carriage or whether the projection be upon the carriage and enter a groove in the segment—the gist of my invention in this particular including any equivalent means or devices which will retain the twisting-segments in position upon the carriages and with the teeth of the segments in engagement with the racks, and yet leave an open space between the segments to enable them to pass over a strand-wire at either stroke of the carriages when desired.

In this my invention one rack in engagement with one segment starts and rotates that segment, causing its shoe to pass to the track of the opposite carriage, and then a second

rack engages the said segment and completes its movement in that direction, each rack working without interference from the other, one rack leaving the teeth of a segment just as the other rack engages it. This is an important feature of my invention.

To obviate the enlargement of the mesh-wires of the upper ends or mouths of the passages in the twisting-segments through which the mesh-wires are delivered, I have provided each segment with a sheave or roll s' and, for the best results, I have mounted the axes s^2 of the said sheaves (shown as sleeves) in ears of a swiveling collar or sleeve s^3 , so applied to the segments as to be free to rotate about the mesh-wires which are being delivered therefrom.

In this present instance of my invention, as shown in Fig. 8, the lower ends of the sleeves referred to are made conical and enter correspondingly-shaped openings in cap-plates attached to the top of the segments in suitable manner, the said cap-plates being made in halves, as best represented in Fig. 10, so that they may readily fit the conical shank of the sleeve. By the employment of these delivery sheaves or rolls the mesh-wires are delivered without friction upon the twisting-segments, and the power required to run the machine is greatly lessened, and if a sheave becomes worn a new one may be readily substituted. These sheaves are very essential, the more essential as the wire used increases in size, and by their employment very great saving in cost of segments is made. The swiveling feature of the segment is very desirable, especially when the speed of the mesh-roll is slow and the mesh is narrower in the direction of its length than of its width, or when substantially-square meshing is being made, as at such times the sheaves by the rotation of the sleeves are enabled to deliver the wire straight, and the strain upon the wire never causes the same to leave the grooves of the sheaves.

In practice a machine having its twisting-segments provided with rolls, as described, may be used to make netting from wires of different diameters, and a wire of any diameter within the capacity of the mouth of the segment may be used at any time, which could not be done on a machine having twisting-segments of the usual kind, for the reason that the strain on the wire led out through the mouth of the segment of usual form soon causes the wire to cut a groove a little larger than itself in the segment, and a segment so cut by one wire cannot afterward be used successfully for a wire of another diameter. The employment of the rolls therefore makes it practicable on one and the same machine to produce netting from wires of any desired diameter. When the rolls are used, the segments are not cut or grooved by the wire; but the rolls when cut may be easily and cheaply renewed. The peripheries of the rolls or sheaves are so located with relation to the mesh-wire passages as to prevent the contact

vers a' and bar a^6 , where both rolls a^2 and a^3 rest on a straight part of the bar a^6 , the jaw 107 is out away from the jaw b^2 and is kept so by the weight 119, common to the Patent No. 387,739. When the clamps are to hold the wires for the second half or reverse part of the mesh-twist, the bar a^6 in its movements brings a notch therein opposite one of the rolls of the levers a' and the said rolls enter the said notches.

