

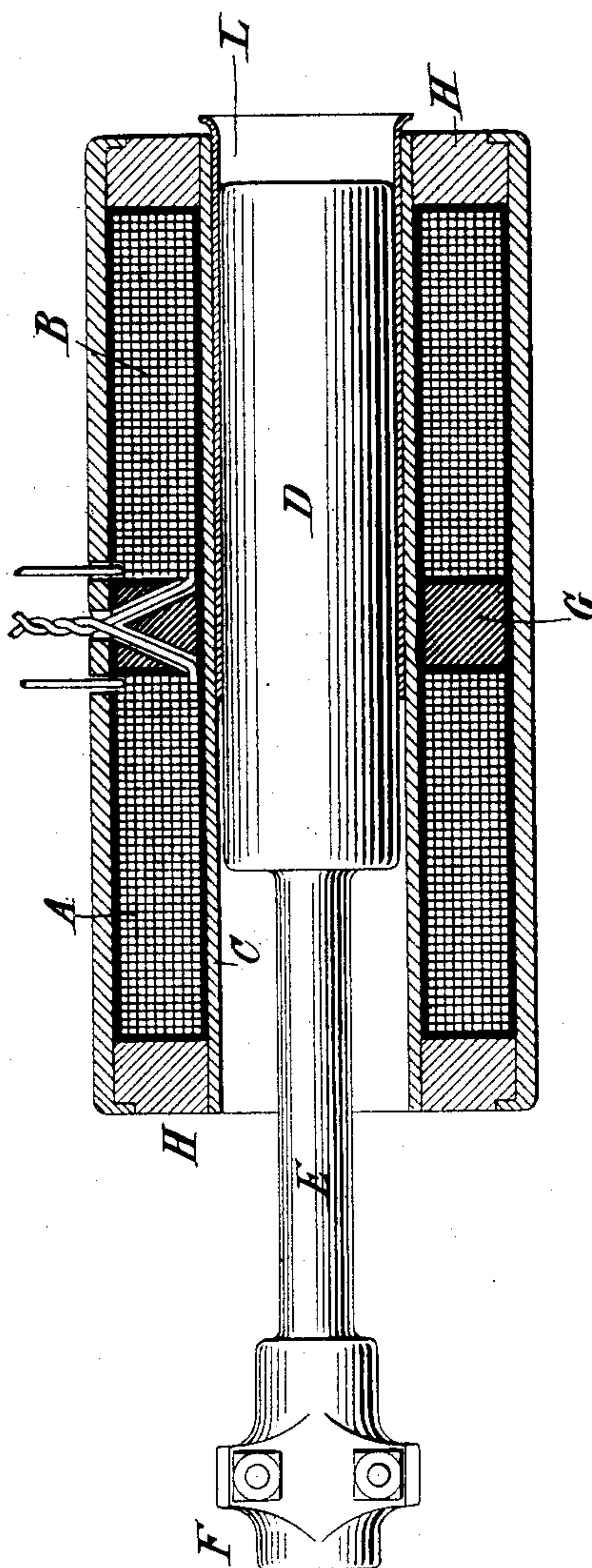
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H. CASLER.
RECIPROCATING ELECTRIC DRILL.

(Application filed Mar. 16, 1898.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

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RECIPROCATING ELECTRIC DRILL.

SPECIFICATION forming part of Letters Patent No. 608,175, dated August 2, 1898.

Application filed March 18, 1898. Serial No. 674,359. (No model.)

To all whom it may concern:

Be it known that I, HERMAN CASLER, a citizen of the United States, residing at Canastota, in the county of Madison and State of New York, have invented certain new and useful Improvements in Reciprocating Electric Drills, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.

The invention which forms the subject of this application is an improvement in electromagnetic reciprocating drills or analogous devices in which a magnetic core, to which the drilling or other tool is attached, is employed in conjunction with one or more surrounding coils or helices, through which electric currents are directed in such manner as to effect the reciprocation of the core in obedience to the shifting magnetic forces produced thereby.

In these devices as heretofore constructed the energizing-coils have generally been inclosed in a casing or shell the exterior and end portions of which have usually been of magnetic material, while the inner tube or lining of the central opening or bore to receive the core has invariably been of non-magnetic material, such as brass or sometimes fiber.

