

No. 777,437.

PATENTED DEC. 13, 1904.

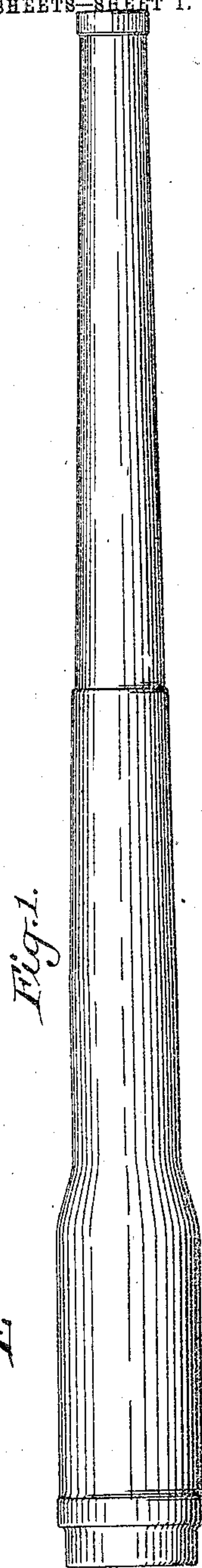
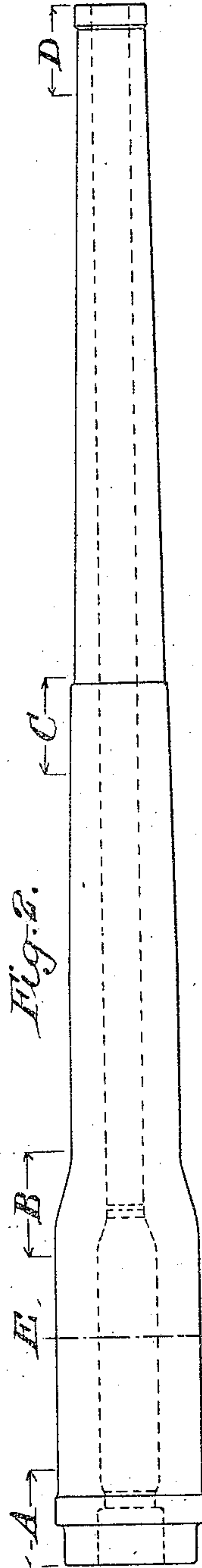
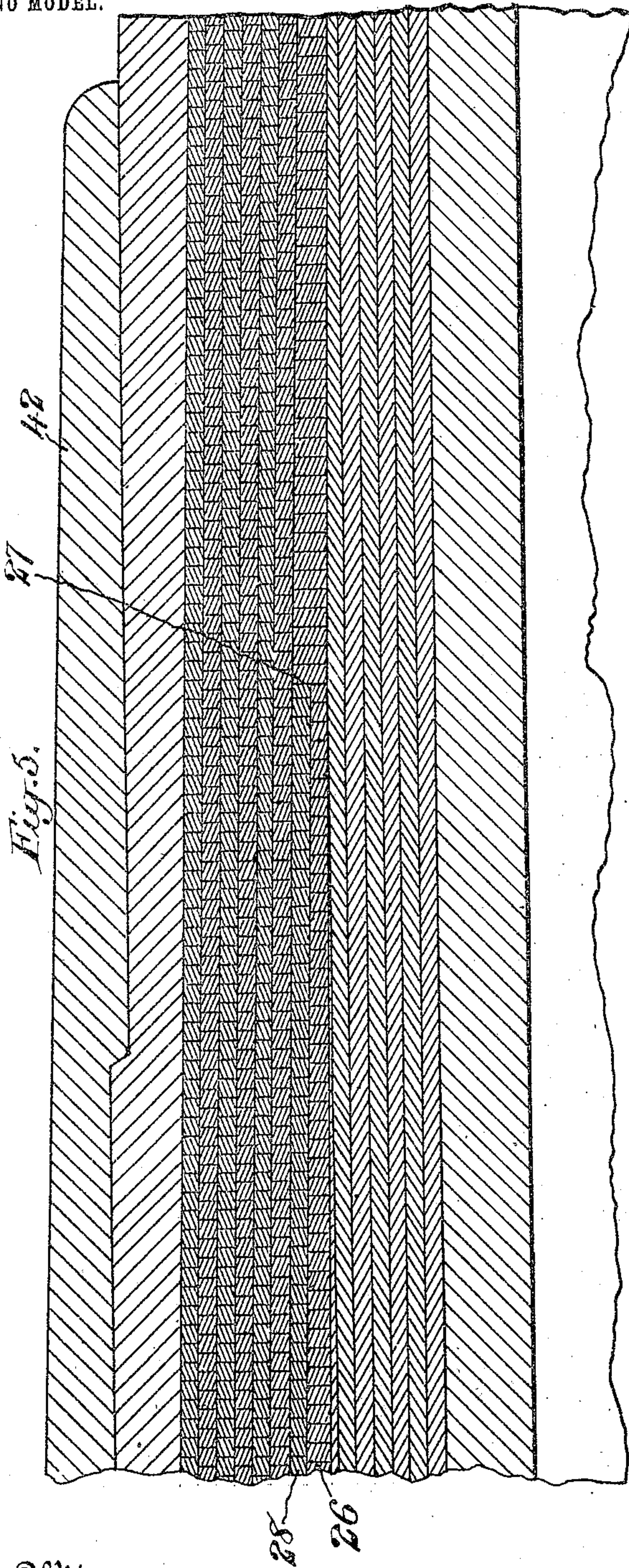
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 1.



Witnesses
Henry Thieme
J. George Barry.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys
Brown & Leonard

No. 777,437.

PATENTED DEC. 13, 1904.

