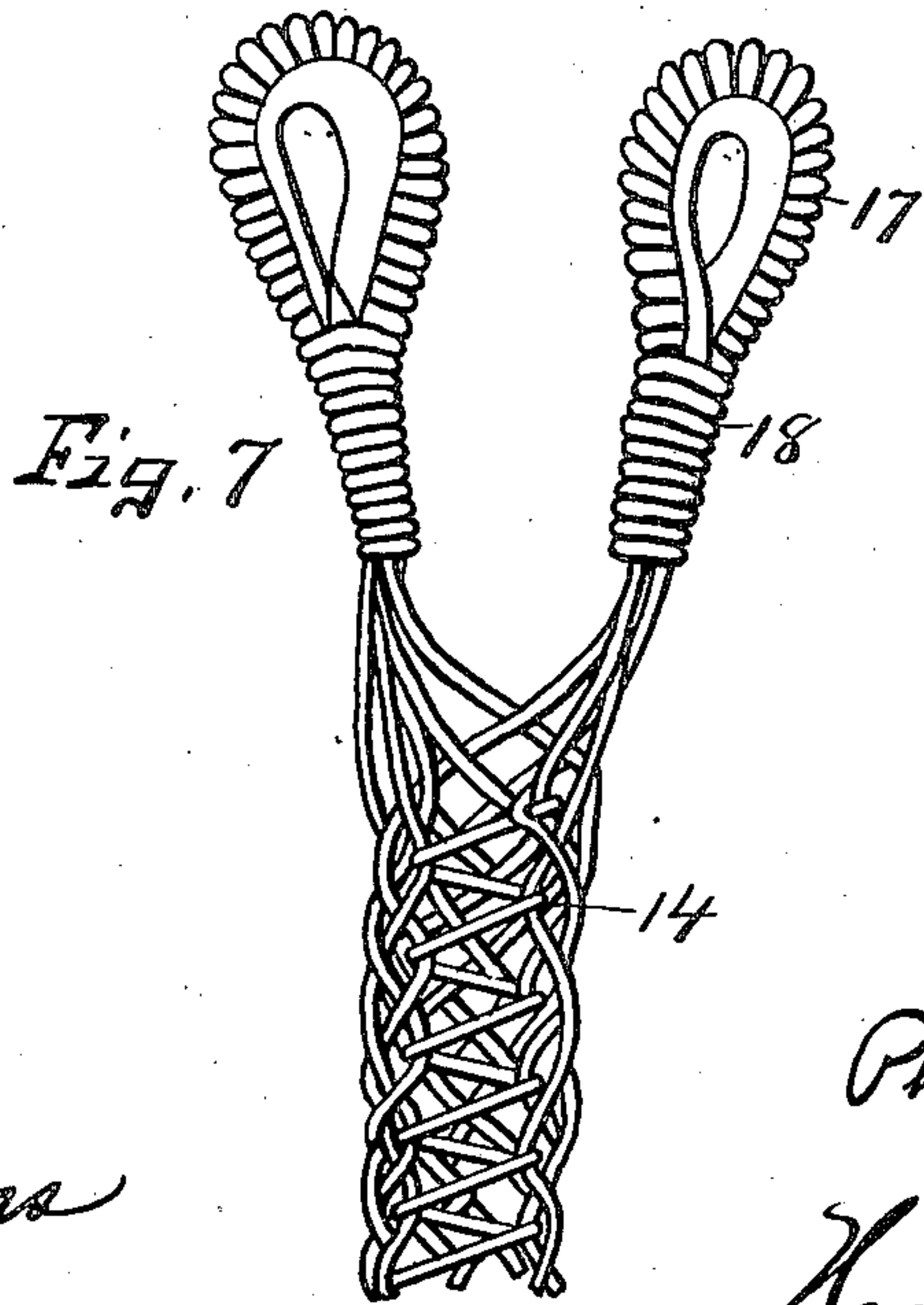
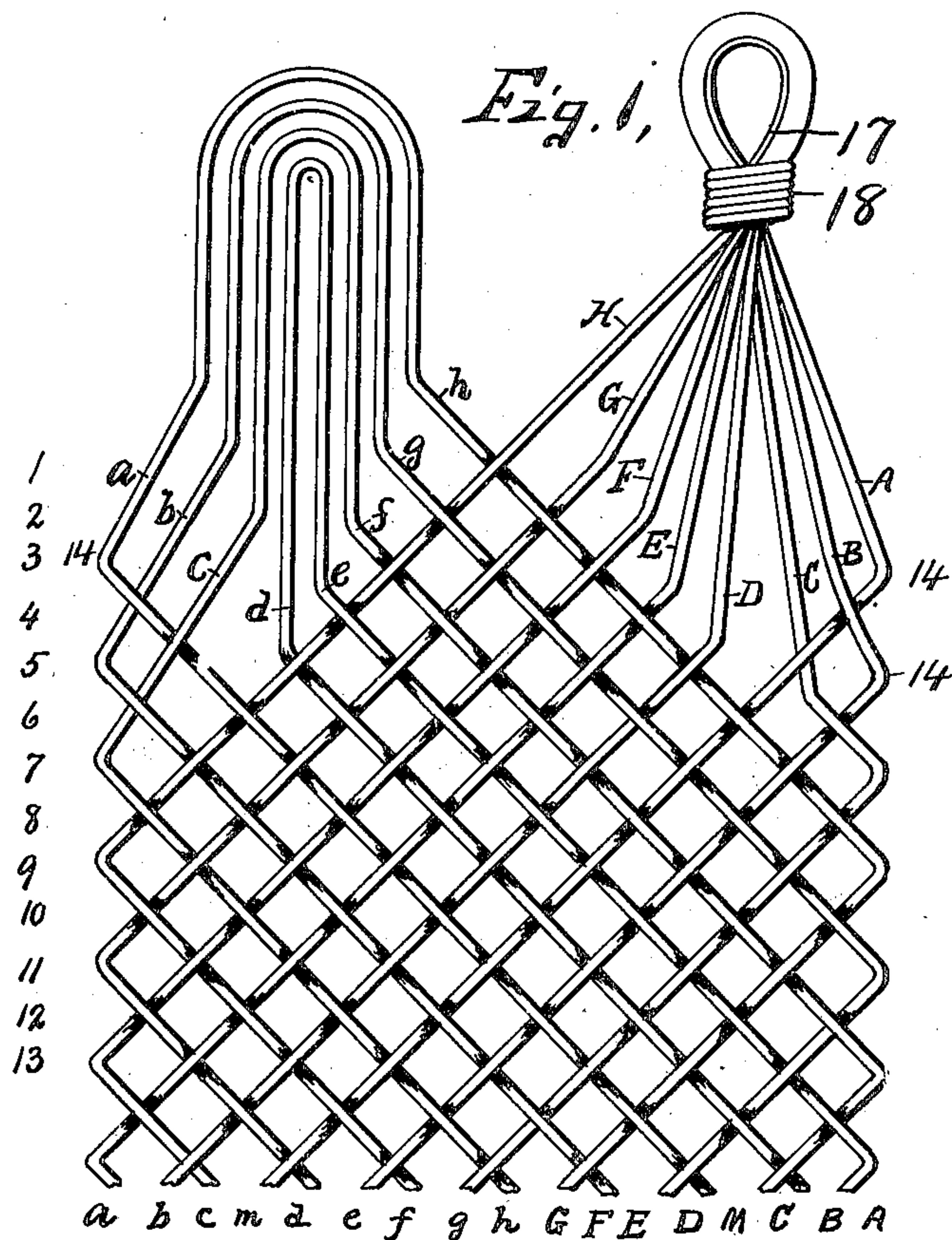


