(No Model.)

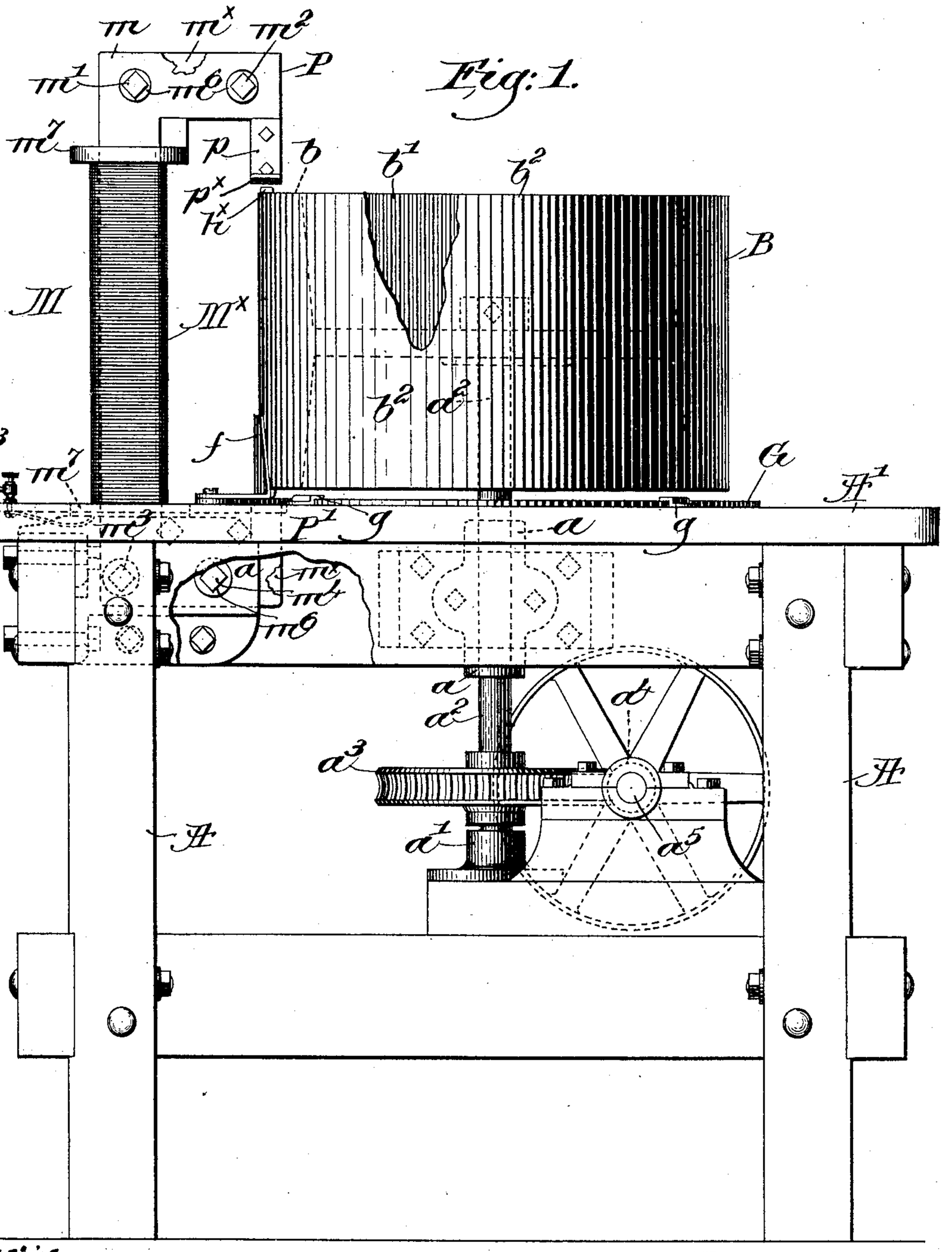
2 Sheets—Sheet 1.

H. A. STORRS.

DEMAGNETIZING DEVICE.

No. 599,304. Patented Feb. 15, 1898.

Fig: 1.



Witnesses.
Edward F. Allen.
Thomas J. Drummond.

Inventor:
Harry A. Storrs.
by Lemoby & Gregory
attys.

(No Model.)

