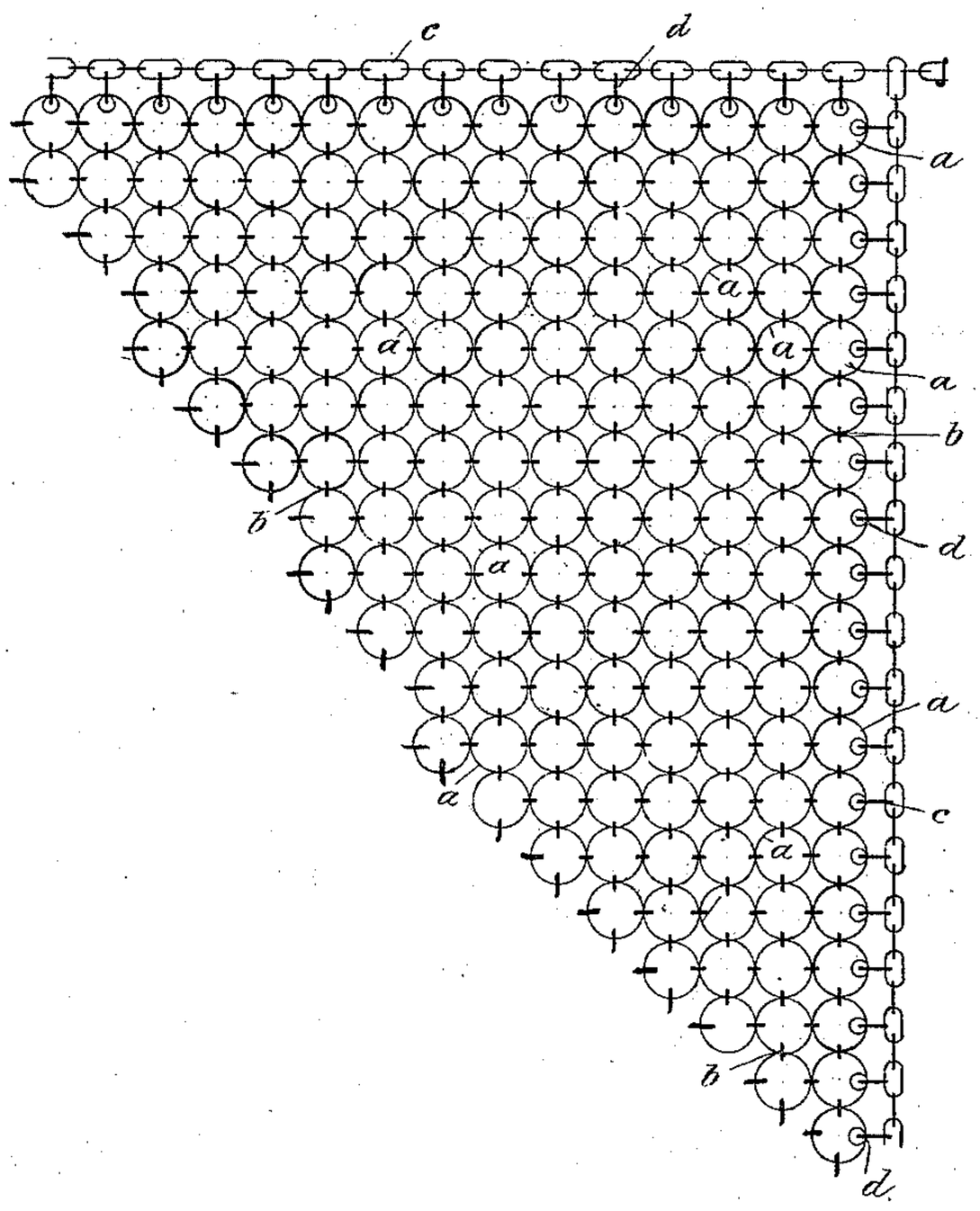
(No Model.)

W. M. BULLIVANT.

TORPEDO NET.

No. 312,965. Patented Feb. 24, 1885.



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UNITED STATES PATENT OFFICE.

WILLIAM MUNTON BULLIVANT, OF LONDON, COUNTY OF MIDDLESEX, ENGLAND.

TORPEDO-NET.

SPECIFICATION forming part of Letters Patent No. 312,965, dated February 24, 1885.

Application filed April 1, 1884. (No model.) Patented in England June 20, 1878, No. 2,466.