The requirements of practical use, the exposure to wet, and the necessity for plentiful lubrication in the case of such devices demand the perfect and permanent inclosure of the coils by the casing, and hence it has been found necessary to maintain a water-tight union between the lining-tube and the heads or ends of the casing; but there is no way of uniting a thin brass or similar tube to the iron or steel heads so as to make a reliable and permanent joint capable of withstanding in devices of this character the hard usage and extreme variations of temperature to which they are subjected under even ordinary conditions. Consequently in the drills of this kind heretofore made with iron or steel shells and brass or non-magnetic lining-tubes great difficulty has been experienced in preserving a union of these two parts which would exclude moisture and oil and not give way under the pounding to which the drill as a whole is subjected or the unequal rates of expansion and contraction of the two metals under va-

riations of temperature. After many experiments and attempts to remedy this objection I have discovered the fact—although from the theoretical considerations usually taken into account the contrary would seem to be true—that if the lining-tube for the coils or the wall of the central opening for the core be of iron or steel not only may the inner and outer portions of the casing be permanently and perfectly united by brazing, but that the efficiency of the drill, having regard both to its durability and economy in operation, is materially increased. My improvement therefore consists in using iron or steel for both the outer shell and the inner lining of the casing for the coils of a reciprocating electric drill in the manner herein described.

A drill of the character contemplated by my invention is shown in the accompanying drawing, which is a longitudinal central section.

A B are the energizing-coils, which are to be supplied with a current or with currents from any suitable source.

C is a cylindrical tube of iron or steel forming a spool upon which the coils are or may be wound and the lining or walls of a chamber in which the magnetic core D, with its shank E and tool-holder F, may reciprocate.

Between the two coils or sections of coil A and B a ring G, of non-magnetic material, is placed, and holes are drilled in it, through which the inside ends of the coils are led out.

H H are heads of iron or steel. These are brazed to the ends of the iron or steel tube C either before or after the coils are in place. An outer and usually heavier cylinder K, of iron or steel, is then passed over the coils and heads H H and its ends bent over the heads, the joint being usually completed by calking with proper tools, so as to make the casing for the coils perfectly water-tight at the ends.

It is desirable to insert a cylinder of thin brass L in the bore of the device as a lining for the core-chamber, which may be withdrawn and replaced when worn.

One of the most desirable features in the construction of apparatus of this kind is to bring the core or plunger and the actuating-coils as closely together as possible. The use of iron or steel as a lining for the coils enables me to effect this result much more per-

fectly than by the use of brass or a softer metal for the purpose, and this without sacrifice of strength and durability of the structure. For example, in a drill in which the
5 diameter of the coils is seven inches and that of the plunger four inches I have found it entirely practicable to use a steel lining of one thirty-second of an inch in thickness.

The use of the iron or steel lining-tube in
10 a drill of this description marks a substantial advance in the art of drill construction for the reasons above stated and also that it permits of brazed joints between the lining-tube and the heads which are very permanent and
15 secure great strength. In the manufacture of these drills it has not heretofore been possible to join a thin brass tube to the iron head in such a manner that the joint could be depended upon to resist the mechanical strain
20 due to the vibration of the drill, the moving of the plunger, and the contraction and expansion under variations of temperature, as the coefficients of expansion of iron or steel and brass are different. Moreover, as I have

above stated, the magnetic action of the sys- 25
tem and efficiency of the drill are increased by the use of a lining-tube of magnetic metal. This fact is explainable on several theories; but I do not deem it necessary to elaborate
30 them herein.

What I claim is—

1. In a reciprocating drill, the combination with energizing-coils and a magnetic core within the same, of a casing for the coils composed of an exterior shell, heads or ends and
35 an interior lining-tube all of iron or steel, and united by water-tight joints, as set forth.

2. In a reciprocating drill, the combination with energizing-coils and a magnetic core within the same, of a casing for the coils composed of an exterior shell, heads or ends and
40 an interior lining-tube, all of iron or steel, the lining-tube and heads being brazed together, as set forth.

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Witnesses:

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