

W. R. MACDONALD.
 CLEANER FOR SHIPS' HULLS AND THE LIKE.
 APPLICATION FILED JAN. 27, 1908. RENEWED FEB. 11, 1910.

952,455.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.

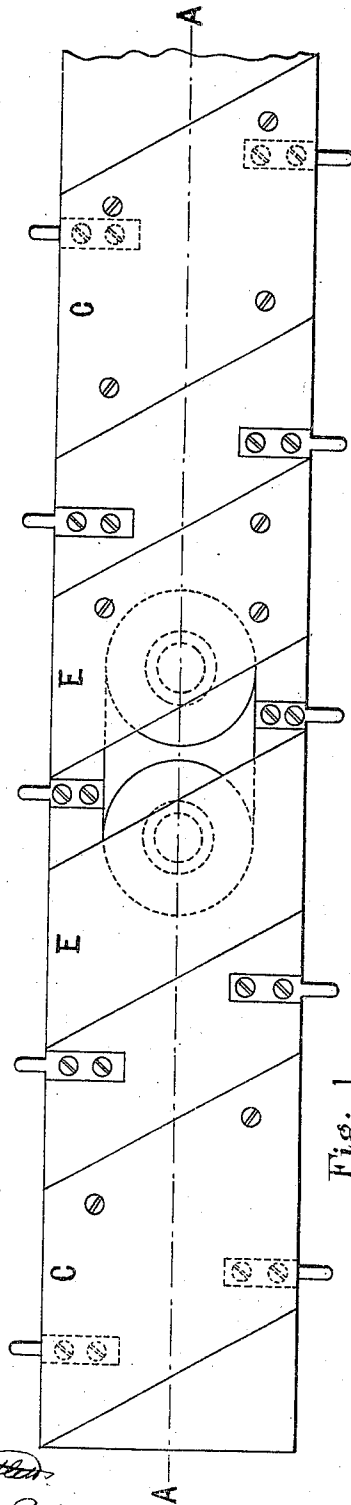


Fig. 1.

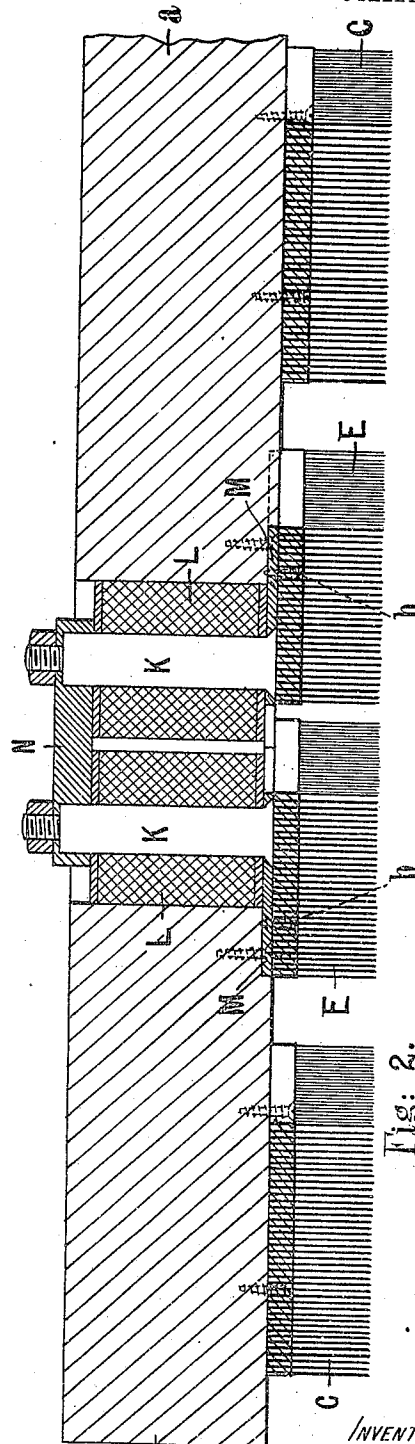


Fig. 2.