To all whom it may concern:

Be it known that I, WILLIAM MUNTON BULLIVANT, a subject of the Queen of Great Britain and Ireland, and residing at 72 Mark Lane, in the city of London, England, have invented certain Improvements in Torpedo-Nets, (for which I have obtained a patent in Great Britain, No. 2,466, dated June 20, 1878,) of which the following is a specification.

One of the methods at present resorted to for protecting ships of war from torpedoes is by nets so arranged as to catch the torpedo before it reaches the ship's side. The nets for this purpose are required to combine great strength with flexibility and comparative lightness.

According to my invention I dispense entirely with seizings or comparatively rigid connections between the grommets, and I cause each grommet to be worked in its place in the net, and the whole of the connections between the grommets to be made with loose metal rings, through which as they are made the grommets are worked.

In short, my improved torpedo-net consists, essentially, of wire grommets loosely connected by rings, every grommet being thus coupled with all the adjacent grommets.

I strengthen the edges of the net with a chain, and in attaching the chain I again dispense with seizings, and form loose or yielding connections by means of small screw-shackles or clip-hooks.

I will now describe in detail the method of manufacture as practiced by me, reference being had to the accompanying drawing, which represents in diagram a portion of a torpedo-net, showing the relative positions of the parts.

The grommets *a* are worked in pliable steel wire—of, say, No. 14 of the Birmingham wire-gage. The wire is carefully galvanized, and is cut to lengths of about thirteen feet, each length serving to form a grommet. The connecting-rings *b* are of round iron rod, preferably about three-eighths of an inch in diameter. The rings are welded up and galvanized. They are preferably five-eighths of an inch inside diameter, or thereabout.

In making each grommet a length of wire is taken. It is turned round upon itself, and the end is threaded through as a knot is tied in a string. Thus a ring is formed, which is gaged to an internal diameter of, say, six and one-eighth inches.

The operation has been so performed that the ring has now two projecting ends—one a long one and the other of a few inches only. The longer end has now to be threaded through and through the ring. This operation may be performed by a man and boy, the man holding the ring, turning it round, and guiding each lay of the wire to its place, the boy passing the end and drawing the wire tight up to the ring.

When the work has progressed so far as to render the ring firm, the short end of the wire is cut off close up to the ring. The remaining end is passed and repassed until the grommet consists of seven complete turns, one, which serves as the core, being surrounded by six other turns laid helically around it in all respects as in the strand of a wire rope, except that the work is endless, forming a ring or grommet.

The first grommet is worked with two of the iron rings upon it, these rings being included when the first tie of the wire to form the grommet is made. The next grommet is worked, including one of the rings on the first grommet and two other or loose rings. Similarly, a third grommet is worked through one of the rings on the second, and so on until a line or chain of grommets is completed of the length of the net required. The last grommet, however, which will form a corner of the torpedo-net, will require to be worked through two rings only.

Care is required in working the first row of grommets to leave the loose rings, which are to serve to attach the next row, all upon the same side. The first grommet of the second row is worked onto the last of the preceding, and has two loose rings upon it. The second grommet of the second row is worked through one of the loose rings on the preceding grommet, and also through the loose ring on the grommet next before the last of the first row. It also receives two loose rings. In a similar way all the succeeding grommets of the second row are worked, except the last, which requires to be worked through three rings only. As before, care is required in working this row to leave the rings in the proper places for the attachments of the third row. The third

row is worked precisely as the second row, and so on until the net is completed, except that the grommets of the last row of the net will each require one ring less than the corresponding grommet of an intermediate row. The net being completed, I strengthen its edges with an ordinary galvanized-iron chain, *c*, with welded links of such a length that two links of the chain correspond in length to one row of the net. Each of the outer grommets of the net I connect by a light galvanized screw-shackle, *d*, to one of the links of the chain, so that each alternate link of the chain will receive a shackle. The shackles are of such a size that the grommets can work freely through them, so that the connections between the edges of the net and the chain are as free as the connections made by the rings between grommet and grommet. Thus the net is completed, and in this state it is supplied to the ship for use.

There is another way in which this torpedo-net may be made, but it is much inferior to that described above—viz., to work the grommets separately and afterward connect them by rings made in parts, which, after being put on, are riveted or fastened, so as to inclose the two grommets they are intended to link.

I claim—

A torpedo-net consisting of wire grommets, each connected with the adjacent grommets by loose rings without seizings or rigid connections, substantially as hereinbefore described.

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

WILLIAM MUNTON BULLIVANT.

Witnesses:

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