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 APPARATUS FOR WEAVING TUBULAR WIRE FABRICS.
 APPLICATION FILED OCT. 2, 1907.

922,438.

Patented May 18, 1909.
 3 SHEETS—SHEET 1.



Witnesses.
A. C. Thomas
W. E. Chase

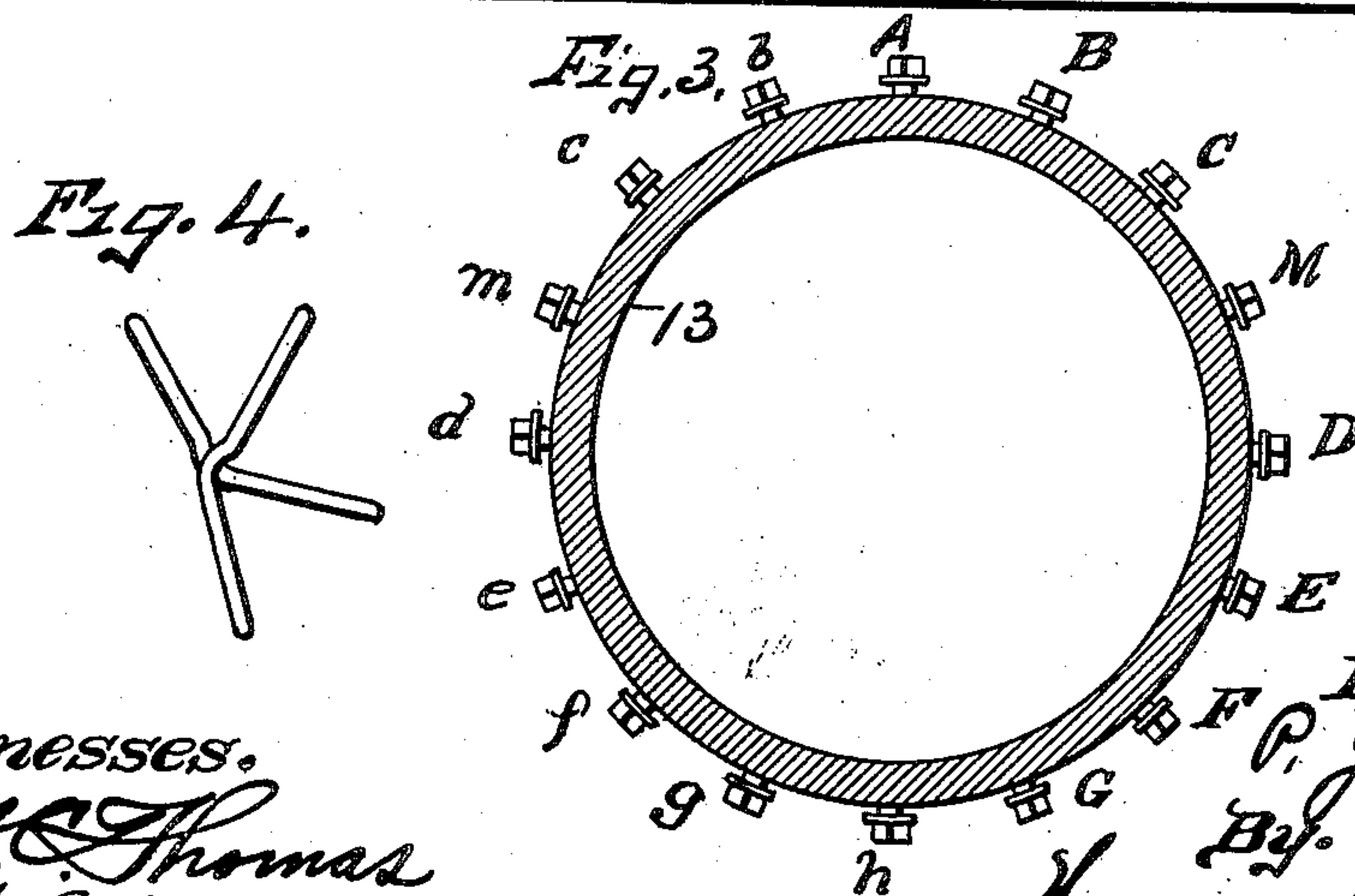
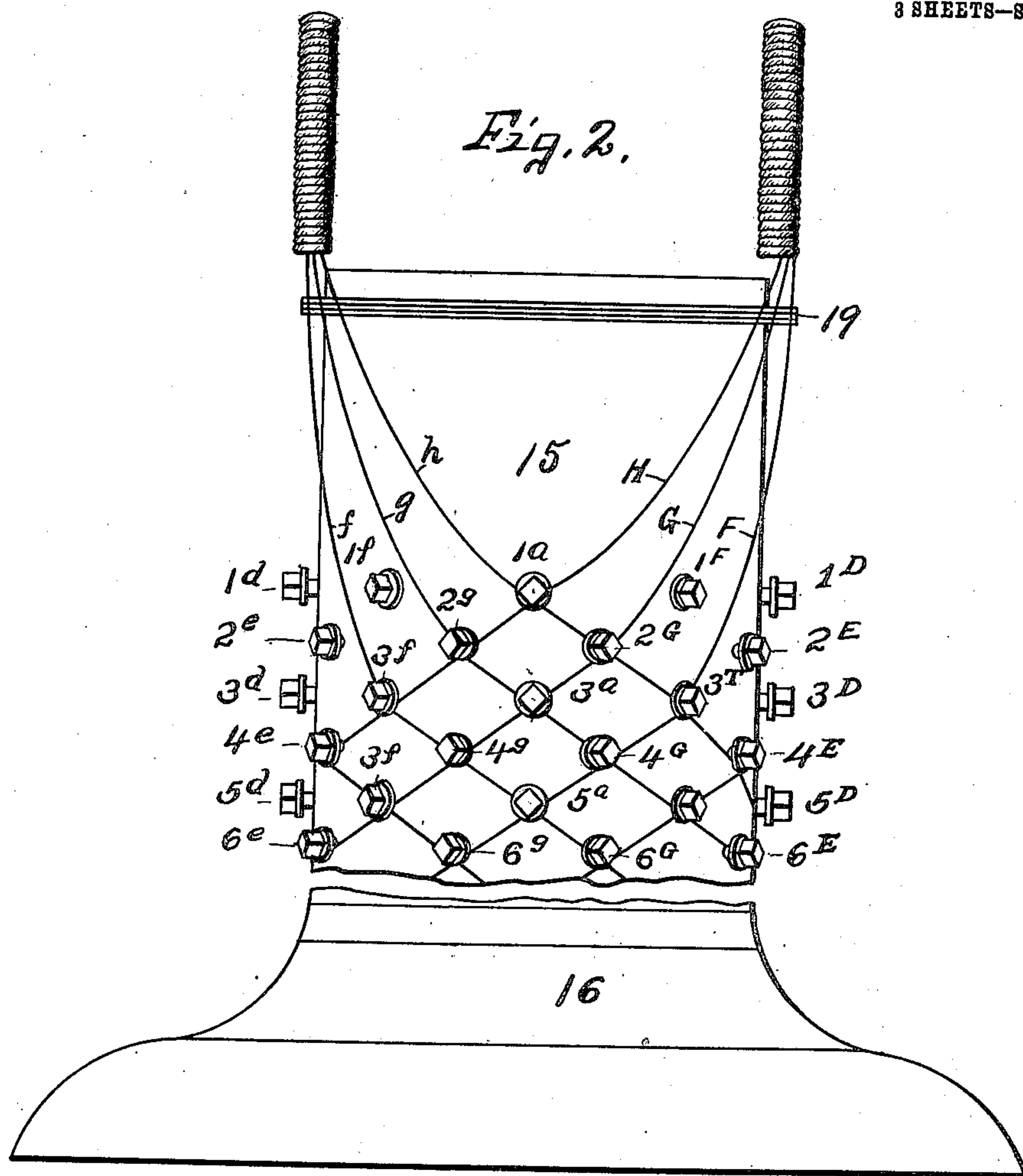
Inventor.
Philip J. Martin
 By.
Lawrence P. Brinson
 Attorney.