WITNESSES
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 3 SHEETS—SHEET 2.

FIG. 3

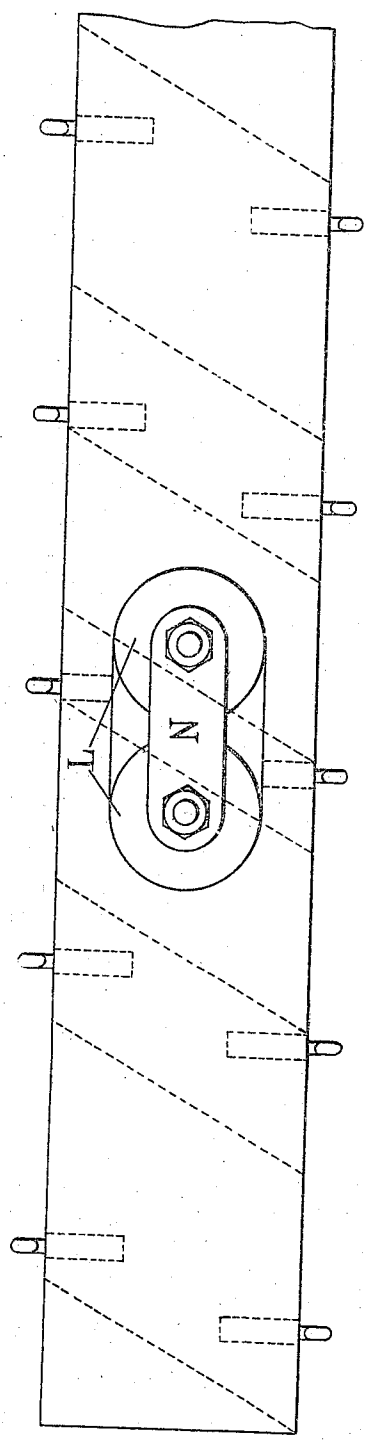
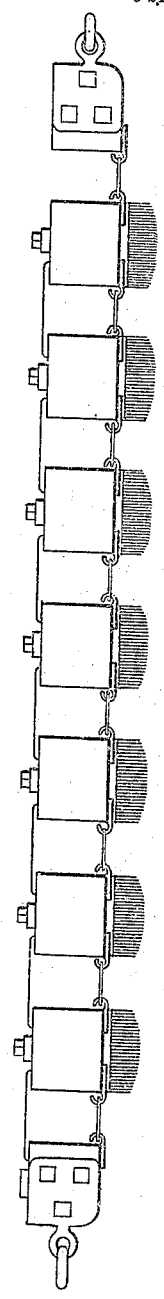