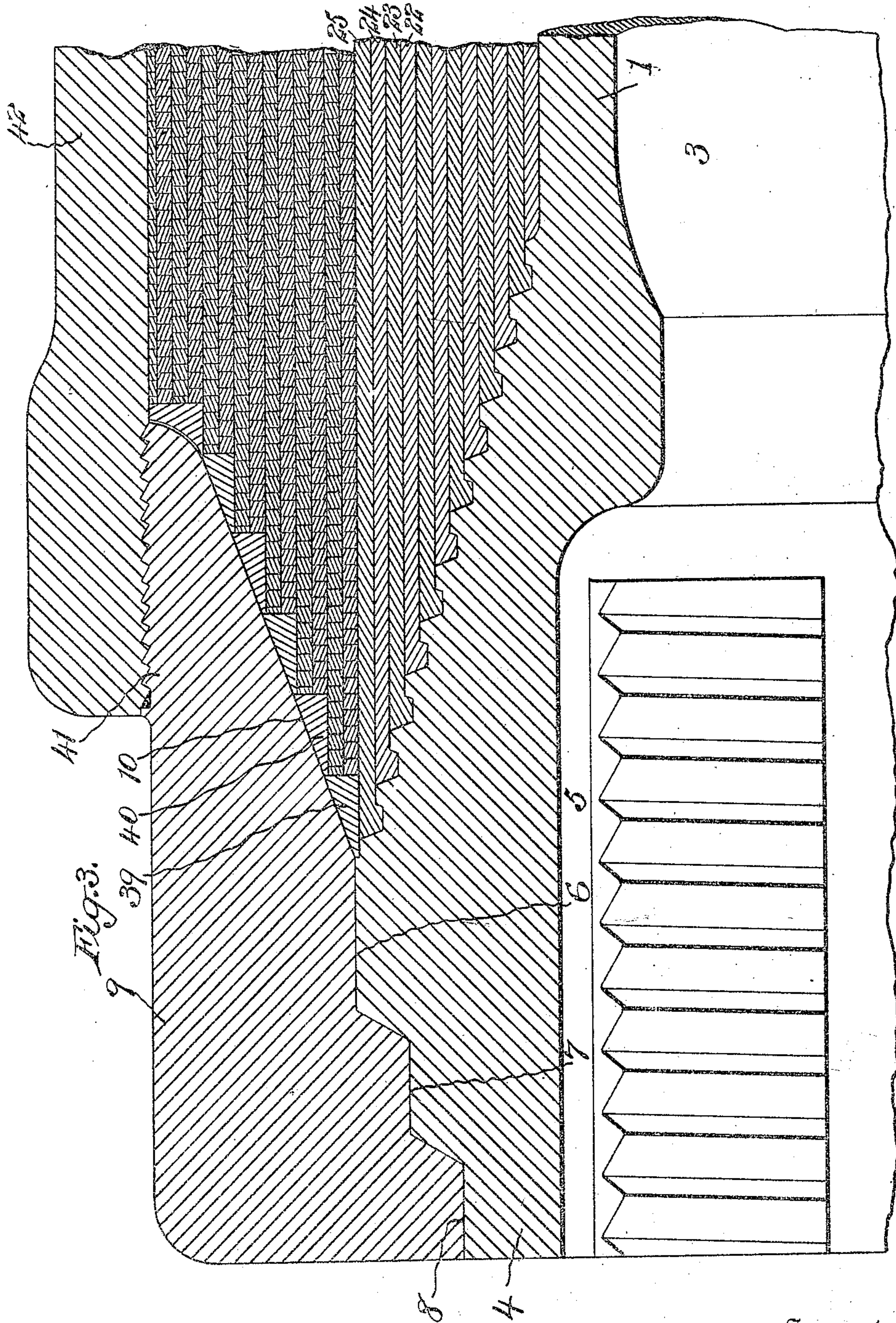
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 2.



Witnesses
Henry Thiele;
J. George Barris.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys, Brown & Ward

No. 777,437.

PATENTED DEC. 13, 1904.

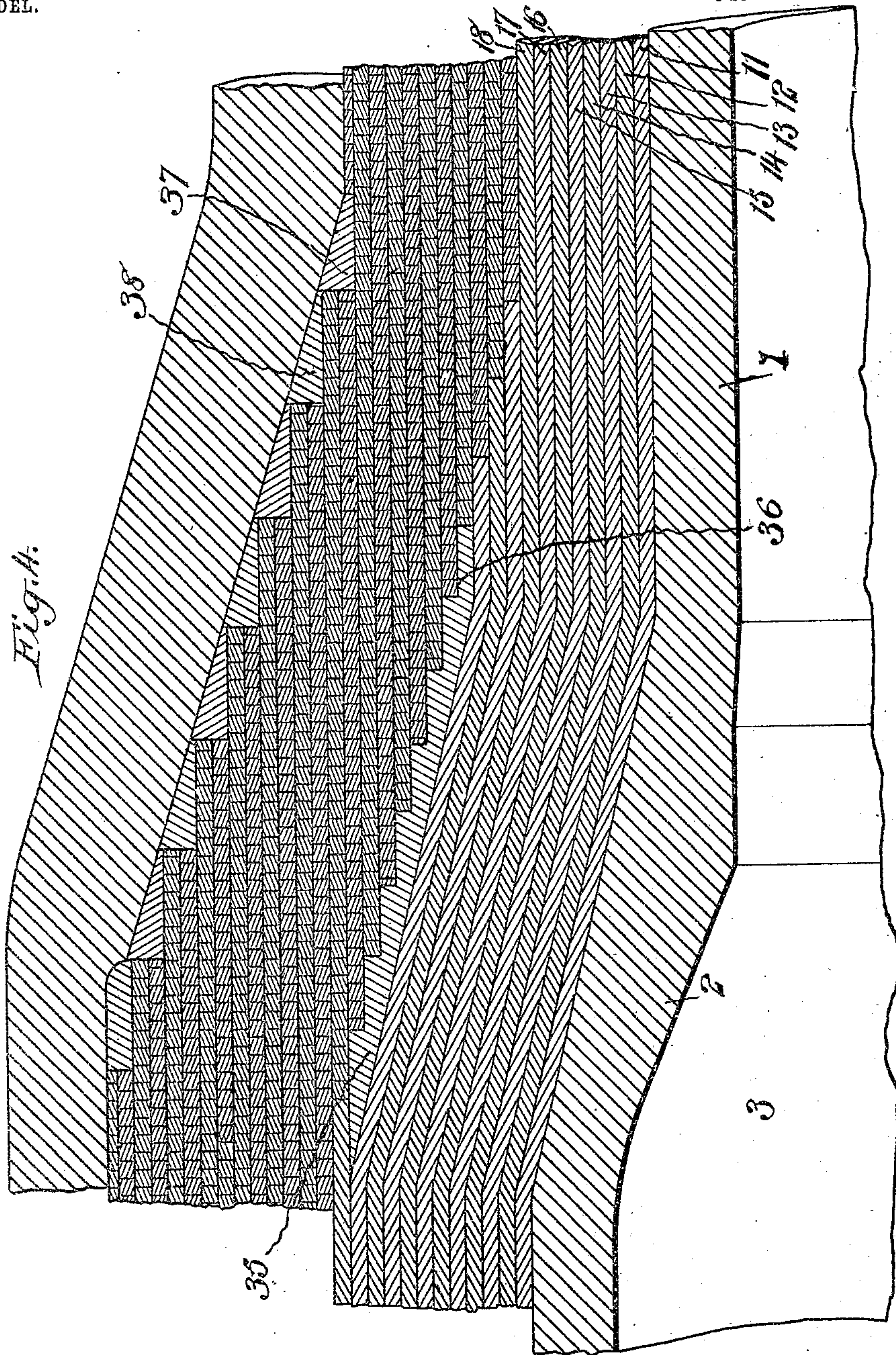
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 3.