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Witnesses.
J. C. Thomas
W. E. Chase

Inventor.
P. J. Martin
 By.
Howard P. Driscoll
 Attorney.

P. J. MARTIN.
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3 SHEETS—SHEET 3.

Fig. 5.

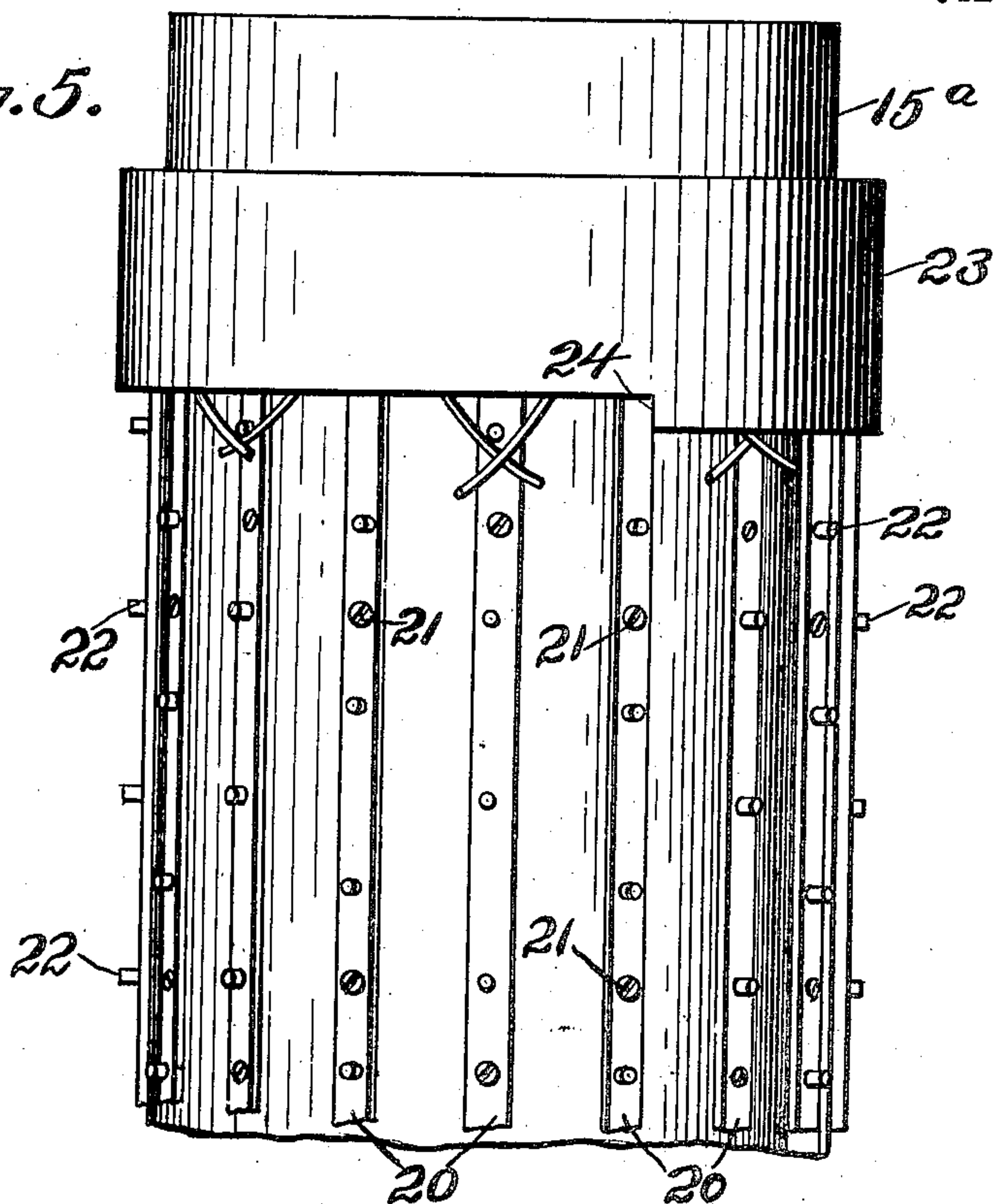
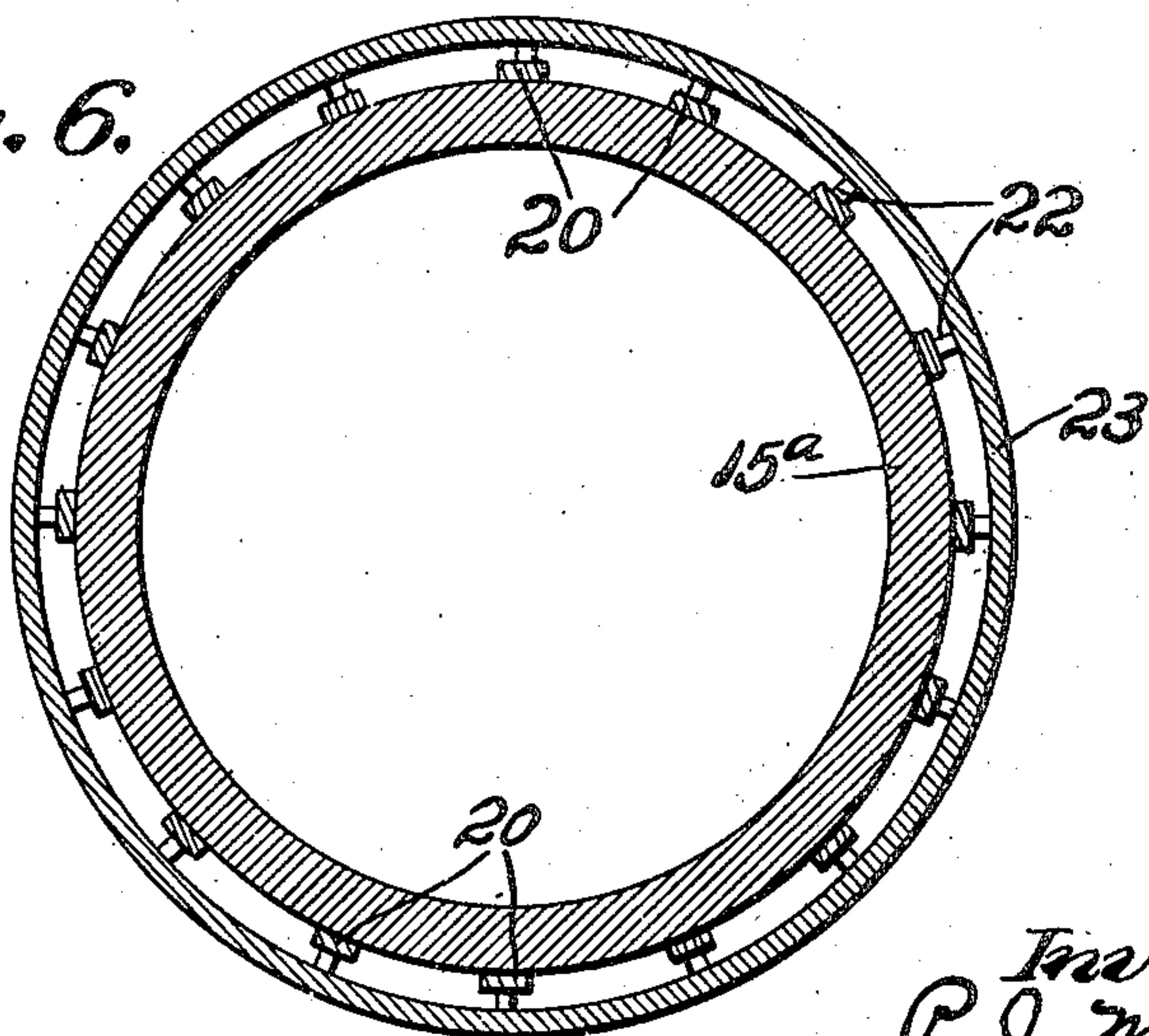