FIG. 5



Witnesses,
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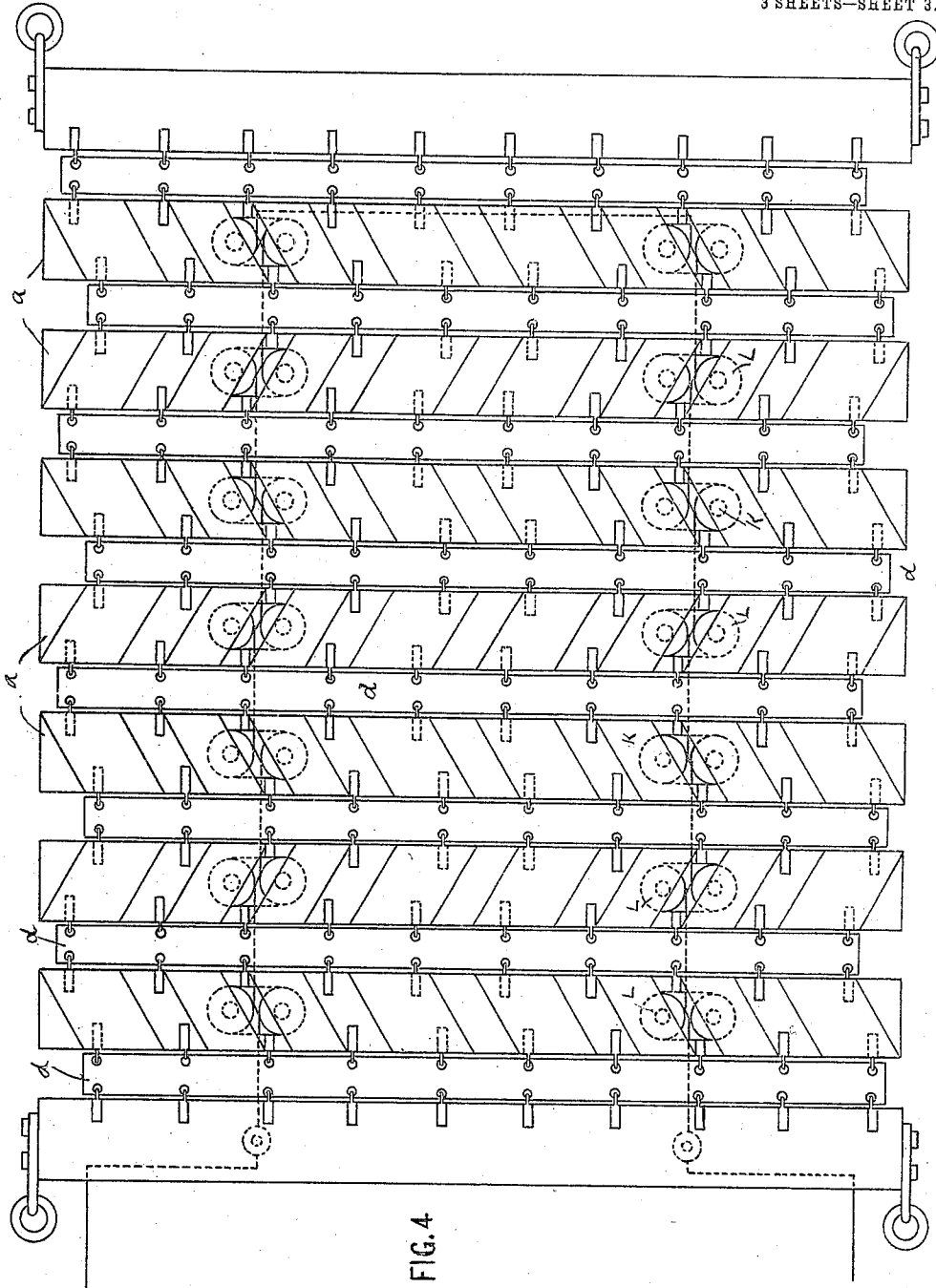


FIG. 4

Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM R. MACDONALD, OF LONDON, ENGLAND.

CLEANER FOR SHIPS' HULLS AND THE LIKE.

952,455.

Specification of Letters Patent.

Patented Mar. 22, 1910.

Application filed January 27, 1908, Serial No. 412,851. Renewed February 11, 1910. Serial No. 543,369.

To all whom it may concern:

Be it known that I, WILLIAM RICHARD MACDONALD, a subject of the King of Great Britain, residing at 60 Haltam street, Portland Place, London, in the county of Middlesex, England, have invented new and useful Improvements Relating to Cleaners for Ships' Hulls and the Like, of which the following is a specification.

10 This invention relates to improvements in the devices employed for cleaning the iron or steel hulls of sea-going vessels, pontoons or any metallic surface subject to magnetic attraction, from barnacles and other growths.

15 The invention consists in making a kind of mat of separate battens flexibly connected, these battens bearing brushes and electromagnets which latter through their attraction for the iron surface apply the brushes with the requisite pressure. Preferably the brushes have iron bristles and themselves form the poles of the electromagnets.