2 Sheets—Sheet 2.

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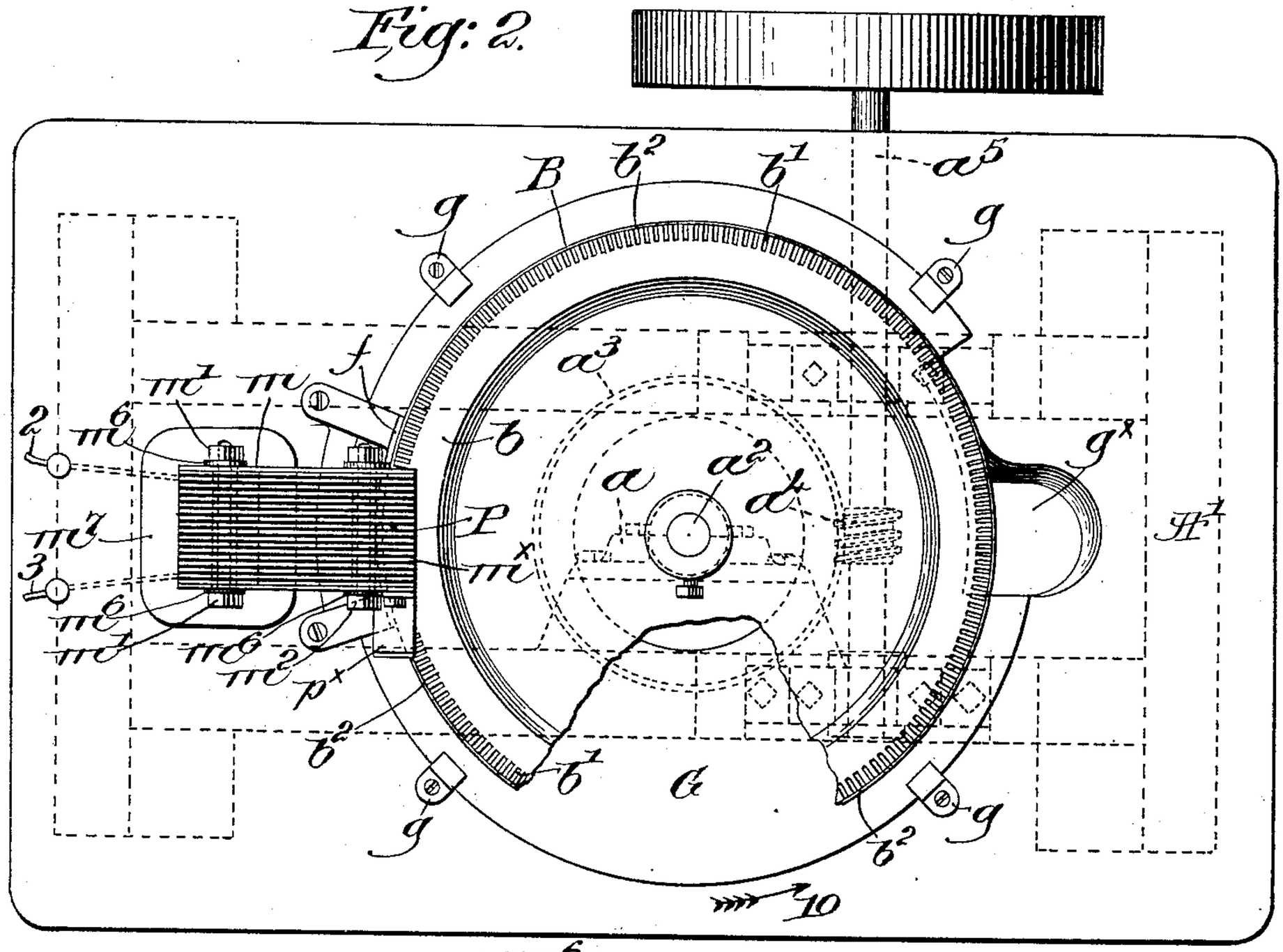
DEMAGNETIZING DEVICE.

No. 599,304. Patented Feb. 15, 1898.

Fig: 2.