Witnesses
Henry Philmel
C. George Barry.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys Brown & Newell

No. 777,437.

PATENTED DEC. 13, 1904.

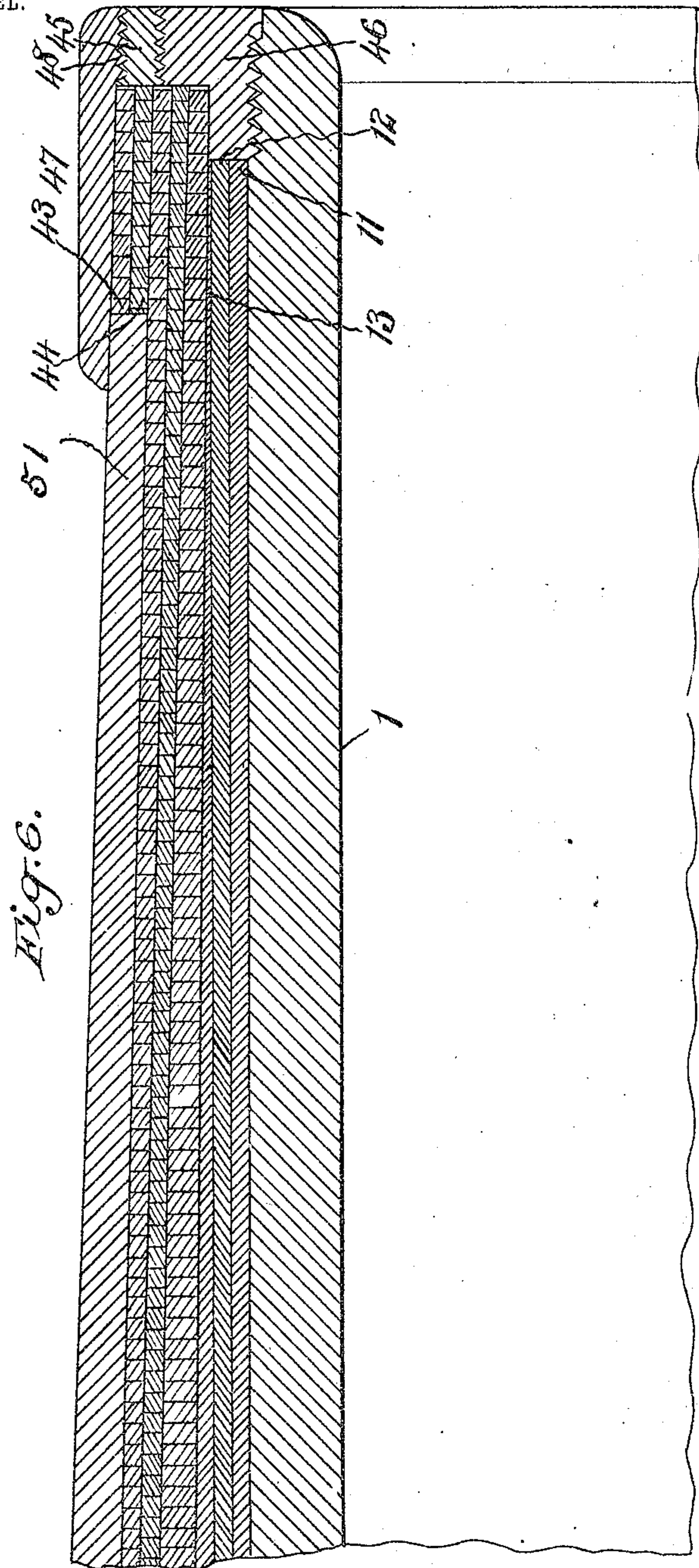
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 4.



Witnesses.
Henry Thiele
George Bump,

Inventors
James E. Sheriff
Francis L. Nichols
By their Attorneys
Brown & Newland

No. 777,437

PATENTED DEC. 13, 1904.

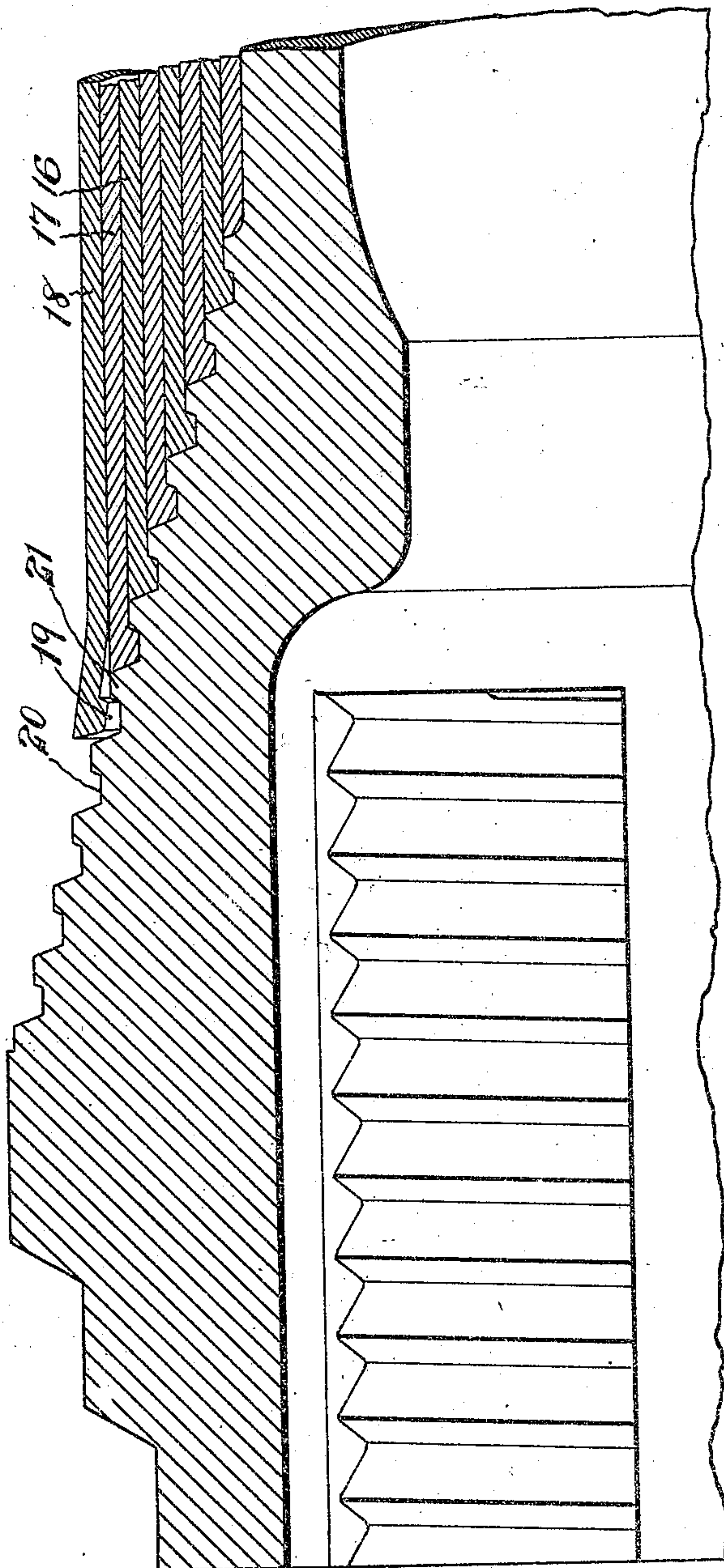
J. E. SHERIFF & F. L. NICHOLS.
ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 5.