Viewing Fig. 4, let it be supposed that the bar a^6 is about to be moved toward the left. During the first part of the movement of the said bar the racks m and r will rotate the segments and the rolls a^3 will enter the notches t of the said bar, as shown in Fig. 5^a. Next the movement of the bar a^6 is reversed or it is moved to the right, and during this movement one of the shoulders or sides of the said notches by acting on the rolls a^2 (shown in Fig. 5^a) causes the jaw-bar 107 to be pushed forward into clamping position, causing the clamps referred to to clamp the wire snugly between them, and while the shoulder continues to hold the clamps closed on the wire the reverse turn of the segments takes place through the action of the said bars then moving to the right. After the shoulders of the bar a^6 act, as described, to move the clamping-bar 107 forward, the rolls a^2 in the continued movement of the bar a^6 ride on the surface t' , said surface being a straight part of the bar, and finally the rolls a^2 come opposite the notches t^2 , and were it not for the lugs a the rolls a^2 would fully enter the said notches and the incline at one side thereof would immediately act in the farther movement of the bar a^6 to the right to again cause the jaws to clamp the wire; but these lugs as the clamping-bar 107 recedes for a slight distance, as represented, say, by the dotted lines y and z , Figs. 3^a and 5, meet the stop-plates t^2 , and inasmuch as the clamp-bar normally acted upon by the weight 119 cannot move back and take with it the rolls, it results that the rolls are relieved by the lugs a from the duty of holding the clamp-bar 107 forward, and the levers a' , carrying the rolls a^2 a^3 , are free to turn on their pivots and resume the positions shown in Fig. 1. This done, the carriages are moved to the right to shift the segments and the rack-bars are moved in the same direction to twist the segments, and while the twisting is taking place the bar a^6 is also moved farther to the right until the roll a^3 enters the notch t^2 . (See Fig. 5.) This done, the rack-bar is now started to the left to thus enable a shoulder of the said bar a^6 to act on the roll a^3 , as described, of the roll a^2 and again cause the clamping-bar to be moved forward to clamp the wires while the reverse twist is being put in. This action is repeated with the formation of each transverse row of meshes.

I claim—

1. The carriages and the twisting-segments kept in position thereon by tracks and shoes,

each segment being kept in position upon its own carriage by a shoe, one entering a recessed track on the other, substantially as described.

2. The carriages, combined with the twisting-segments mounted thereon, the said segments being cut away to leave between them a free open space, as described, to enable the said segments in each direction of the movement of the carriages to embrace or come onto a strand-wire, substantially as described.

3. In a machine for the production of wire-netting, two carriages and a series of twisting-segments thereon provided with holes for the passage of wires to the twisting-point, combined with rollers or sheaves, one on each half of each twisting-segment, the said rollers or sheaves being supported by stands erected on the twisting-segments, the wires after leaving the holes in the segments being drawn over the rolls or sheaves, as and for the purposes set forth.

4. The carriages and twisting-segments having wire-passages, combined with delivering sheaves or rolls and independent swiveling sleeves or collars on which they are mounted, each sleeve or collar being free thereby to rotate about the mesh-wire delivered from its supporting-segment, substantially as described.

5. The carriages and twisting-segments cut away at their faces for the introduction of strand-wires, combined with two rack-bars, one for each segment of each pair of segments, substantially as described.

6. The carriages and twisting-segments suitably held by or between them and clamping devices having movable surfaces to clamp the mesh-wires where they are twisted together, combined with devices to move the clamping devices and a mesh-roll and means to move it continuously, substantially as described.

7. The carriages, their twisting-segments, and the jaw-bars, combined with levers having clamping-surfaces adapted to engage the wires at the mesh-twist and travel with the netting during the reverse twist, substantially as described.

8. The carriages, twisting-segments suitably mounted thereon, means to rotate the said segments, and the clamping devices, part of which include the jaw 107, combined with the cam-bar a^6 , devices to move it, and devices intermediate said cam-bar, and the said clamping-jaw 107 to actuate the latter, substantially as described.

9. The carriages, the twisting-segments mounted thereon, the rack-bars, and their connecting-pinion, combined with the cam n^3 , the lever n^5 , and its connections with one of the said rack-bars to intermittingly actuate the rack-bars, substantially as described.

10. The reciprocating carriages and their twisting-segments shaped to leave a space between the segments for a selvage or strand-wire, each semi-segment having a separate

guide-passage for a mesh-wire and having
strands at their upper ends, combined with
rollers or sheaves having their acting sur-
faces located at a distance from and in line
5 with the open ends of the mesh-wire passages
to thereby adapt the said segments to manipu-
late wire of different diameters without in-
jury to the segments.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

BENJAMIN SCARLES.

Witnesses:

GEO. W. GREGORY,
FRANCES M. NOBLE.