20 A cleaner constructed according to the invention is illustrated in the accompanying drawings in which—

Figure 1 is an outside view of a single batten looking from underneath, its brushes being removed; Fig. 2 is a sectional view looking in a direction at right angles to that from which Fig. 1 is seen; Fig. 3 is an outside view looking from above; Fig. 4 is an elevation of the whole cleaner, and Fig. 5 is an edge view of the same.

25 As designed a number of battens *a* are provided each of which is fitted as shown in Figs. 1, 2 and 3, with two or more electromagnets, according to the strength required; each of these magnets consists of two steel or wrought iron cores *K*, *K* which have chamfered heads fitting into two sole-plates *M*, *M*; these latter are for the better distribution of the magnetic lines to the bristles of the brushes *E*, *E*. The sole-plates are 30 screwed to the battens and the brushes bolted by screws *b* to the sole-plates. The yoke *N* of the magnet is recessed to receive the cores, this also being for the freer passage of the magnetic lines. The ends of the cores are turned to a smaller diameter and threaded to receive a nut so that they may be fastened firmly to the yoke. *L*, *L* are the coils of the magnet which are made separately and placed on their respective cores 35 before the yoke is fixed.

In order that efficient magnetic contact

may be made between the bristles of the brush, forming the tips of the pole pieces, and the cores, the bristles have been carried right through their wooden base or support 60 and made to press against the sole-plates to which they are attached.

At various intervals along the batten specially shaped bass brushes *C*, *C*, are placed to assist in the cleaning of the vessel. 65 A number of these battens are connected together by means of flexible joints *d*, as shown in Fig. 4. The whole apparatus thus forms a mat which may be hauled fore and aft along the ship's side by various external 70 means, such as by suitably arranged lines through the hawse-holes to the vessel's winches.

The steel or iron wire brush which has a curved surface, as is shown in Fig. 5 fulfils 75 three functions, viz:—that of making a good magnetic contact with the uneven sides of the vessel; that of acting as a brush in helping to clean the ship and thus making a better bed for itself; that of putting pressure upon 80 all the brushes mounted on the batten, it being under complete control depending only upon the strength of the electric current supplied to the windings of the magnet.

The operation is as follows:—Owing to 85 the curved surface of the said brush and the flexibility of the bristles, if the magnetic flux is increased, the longer bristles of the brush, in the center, will bend so as to allow the shorter bristles, as well as the greater 90 mass of metal forming the sole plate to come nearer to the side of the vessel, thus increasing the lines of force or magnetic attraction. The electromagnets are so placed that they are at their best advantage whatever the po- 95 sition of the apparatus upon the ship's side.

Both the bass and the wire brushes are so made as to be easily detached for the purpose of renewing, but this at the same time makes the mat more general and efficient in 100 its working as different strength of bristles may be used according to the various requirements.

What I claim is:

1. In an apparatus for cleaning subma- 105 rine iron surfaces the combination of a plurality of battens, flexible connections between said battens, and brushes fastened to one face of said battens, with electromagnets also rigidly secured to several of said bat- 110 tens, the poles of said electromagnets projecting the same way as the brushes.

2. In an apparatus for cleaning submarine iron surfaces, the combination with a plurality of battens, and flexible connections between said battens, of a plurality of electromagnets, and a plurality of brushes of iron bristles, said bristles forming the poles of the electromagnets.

3. In an apparatus for cleaning submarine iron surfaces, the combination with a plurality of battens, and flexible connections between said battens, of a plurality of iron cores, windings on said cores, sole plates secured to said cores, bases adjacent to said sole plates, and iron bristles piercing said bases and making contact with said sole plates.

4. In an apparatus for cleaning subma-

rine iron surfaces, the combination with a plurality of battens, flexible connections between said battens, and a plurality of brushes secured to said battens, of a plurality of electromagnets secured to several of said battens, said electromagnets and brushes facing the same way, and the brushes having bristles of greater length in the middle than outside, so as to present a convex surface.

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

W. R. MACDONALD.

Witnesses:

ALBERT EDWARD ODELL,
LEONARD EDMUND HAYNES.