Fig. 1.



Witnesses,
Henry Thiel
George Barry

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys *Brown & Howard*

No. 777,437.

PATENTED DEC. 13, 1904.

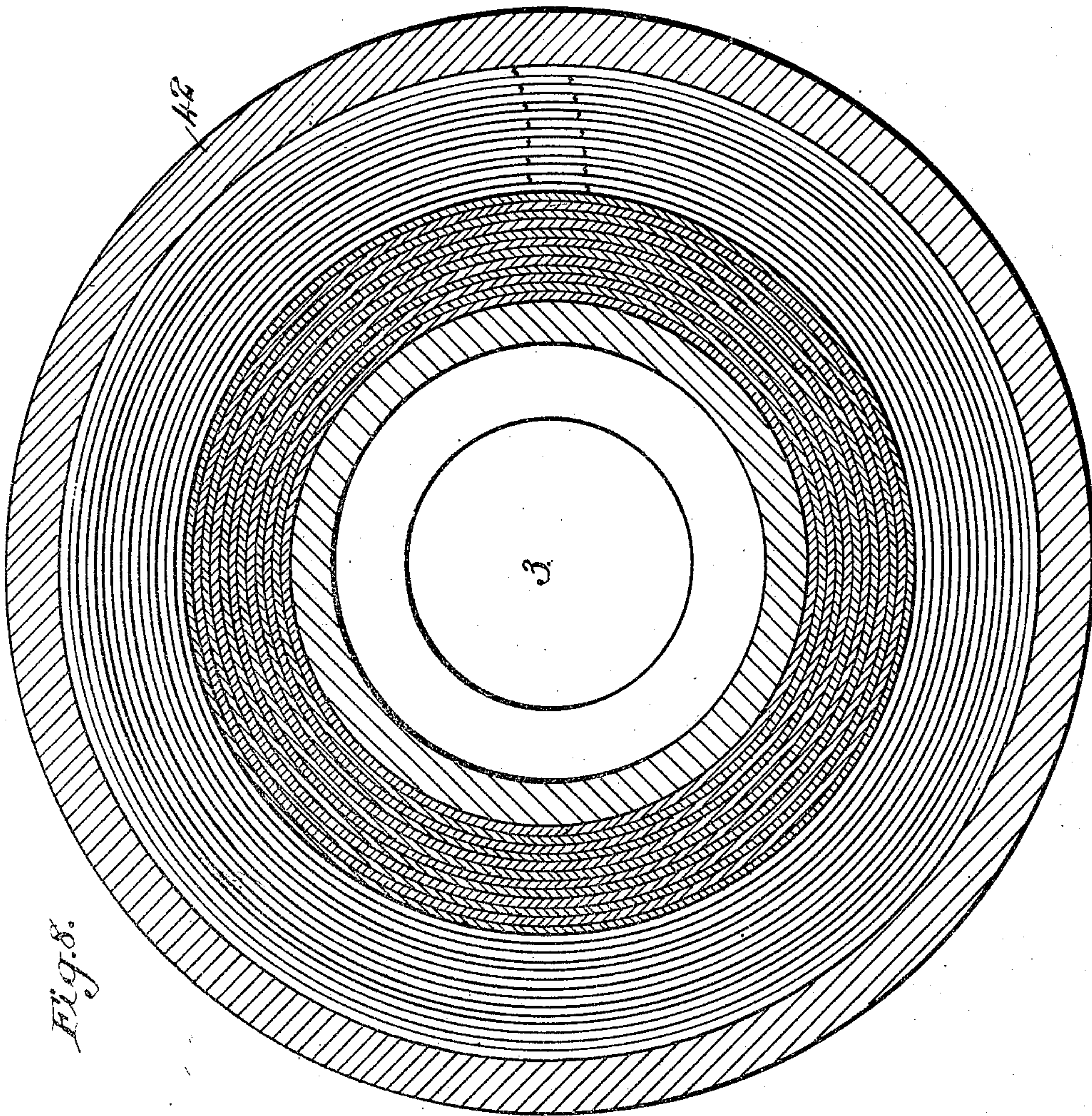
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 6.



Witnesses.
Henry Thieme,
J. George Perry.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys
Brown & Howard

No. 777,437.