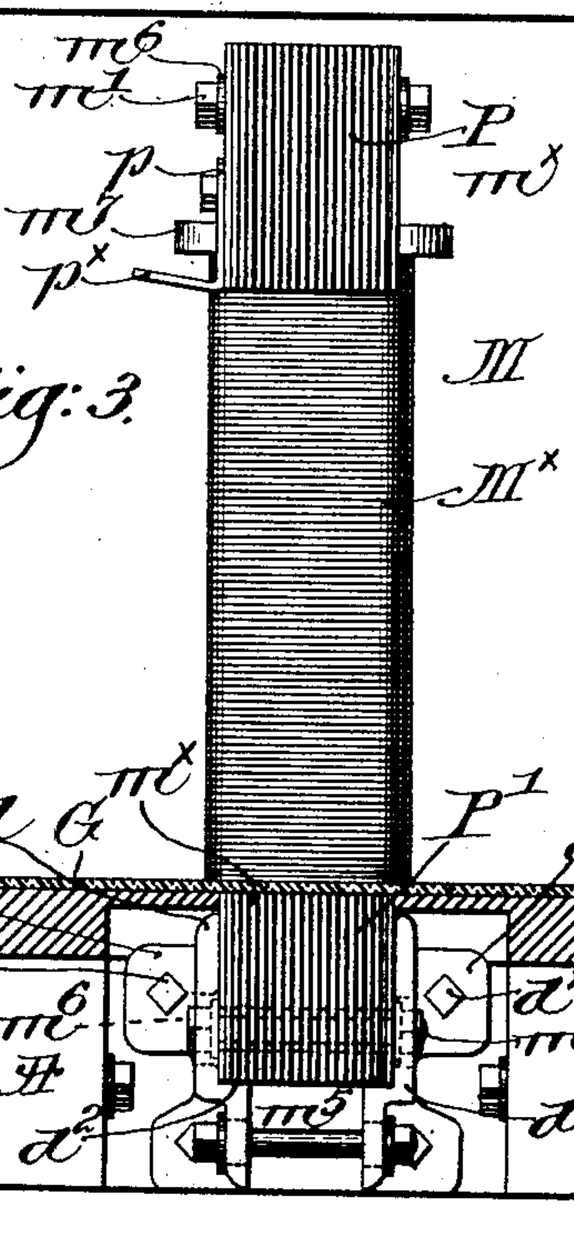


Fig: 3.

Witnesses.
Edward F. Allen.
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Inventor:
Harry A. Storrs.
by Crosby & Gregory
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UNITED STATES PATENT OFFICE.

HARRY A. STORRS, OF BURLINGTON, VERMONT, ASSIGNOR TO THE DRAPER COMPANY, OF PORTLAND, MAINE, AND HOPEDALE, MASSACHUSETTS.

DEMAGNETIZING DEVICE.

SPECIFICATION forming part of Letters Patent No. 599,304, dated February 15, 1898.

Application filed June 18, 1897. Serial No. 641,228. (No model.)

To all whom it may concern:

Be it known that I, HARRY A. STORRS, of Burlington, county of Chittenden, State of Vermont, have invented an Improvement in Processes of and Apparatus for Demagnetizing Iron or Steel Objects, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In various arts and mechanisms it happens that continued operation of apparatus will have the effect of magnetizing iron or steel parts thereof in such degree that the operation of the apparatus is sometimes seriously deranged, if not altogether stopped. One class of apparatus wherein such magnetization of parts has been found to seriously affect the operation is that form of looms for weaving wherein a series of steel heddles or warp-stop-motion detectors are employed. After such a loom has been running for a considerable length of time under certain conditions it is found that the heddles or detectors become magnetized and stick together, making it very difficult to weave properly and also vitiating the warp-stop principle.

This invention consists in a simple and effective apparatus for demagnetizing such heddles or detectors or other magnetized metal objects in a practical way.

Figure 1, in side elevation and partially broken out, represents an apparatus for demagnetizing steel heddles or detectors or other magnetized metal objects in accordance with my invention. Fig. 2 is a top plan view thereof. Fig. 3 is an inner face view of the exciting-magnet, looking toward the left, Fig. 1.

The process may be briefly described as follows, and it will be still further illustrated by consideration of the apparatus hereinafter described, which embodies my invention:

Briefly stated, the process consists in bringing the pieces of metal to be demagnetized, such as loom-heddles, between the two poles of an electric magnet through which is passed an alternating current. The pieces of metal are left for a short time between the poles of this magnet, and as a result of so bringing the pieces of metal between the poles of the magnet it is found that they are demagnetized on being removed from the magnetic field.