Fig. 6.



Witnesses.

W. E. Thomas
W. E. Chace

Inventor.
P. J. Martin
 By.

Howard P. Krinson
 Attorney.

UNITED STATES PATENT OFFICE.

PHILIP J. MARTIN, OF SYRACUSE, NEW YORK, ASSIGNOR TO WALTER F. MARTIN, OF WEST HOBOKEN, NEW JERSEY.

APPARATUS FOR WEAVING TUBULAR WIRE FABRICS.

No. 922,438.

Specification of Letters Patent.

Patented May 18, 1909.

Original application filed March 4, 1907, Serial No. 360,557. Divided and this application filed October 2, 1907. Serial No. 395,549.

To all whom it may concern:

Be it known that I, PHILIP J. MARTIN, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Apparatus for Weaving Tubular Wire Fabrics, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in apparatus for the manufacture of woven metal cable grips of the class set forth in my Patent No. 832,401, granted October 2, 1906, whereby the same may be economically constructed by unskilled labor in such a manner as to produce in a grip made by it certain qualities which have been found to be of value therein.

The grip described in Patent No. 832,401 is known as a split grip. It consists, likewise, of a plurality of strands of wire or wire cord woven into an open mesh hollow body cylindrically shaped, but divided longitudinally, the strands not passing around the cylinder but being bent back in the weaving and forming eyelets at the divisional line. The strands have their middle portions twisted together to form two pulling tugs, one on each side of the cylindrically shaped body, immediately above the weaving, as practical tests have demonstrated the superiority of two loops over one in this style of grip. This grip, preparatory to use, is opened up and placed around the cable to be drawn at any desired point along the length thereof; lacing is passed through the above mentioned eyelets. The gripping action of these grips is due to the change of form of the meshes. When a pull is exerted on the pulling tug the meshes are elongated axially and narrowed circumferentially; this decreases the diameter of the grip and causes the same to firmly grasp the cable. It is obviously of the greatest importance that this lessening of the diameter should occur simultaneously and uniformly throughout the entire length of the grip. To accomplish this, all of the meshes must at any one time be identical, or nearly so; and such identity can only be obtained by making each crossing of the strands a joint, and by making all of the corresponding joints equidistant apart. Owing to the necessary stiffness of the wire

or wire cord of which the grips are composed, it has been found extremely difficult, if not altogether impossible, to obtain these results manually; and it is to overcome this difficulty and make possible the production of grip approximating perfection that my invention is intended.

This application, which is a division of my application Serial No. 360,557, filed March 4, 1907, has for its subject-matter, therefore, a cylindrical former having thereon a plurality of engaging parts adapted to receive the several strands of the grip, and to hold them at their points of intersection with means for clamping the strands at each point of intersection as it is finished. Several forms of such apparatus are hereinafter set forth.

My invention further consists in the construction, arrangement, and combination of parts hereinafter more fully described and claimed.

In the accompanying drawings, which form a part of this application:—Figure 1 is a flat development of a split grip woven upon a former constructed in accordance with this invention. Fig. 2 is an elevation of a former constructed in accordance with this invention, a cable being shown as being woven thereon. Fig. 3 is a horizontal section through Fig. 2. Fig. 4 is a perspective view illustrating the manner of forming articulated joints in the fabric. Fig. 5 is an elevation of another type of former. Fig. 6 is a horizontal section taken therethrough. Fig. 7 is a perspective view of a part of a completed grip.

One type of the former is shown in Figs. 2 and 3. This consists essentially of a cylindrical body—15—of approximately the diameter of the grip to be made thereon, arising from a suitable base—16—and having in its surface a plurality of threaded holes, these holes being so disposed in the body that their locations are adjacent to the points of intersection of the strands of the grip to be woven thereon. Each of these threaded apertures is adapted to receive a headed screw or bolt 1^a 1^b—1^A 1^B—2^a 2^b—2^A 2^B—etc. which is threaded to pair with the thread in the aperture. As the operation of this type of former is practically the same for both the closed and split grips, whether with one or

two pulling tugs, the description thereof is confined to its use in manufacturing a double tug split grip.