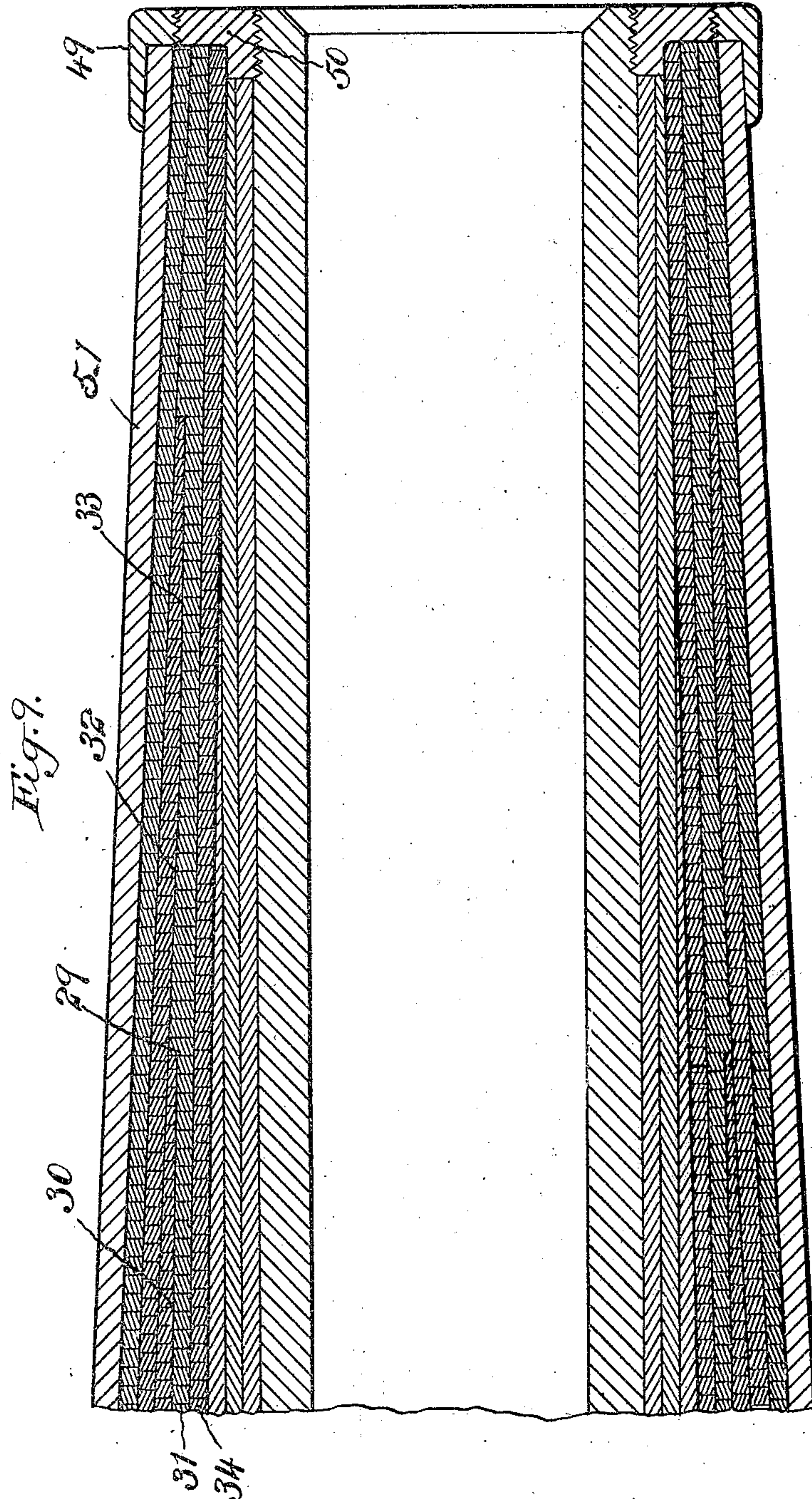
PATENTED DEC. 13, 1904.

J. E. SHERIFF & F. L. NICHOLS.
ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 7.



Witnesses
Henry Thiele
J. George Barry.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys Brown & Howard

No. 777,437.

PATENTED DEC. 13, 1904.

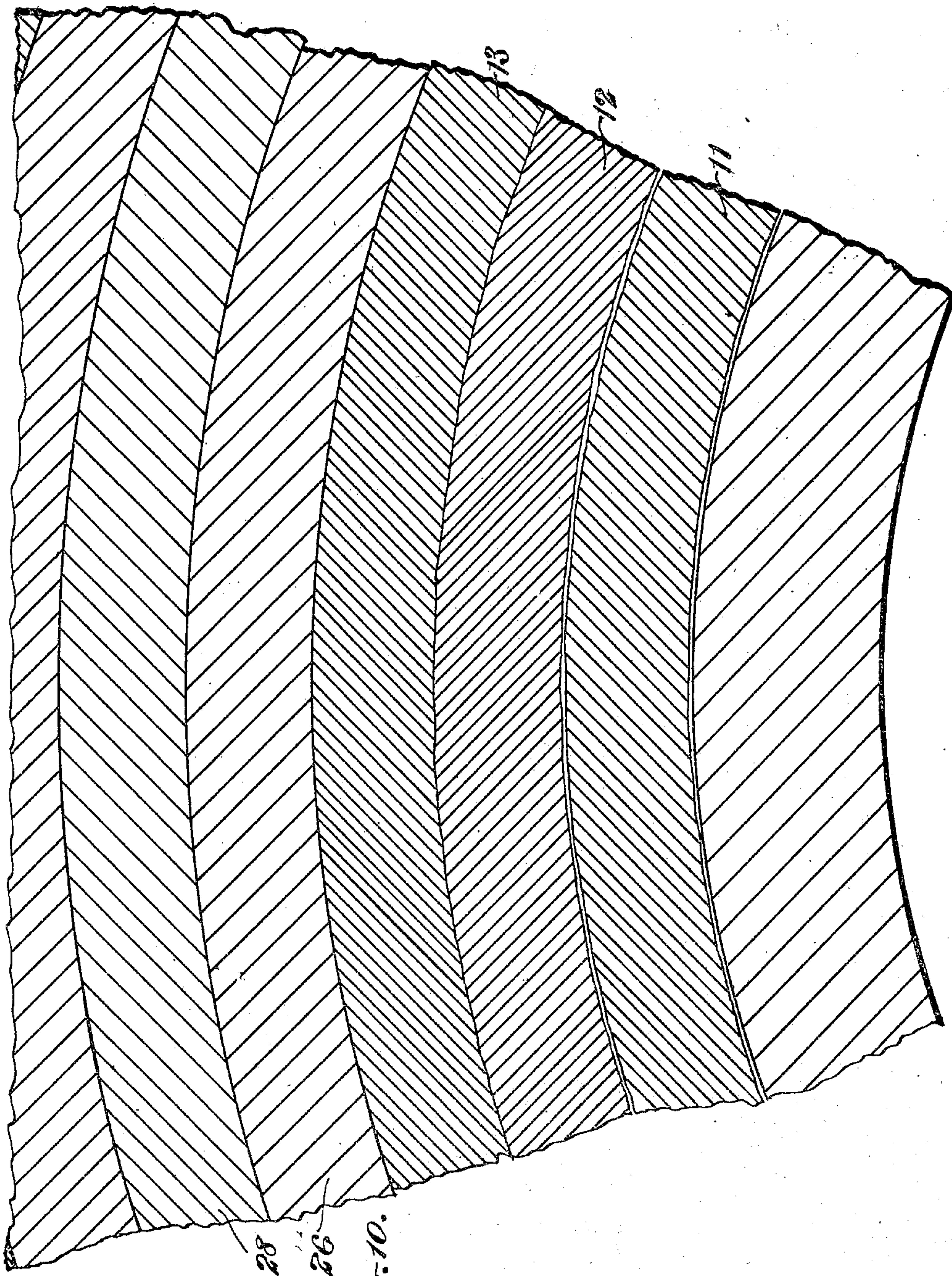
J. E. SHERIFF & F. L. NICHOLS.