While I have herein shown the pieces of metal to be demagnetized as brought between the poles of the magnet, the gist of the invention consists in effecting such a relative movement of the magnetized metal pieces and the poles of the magnet as will accomplish the desired result.

In order to practice my invention conveniently and quickly, it is preferable to provide a holder or carrier wherein the pieces of metal may be placed and then moved within the field of the magnet, and in my apparatus hereinafter described I show one such form of holder and carrier which is particularly adapted to heddles and other like objects.

The apparatus herein shown is devised in some of its parts more particularly for the demagnetization of thin sheet-metal, iron, or steel loom heddles or detectors, but it will hereinafter appear from the description that other magnetized objects may be demagnetized thereby with but slight and merely mechanical changes in the construction of the apparatus.

Referring to Fig. 1, the apparatus is mounted on a suitable stand or support A, preferably of wood and provided with a vertical bearing a and a step-bearing a' for a vertical shaft a^2, extended through the top A′ of the stand and provided near its lower end with a worm-wheel a^3. A worm a^4 on a suitably-driven shaft a^5 is in mesh with and rotates the shaft a^2 at a slow rate of speed, the latter shaft making about one-sixth of a revolution per minute in the apparatus herein described. Above the top A′ a carrier is secured to the shaft a^2, shown as a drum B, made of wood or other non-metallic material and having a rim b, provided with peripheral slots or pockets b', extending from the top to the bottom of said rim and of a suitable depth to receive the heddles or detectors. A thin shell b^2, preferably of paper, is secured to the exterior of the rim, forming an outer wall for the pockets b', into which the heddles to be demagnetized are inserted from the top.

Resting on the top A′ of the frame is a glass plate G, secured in place by brass clips g, the

lower ends of the heddles resting upon and sliding over the plate as the drum is revolved, the said drum being so attached to the shaft e^2 as to just clear the plate G. The heddles are slightly longer than the depth of the drum, so that they will project, say, about one-sixteenth of an inch above and below it, a heddle being shown at $h^\times$, Fig. 1. At one side of the drum is mounted the exciting-magnet M, the core thereof being preferably built up of blanks m of Norway iron about 0.02 of an inch thick and of substantially the shape of the letter E without the central bar. To prevent eddy-currents, the laminæ or blanks are carefully insulated from each other, as by sheets of thick tissue-paper $m^\times$, (or thin manila.) Four bolts m' m^2 m^3 m^4 are extended through and clamp the blanks firmly together, fiber sleeves and washers m^5 m^6, respectively, insulating the bolts from the core. Two preferably fiber heads m^7 are placed on the vertical portion of the core, and the winding $M^\times$ is confined between the heads. The winding is insulated from the core by covering the latter with several thicknesses of Manila paper thoroughly shellacked, and in winding on the wire care should be taken that portions which will differ much in potential shall not lie in contact. This can best be accomplished by winding the wire in layers and placing a thickness of paraffined paper between the layers, and a covering of paper and cloth thoroughly shellacked should be placed outside of the windings to protect them from dampness and injury. As shown in Fig. 1, the poles P P′ of the magnet are turned toward each other and preferably approach the upper and lower edges of the rim b of the drum, the glass plate G extending over the pole P′ and acting as a shield to prevent contact therewith of the lower ends of the heddles in the carrier B. The top A′ of the support or stand is recessed or cut away to receive the lower end of the magnet, which is held firmly in position by preferably brass clamps d, having ears d', by which they are secured by bolts $d^\times$ to the stand A. As shown in Fig. 3, the inner faces of the clamps are shouldered at d^2 to embrace the lower end of the core, clamping-bolts d^3 below the latter serving to firmly hold the clamps together. The fiber bushings or sleeves m^5 and washers m^6 on the bolts m^3 m^4, which pass through the brackets and the core, insulate said bolts and prevent the magnet from acting like a transformer with short-circuited secondary. If an alternating electric-lighting current of about fifty-two volts is available, it may be connected directly to the ends 2 3 of the winding $M^\times$ to produce a sufficiently strong alternating magnetic field to demagnetize the heddles when the carrier is rotated at the speed noted. When an alternating current cannot be conveniently obtained from some commercial light or power circuit, a small self-exciting alternator can be provided.

When the apparatus is in use, no mass of iron should be placed in close proximity to the magnet, as it would tend to weaken and distort the field.