In Fig. 1 it will be noted that the operator
 5 has gathered a plurality of wires *a*, *b*, *c*, etc., A.B.C. etc., into two bundles, one of which is shown as passed around a gromet—17—, it being fastened thereon by a serving of cord—18—forming a completed tug. In the other
 10 tug of this figure the serving is omitted, and the individual wires of the bundle are separated for the purpose of permitting their course to be more readily traced, although they will be similarly served. The two
 15 gromets with their attached wires are now placed above the upper end of the former—15—, and the wires of the bundles opened out on both sides of the gromets and secured upon the periphery of the upper part of the
 20 former by means of a suitable clip—19—shown in the figure as a wrapping, although it is obvious that a ring, either closed or open, could be employed for this purpose if desired or that any suitable form of fastening
 25 devices could be used. Having thus clamped the wires to the former at a point beneath the gromets the operator takes the wire-end *h* of one bundle and lays it beneath the head of and close against the body of the stud 1^h; he
 30 then takes the corresponding wire-end—H—from the other bundle and passes it also beneath the stud and adjacent thereto and over the wire-end *h*. Having drawn these wires tight he clamps them in place by turning the
 35 headed bolt until its head bears on the two wire-ends, and after they are so clamped he gives each wire-end a sharp bend by lifting the end of the wire-end *h* upwardly and away from the former and the other wire-end H
 40 toward the former. This is repeated at each intersection of two wire-ends and is shown in detail in the perspective view in Fig. 4. The wire end *g* is now laid beneath the pin 2^g over the wire-end H which has
 45 already been laid adjacent to that bolt and their junction is clamped by turning the bolt home and the desired kink is produced at the intersection by bending as before described; after which the wire-end *G* is lead beneath
 50 and adjacent the head of bolt 2^g and is there crossed by the wire-end *h*, which has been already overlaid by the wire-end H at the bolt 1^h, and the intersection formed in the manner before described.

55 The process is repeated with the wire-ends *f* and *e* of the one gromet and the wire-ends F and E of the other gromet, these wire-ends *e*, *f*, *g* and *h* being each ends of the one bundle of wires; and E, F, G and H being ends of the other bundle
 60 of wires, the one set of wire-ends E, F, G, and H being laid in a right-hand twist and the other set *e*, *f*, *g*, and *h* being laid in a left-hand twist. A wire-end *d* whose
 65 opposite end is laid with a left-hand twist

is also spirally laid to the left, its first intersection being with the wire-end H at the bolt 5^d, and the corresponding wire-end D of the opposite bundle is laid in a right hand twist, its first intersection being
 70 with the wire-end *h* at the bolt 5^p. The wire ends *a* and A of the two tugs are brought around bolts 3^a and 3^A respectively, and after being clamped they are carried in a left and right-hand spiral
 75 respectively and interlaced with the right and left hand wire-ends previously laid. These wire-ends *a* and—A—are given a slight right and left hand lay in leading them from the serving of the tugs so that
 80 they form at the bolts 3^a and 3^A loops or bends—14—serving as points at which the wrapping shown in my said patent may be applied. The wire-ends *b* and—B—are likewise given a right and left hand lay
 85 respectively and are interwoven at posts 4^b and 4^B with the left and right hand lays of the wire-ends *a* and A, respectively, before being brought around the bolts 5^a and 5^A after which they themselves are given a
 90 left and right hand lay and interwoven with the previously laid wire-ends.

The wire-ends *c* and C are given a right and left hand lay respectively and interwoven with the wire-ends *a* and *b* and A and B
 95 at—5^c—and 6^b—and 5^c and 6^B respectively, before being passed around the bolts 7^a and 7^A respectively, after which they themselves are given a left and right hand lay respectively. When any wire end by its
 100 spiral lay has been brought to bolts whose exponent in the drawing is marked *a* and A, their lay is reversed and this is continued until by the method of weaving before described a grip of the desired length has been
 105 formed.

It will be noted that by the described lay the wire-ends of the bundles are unequally distributed, that is to say that more of the ends of each bundle are laid
 110 in one lay than the other. Thus with the eight ends of each bundle shown by Fig. 1 five of such ends are given a right-hand lay as to one bundle and a left-hand lay as to the other bundle, the remaining three
 115 wires of each bundle having a left and right hand lay respectively.