ORDNANCE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

8 SHEETS—SHEET 8.



Witnesses.
Henry Thiele.
J. George Barry.

Fig. 10.

Inventors
James E. Sheriff
Frank L. Nichols
By their Attorneys Brown & Howard

UNITED STATES PATENT OFFICE.

JAMES E. SHERIFF, OF NEW YORK, N. Y., AND FRANK L. NICHOLS, OF STAMFORD, CONNECTICUT.

ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 777,437, dated December 13, 1904.

Application filed January 15, 1904. Serial No. 189,168. (No model.)

To all whom it may concern:

Be it known that we, JAMES E. SHERIFF, residing in the borough of Brooklyn, in the city and State of New York, and FRANK L. NICHOLS, residing at Stamford, in the county of Fairfield and State of Connecticut, citizens of the United States, have invented new and useful Ordnance, of which the following is a specification.

Our invention relates to ordnance, with the object in view of producing a wire-wound gun in which the stresses shall be so distributed as to render the gun light and strong.

With this end in view our invention consists, primarily, in a wire-wound gun having a core composed of tubes so related prior to the winding of the wire thereon that an exterior tube may be materially compressed without materially compressing an inner tube.

Our invention further consists in certain features of construction and combination of parts, as will be hereinafter described, and pointed out in the claims.

A practical embodiment of our invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the gun in side elevation as it appears when completed. Fig. 2 is an outline of the same having the breech-opening, powder-chamber, and bore indicated in dotted lines. Fig. 3 is an enlarged partial longitudinal central section covering a distance indicated at A, Fig. 2. Fig. 4 is a similar section covering a distance indicated at B, Fig. 2. Fig. 5 is a similar view covering a distance indicated at C, Fig. 2. Fig. 6 is a similar view covering a distance indicated at D, Fig. 2. Fig. 7 is a view taken in the same plane as Fig. 3 with the wire winding and jackets removed, showing the manner of engaging the tubes with the breech end of the core-tube. Fig. 8 is an enlarged transverse section in the plane of the line E E of Fig. 2. Fig. 9 is a partial longitudinal central section covering the distance indicated at D, Fig. 2, and showing a modified form of wire body and muzzle structure; and Fig. 10 is an exaggerated partial transverse section indicating the skin fea-

ture of the superposed tubes and their relation to one another during the winding of the wire body thereon.

The core-tube is denoted by 1. It is preferably formed in one continuous piece from end to end of the gun, and its breech portion is gradually enlarged, forming a tapered portion 2 at the forward end of the powder-chamber 3, and is still further enlarged, forming a tapered portion 4, extending from at or near the rear end of the powder-chamber 3 to a point over the opening 5 for the reception of the breech-block, decreasing in diameter step by step to the extreme rear end, forming in the present instance the three steps 6, 7, and 8 for the reception of the breech-bolster 9, the interior of which is fitted to conform to the steps 6, 7, and 8, and then gradually enlarged as it extends forwardly, forming the forwardly-flaring portion 10, within which the rear end of the wire body is locked, as will hereinafter more particularly appear.

For the purpose of preventing the accumulated compression of the several layers of wire winding from being exerted directly upon the core-tube and to relieve it from a strain which is liable to crush it beyond its elastic limit we build a portion of the body of the gun, in proximity to the core-tube 1, of one or more, preferably several, tubes, the innermost of which is fitted to conform to the exterior of the core-tube and each succeeding one of which is fitted to conform to the one which is in immediate proximity thereto within it. In the present instance we have shown the core-tube as originally provided with eight of these superposed tubes, extending substantially the entire length of the chase and over the powder-chamber, the said superposed tubes being denoted, from the inner to the outer, by 11, 12, 13, 14, 15, 16, 17, and 18. This number is not, however, an essential feature of our invention, as there may be more or less of these tubes as further experience may prove desirable. These several tubes are expanded to follow the tapered portion of the core-tube at the forward end of the powder-chamber, and at their rear ends

they are interlocked with the breech portion of the gun, in the present instance with the tapered portion of the core-tube opposite the rear end of the powder-chamber and forward end of the breech-block bore by providing their rear ends with inwardly-projecting ribs 19, (see Fig. 7,) adapted to be received in depressed annular seats 20, formed in the exterior of the core-tube. These superposed tubes may have their rear ends tapered during the rolling process, as indicated at the rear end of the tube 18, Fig. 7, to permit the rib 19 to be passed over the projection 21 immediately in front of its seat, and these expanded ends of the tubes are compressed by any suitable means to force the rib 19 to its seat preparatory to the adjustment of a succeeding tube.

The bottoms of the annular seats 20 are radially nearer the axis of the gun than the exterior surfaces of the next adjacent interior tubes, and hence the tubes may be extended full thickness over the projection 21 and yet firmly interlock with the tapered breech portion. These body-tubes, which extend substantially the length of the chase and powder-chamber, are gradually turned down, as shown in Figs. 5 and 6, until but two of them, 11 and 12, and a part of the third, 13, finally reach the extreme forward end of the chase, and in order to provide for the increased number of layers of wire around and in proximity to the powder-chamber and to materially strengthen the gun at this point additional shorter superposed tubes 22, 23, 24, and 25, in the present instance four, are superposed and terminate opposite the forward end of the powder-chamber and rear portion of the chase, as clearly shown in Fig. 4.