In operation the heddles are placed in the pockets b' of the carrier B, the slow revolution thereof permitting this, and with their lower ends resting on and sliding over the plate G the heddles are moved into and through the rapidly-alternating magnetic field, from which they slowly emerge, and are finally discharged by gravity through an opening $g^\times$ in the plate G′, demagnetized and ready for further service in the loom. It is designed that the motion of the carrier shall be in the direction of arrow 10, Fig. 2, the operator facing the carrier with the magnet at his right. The heddles are held in fixed position in the carrier, and are by the movement of the carrier moved gradually out of the alternating field. In moving through the field it is supposed that the magnetism in a heddle undergoes a rapid change in direction or polarity, due to the alternating current in the exciting-magnet, and the gradual removal of a heddle from the field causes the heddle to lose almost entirely all of its magnetism. I prefer to place the heddles singly in the pockets of the carrier in order to obtain the best results, the adjacent heddles being sufficiently separated by the walls of the pockets to enable the magnetic field to act directly upon each heddle. It may in some instances be desirable to slightly extend the pole P in the direction of movement of the heddles in the carrier, and for this purpose a plate p is bolted to the said pole of the magnet, bent and preferably slightly upturned at its lower end, as at $p^\times$, said extension acting to so extend the magnetic field that the heddles will not be too suddenly withdrawn therefrom. The magnetic effect on the heddles will thus be concentrated in the space under the pole into which the heddles first enter and will be gradually weakened as they approach the point where the heddles pass out from under the pole. When, however, the alternations of the field are sufficiently rapid, there is no occasion for the extension.

Loom-heddles of the character hereinbefore referred to are longitudinally slotted at or near one end to receive the supporting or actuating cross-bar of the harness-frame, and thus so much metal is removed from the heddle. If the heddles are inserted slot end down in the carrier, it may be convenient and advisable to compensate for this loss of metal by mounting a laminated iron director f on the top of the main frame closely adjacent to the periphery of the carrier and above the pole P′ of the exciting-magnet to afford, with the heddles, an ample conducting path for the magnetic lines of force.

While I have herein shown an exciting-magnet having a laminated core, other forms of magnet may be used, but the laminated core prevents the presence of eddy-currents, and for that reason I prefer the described form.

So, too, while this apparatus herein described is particularly adapted for the demagnetization of iron or steel loom heddles or detectors it will be obvious that slight changes of construction will adapt the apparatus to the demagnetization of other objects, and my invention is therefore not restricted to the precise construction and arrangement of apparatus as herein shown and described.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, an electromagnet having overhanging poles and adapted to produce an alternating magnetic field, a rotatable carrier for the object to be demagnetized, having a fixed axis and adapted to move said object slowly between the poles of the magnet, and a shield interposed between the lower pole of the magnet and the object, to prevent contact of the latter with the pole, substantially as described.

2. In an apparatus of the class described, an electromagnet having a laminated, insulated core and overhanging poles, and an insulated winding, energized by an alternating current to produce an alternating magnetic field, combined with a rotatable carrier having open pockets for the objects to be demagnetized, a fixed support above which the carrier moves, said support retaining the objects in the carrier and being interposed between them and the adjacent pole of the magnet, and means to automatically discharge said objects from the carrier, substantially as described.

3. In an apparatus of the class described, means, including an electromagnet, to produce an alternating magnetic field, a rotatable carrier having a series of open-ended pockets therein, to move the objects to be demagnetized through the magnetic field, and a supporting member coöperating with the carrier to retain the objects in the pockets thereof as they are moved through the field, said member having an opening therein through which the demagnetized objects are discharged by gravity, substantially as described.

4. In an apparatus for demagnetizing metal heddles, an electromagnet having overhanging poles and adapted when energized to produce an alternating magnetic field, a rotatable drum having a series of peripheral, open-ended pockets to receive the heddles and move them through the magnetic field in alinement with the poles of the magnet, and a glass shield interposed between the lower pole and the lower ends of the heddles, to prevent contact therewith and support the heddles in the carrier, substantially as described.

5. In an apparatus of the class described, means, including an electromagnet, to produce an alternating magnetic field, a rotatable carrier having a series of pockets therein, to move the objects to be demagnetized through the magnetic field, and ejecting means for automatically effecting removal of the objects from said pockets, substantially as described.

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

HARRY A. STORRS.

Witnesses:
A. B. STETSON,
H. R. ST. PIERRE.