In order to provide for the increased number of intersections thus created in the middle rows of intersections and in the
 120 rows of intersections on each side of such middle rows over the number of loops—14—forming around the edge row of bolts whose exponents are marked *a* or A, I as shown prefer to start the first inter-
 125 sections along the middle of the grip in a circumferential row of bolts above the row of bolts which forms the first set of lacing loops—14—. By this means a perfectly even weave is obtained which is of great
 130

advantage in uniformly distributing the pressure created on the inclosed cable by the pull exerted on the heads.

In Fig. 1 I have designated the rows, 5 vertical and horizontal, in which the intersections occur by numerals and letters. It will be understood that a bolt will be located at each such intersection and the foregoing reference character designated the bolts by the intersecting rows in which 10 they are situated. It will also be seen that additional vertical rows of intersections marked *m* and *M* are located between the rows *c*, *d* and *C*, *D*, the first intersections 15 on such rows being at 6^m and 6^M, being the crossing of wire-ends —*a*— and —*H*— and *A* and *h*. It will further be seen that as shown in the flat development seventeen vertical rows of bolts are shown, but in 20 practice the rows *a* and *A* may be the same, as is the case in the showing of Fig. 3, in which event the grip is woven to the diameter of the former on which it is made. After the grip has been woven in this man- 25 ner and completed the bolts are withdrawn and a perfectly smooth surface being given the former, it is slipped therefrom.

It will be noted that by the abrupt bend given to each wire beneath the heads of the 30 bolts that a kink is formed therein which serves as an articulation upon which the strands interwoven therewith turn.

It is obvious that a closed tubular grip may be woven upon the former above de- 35 scribed by properly laying the several strands and weaving them. In this case the spiral lay of each wire is continuous from end to end and is not reversed upon itself as is necessary with the split grip, but the 40 method of producing the articulating joint is equally as applicable and the former serves the purpose as before.

In Figs. 5 and 6 I have shown a modified type of former which is more expeditious in 45 its use than the former previously described, in that it dispenses with the necessity of the individual manipulation of the bolts. In these figures the former consists of a tubular body 15^a somewhat smaller than the diam- 50 eter of the grip to be woven thereon and having projecting therefrom a plurality of radial longitudinal ribs 20, in number equal to the number of longitudinal rows of intersections to be formed in the closed tubular grip to be 55 woven thereon or to the number of longitudinal rows of intersections plus one to be formed with a split grip to be woven thereon. These ribs are detachable and are secured to the tubular body by means of screws 60 —21—, each rib being provided with a series of lugs —22— thereon located in the same relative arrangement as are the clamping bolts of the former shown in Figs. 2 and 3. The ribs do not extend all the way to the top

of the former, and the bundle or bundles of 65 wire forming the loops around the pulling head gromets are secured on such upper end of the former in the manner before described in connection with the former shown in Figs. 2 and 3. 70

A tubular sleeve —23— is adapted to fit over the former and the ribs thereon, being of such diameter as to be capable of rotating and sliding thereon over the lugs on the ribs. The lower end of this sleeve is pro- 75 vided with a reëntering portion —24— which may be formed by a step in the bottom thereof. In using this type of the former after the wires have been gathered into bundles and looped around the gromets, with 80 their wrappings, and have been secured to the former by a tie, the wires are laid around the several lugs upon the ribs one at a time, and as each set of intersecting wires is thus laid and the intersections formed the sleeve 85 which has been placed upon the upper end of the former is, by either a rotary or axial movement or both, so moved as to cause the shoulder upon the lower end thereof to cover and clamp that intersection, after which the 90 wires are kinked as before described.

It will be generally found advisable to form the successive intersections circumferentially around the former and thus the sleeve will be rotated, after making each intersec- 95 tion, through the distance between the two ribs. After a horizontal row has been finished the first intersection of the succeeding row will be formed and this will be covered by an axial movement of the sleeve. It 100 will thus be seen that by the provision of this casing with an offset portion I am able to clamp each intersection as it is formed for the purpose of kinking and holding the wires thereof and at the same time leave the 105 adjacent strands at which the next succeeding intersection is to be made free from the manipulation of the wires thereon.

After the grip has been formed the sleeve is removed from the former, the screws hold- 110 ing the ribs to the former removed, and the tubular part of the former withdrawn from within the grip. The ribs can now be collapsed or moved toward the axial line of the grip thus withdrawing the lugs thereon from 115 engagement with the wires.

What I claim is:

In a former for weaving a wire fabric, the combination with a tubular body, of means for clamping wires thereto, and means for 120 clamping the intersections of the wires as they are formed, substantially as described.

In witness whereof I have hereunto set my hand this 23d day of September 1907.

PHILIP J. MARTIN.

Witnesses:

HOWARD P. DENISON,
H. E. CHASE.