An important feature of our invention is the arrangement of the superposed tubes so that there shall be a certain definite space, however small it may be, between the inner surface of a tube and the exterior surface of the adjacent interior tube, whereby each exterior tube may be subjected to a material compression before this force is transmitted to the next adjacent interior tube, and, so far as this part of our invention is concerned, it is to be distinctly understood that the superposed tubes which surround the core-tube are not intended to rest in such close proximity when they are originally arranged as to make a continuous body, but are arranged so that each exterior tube will have a slight lateral play with respect to the interior tube, the amount of such play being determined with great accuracy and depending upon the amount of compression to be exerted by the several layers of wire wound under tension.

The tubes which we superpose about the tube-core are preferably of seamless machine-wrought tubing and are preferably made so thin that any considerable flaw would be readily observed, although it will be obvious that a flaw in any one part of these several tubes

would be of comparatively little account when covered by the sound portion of one or more exterior tubes.

It is intended to assemble the tubes in their normal condition—i. e., with their opposite surfaces or skins in the condition in which they were left or placed by the manipulation incident to their manufacture. This condition may be a special condition of toughness or hardness suitable to the purpose for which the tubes are to be used.

The layer 26 of wire which is wound along the chase of the gun—in the form shown in Figs. 1 to 8, inclusive, the first layer exterior to the superposed tubes and in the form shown in Fig. 9 the second layer—is composed of wire which is deeper or thicker than the wire which is to form the greater portion of the body of the wire-wound portion, the depth or thickness being here shown as about twice that of the ordinary wire, and this layer 26 is turned off, as shown in Figs. 1 to 8, on a taper corresponding to the exterior taper of the body of exterior wire winding until the depth or thickness is about one-half the original depth of the wire or until the depth or thickness of the ordinary wire will just fill the cut-away portion up to the original depth or thickness of the wire, and then a new step is formed by beginning the taper at the exterior of the full depth of wire, as shown at 27, and again gradually turning away the exterior of said layer 26 to conform to the taper of the exterior of the body of wire winding until the depth or thickness of the ordinary wire will fill the cut-away portion flush with the surface of the wire of the layer 26, and so on throughout the chase. The chase of the gun is then wound by subsequent layers 28 of wire up to the steps formed by the cutting away of the deeper layer 26 and until the few exterior layers of wire extend continuously to the extreme muzzle, as shown in Fig. 6.

Instead of cutting away the deeper layer of wire, as shown in Figs. 1 to 8, it may be cut away to a depth less than the thickness of the ordinary wire, as shown at 29, Fig. 9, and the layer of ordinary wire 30 immediately exterior to the deeper layer 31, corresponding to the layer 26, above referred to, may be turned down to bring its exterior flush with the exterior of the deeper layer 31. When this form of cutting away the deeper layer is resorted to, the said deeper layer is cut away on two different tapers, the first part throughout about one-half of the length of the step being cut away, as shown at 32, Fig. 9, on a taper corresponding to the taper of the exterior chase-jacket, and the final portion (denoted by 33, Fig. 9) being cut away on a taper corresponding to the taper of the body of superposed tubes. When this manner of turning down the steps on the deeper layer of wire is resorted to, it may also be found desirable to first wind the body of superposed tubes

with a continuous layer 34 of wire of ordinary depth and then place the deeper wire layer exterior to this. This structure has the advantage of strengthening the wire body at the points where the deeper layer is cut away to the greatest depth, as it leaves something like two-thirds or more of the depth intact, and hence the tension exerted upon the deeper layer during its winding will not have a tendency to stretch the wire beyond its elastic limit at the point where the step is complete.

The inner layers of wire abut at their rear ends against the forward ends of a shorter superposed tube, as shown at Fig. 4, and the subsequent layers which terminate opposite the tapered portion 2 of the core are conveniently anchored in a conical anchoring-ring 35, having its interior fitted to conform to the outer of the body of superposed tubes which extend opposite the tapered portion 2 and its outer face provided with a series of steps 36, on which the several wire layers are anchored.

A series of tapered anchoring or abutment rings, 37 38, &c., are located exterior to the body of wire winding along the tapered portion opposite the rear part of the chase and forward part of the powder-chamber, as shown in Fig. 4. These rings are made to overlap a little distance, so that a previously-adjusted ring after having been wound up to will form a shallow shoulder for adjusting a succeeding ring. The overlap is so limited that a succeeding ring may be expanded and slipped over a previously-adjusted ring and shrunk or compressed to its seat. A similar series of tapered anchoring rings or abutments 39 40, &c., is located within the flaring portion 10 of the breech-bolster and forms seats for the layers of wire which terminate within the said flaring part of the breech-bolster. This feature provides for gradually reducing the thickness of the wire body at the breech and also provides for the elongation of the wire body under radial compression without transmitting the elongating strain to the core throughout this portion of the gun, since the overlapped edge of a smaller ring would be shared by its succeeding ring before the core became unduly strained.

The breech-bolster 9 is provided with an exterior thread 41, by which it is screwed into the rear end of the trunnion-jacket 42 to hold the parts in assembled adjustment.

At the muzzle the chase-jacket terminates a short distance back from the extreme end of the muzzle, and additional layers of wire, in the present instance two layers 43 44, are introduced between it and an annular ring 45, which is screwed onto the muzzle-bolster 46, the latter being in turn screwed onto the core-tube 1. The ring 45 as well as the layers 43 44 of wire and the extreme end of the chase-jacket 51 are covered by a jacket 47, screwed onto the muzzle by a screw-thread 48 on the exterior of the ring 45 engaging with

a corresponding thread on the interior of the forward end of the muzzle-jacket 47. In the form shown in Fig. 9 the muzzle-jacket 49 is screwed directly onto the muzzle-bolster 50 and overlaps the forward end of the chase-jacket 51.

The wire body of the gun has a true and uninterrupted taper throughout the length of the chase or greater portion thereof, the outer surface of the wire body conforming to the interior taper of the chase-jacket and the interior surface of said wire body conforming to the exterior taper of the body of superposed tubes, the gradual reduction in the thickness of the wire body being proportionate to the gradual reduction of pressure in the bore of the gun when the gun is fired. The structure of the body is such that the chase-jacket may be placed in position over the muzzle end of the body and drawn into position by the screwing of the breech-bolster 9 into position, the two parts,—viz., the breech-bolster 9 and the trunnion-jacket 42—being arranged to be drawn toward one another and to force the parts between them into a compact assembled adjustment.

By means of the construction and relative arrangement of the tubes hereinabove described the compression exerted upon an outer tube by the primary layer of wire wound under tension may compress said outer tube without materially compressing an inner tube; but such outer tube may be compressed to a point where a subsequent layer of wire wound under tension will exert compression through the primary wire layer and outer tube to an interior tube, and so on throughout the series of layers of wire wound under tension, the final or outer layer of wire wound under tension exerting its force of compression through the several inner layers of wire and through the several exterior tubes to the final interior tube or core-liner, so that the latter instead of being normally subjected to the combined pressures of the several layers of wire may be subjected to the pressure of the exterior layer of wire only.

It is obvious that changes might be resorted to in the form and arrangement of the several parts without departing from the spirit and scope of our invention. Hence we do not wish to limit ourselves to the structure herein shown and described; but

What we claim is—

1. A wire-wound gun having a core formed primarily of superposed tubes, the circumference of the bore of an exterior tube being greater than the circumference of a succeeding interior tube whereby an exterior tube may be materially compressed without materially compressing the inner tube.

2. A wire-wound gun having a core-tube, a tube surrounding the core-tube and having the circumference of its bore primarily greater than the circumference of the core-tube, where-

by the surrounding tube may be materially compressed without affecting the core-tube and a gun-body exerting compression on said surrounding tube.

5 3. A gun comprising a core formed of superposed tubes structurally in their normal condition with their skin-surfaces intact and a body exerting compression on the core.

4. A gun comprising a core-tube gradually
10 enlarged to form the powder-chamber, a tube superposed upon the core-tube and enlarged throughout a portion of its length to conform to the shape of the core-tube, the circumference of the bore of the superposed tube being
15 primarily greater than the circumference of the core-tube whereby the former may be materially compressed without materially compressing the latter and a gun-body exerting compression upon the superposed tube.

20 5. A gun comprising a core-tube enlarged to form the powder-chamber, a plurality of superposed tubes surrounding the core-tube and enlarged throughout portions of their lengths to conform to the shape of the core-
25 tube, a superposed tube having the circumference of its bore primarily greater than the circumference of an adjacent inner tube whereby the exterior tube may be materially compressed without materially compressing the inner tube and a gun-body exerting compression upon the superposed tubes and core-tube.

6. A gun comprising a body portion and a core formed of superposed tubes, an exterior core-tube having an interlocking engagement
35 with the breech portion of the gun.

7. A gun comprising a core-tube provided with a tapered portion, an annular groove in said tapered portion, a tube superposed upon the core-tube and provided with an inwardly-
40 extended annular rib for engaging the groove in the core-tube and a gun-body exerting compression upon the said superposed tube.

8. A gun comprising a core-tube provided with a tapered portion, annular grooves formed
45 at intervals in the exterior surface of the tapered portion, superposed tubes provided with annular ribs at their ends fitted to enter the grooves in the tapered portion of the core-tube and a gun-body exerting compression upon
50 the superposed tubes.

9. A gun comprising a core-tube having a tapered portion, annular grooves formed in the tapered portion, superposed tubes having inwardly-projected ribs adapted to seat in said
55 grooves and a body of wire wound on the superposed tubes under compression.

10. A gun comprising a core-tube having a portion tapered outwardly and another portion tapered inwardly as it extends from the
60 muzzle toward the breech, superposed tubes abutting against the outwardly-tapered portion, a breech-bolster abutting against the inwardly-tapered portion, a body exerting compression upon the superposed tubes and a

jacket having a screw-threaded engagement 65 with the breech-bolster for drawing the bolster and jacket into snug contact with their respective seats.

11. A gun comprising a core-tube having a tapered portion provided with annular
70 grooves, superposed tubes having an interlocking engagement with said grooves, the bottoms of said grooves being radially nearer the axis of the gun than the exterior surface of an adjacent interior tube and a body embracing
75 the said superposed tubes.

12. A gun comprising a core-tube, tubes superposed about the core-tube and independently interlocked with the core-tube and a body embracing the superposed tubes. 80

13. A gun comprising a core, a body of wire wound under tension, and a series of exterior tapered rings for anchoring successive layers of wire, the said rings overlapping one another to a limited extent. 85

14. A gun comprising a core-tube having a portion tapered outwardly and another portion tapered inwardly as it extends from muzzle toward the breech, superposed tubes abutting against the outwardly-tapered portion, a
90 breech-bolster abutting against the inwardly-tapered portion and provided at its front with a flaring mouth, annular abutment-steps seated within said flaring mouth, a body of wire wound on the superposed tubes and abutting
95 against the said annular steps, a jacket surrounding the body of wire and having a screw-threaded engagement with the breech-bolster for drawing the parts into snug contact with their respective seats. 100

15. A gun comprising a core-tube having an outward taper throughout a portion of its length, superposed tubes abutting against said outwardly-tapered portion, a breech-bolster fitted to said core-tube and a body of wire surrounding the superposed tubes, a chase-jacket having an outwardly-tapered portion, annular abutment-seats on the inner face of said tapered portion of the jacket, the said jacket and breech-bolster having a screw-threaded
110 engagement for drawing the parts into close contact with their respective seats.

16. A gun comprising a core tapered on its exterior and a body composed of wire wound under tension, the said body of wire including a layer of wire deeper or thicker than
115 other layers of wire, said deeper or thicker wire layers being turned down to form tapered steps for the reception of exterior layers of wire. 120

17. A gun comprising a core having a tapered exterior and a body composed of wire wound under tension, said body of wire including a wire layer deeper or thicker than
125 other layers of wire, the said deeper or thicker layer of wire being turned to form steps, each having different pitches of taper, the taper of one portion of a step corresponding to the ta-

per exterior of the core and the taper of another portion of the step conforming to the taper of the exterior of the body.

18. A gun comprising a core, a body of wire wound under tension, a muzzle-bolster forming an abutment for the wire, a ring having a screw-threaded engagement with the exterior of the muzzle-bolster, a chase-jacket and a muzzle-jacket having a screw-threaded engagement with the exterior of said ring and overlapping the chase-jacket.

19. A gun comprising a core, a body of wire wound under tension, a muzzle-bolster forming an abutment for the wire, a ring having a screw-threaded engagement with the exterior of the muzzle-bolster, a chase-jacket and a muzzle-jacket having a screw-threaded engagement with the exterior of said ring and

overlapping the chase-jacket, the space between the forward end of the chase-jacket and the said annular ring being filled with wire wound under tension.

20. A gun comprising a core conical throughout a portion of its length and formed of superposed tubes, a conical exteriorly-stepped ring seated on said conical portion of the core and a body exerting compression on the core.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 11th day of January, 1904.

JAMES E. SHERIFF.
FRANK L. NICHOLS.

Witnesses:

FREDK. HAYNES,
C. S. SUNDGREN.