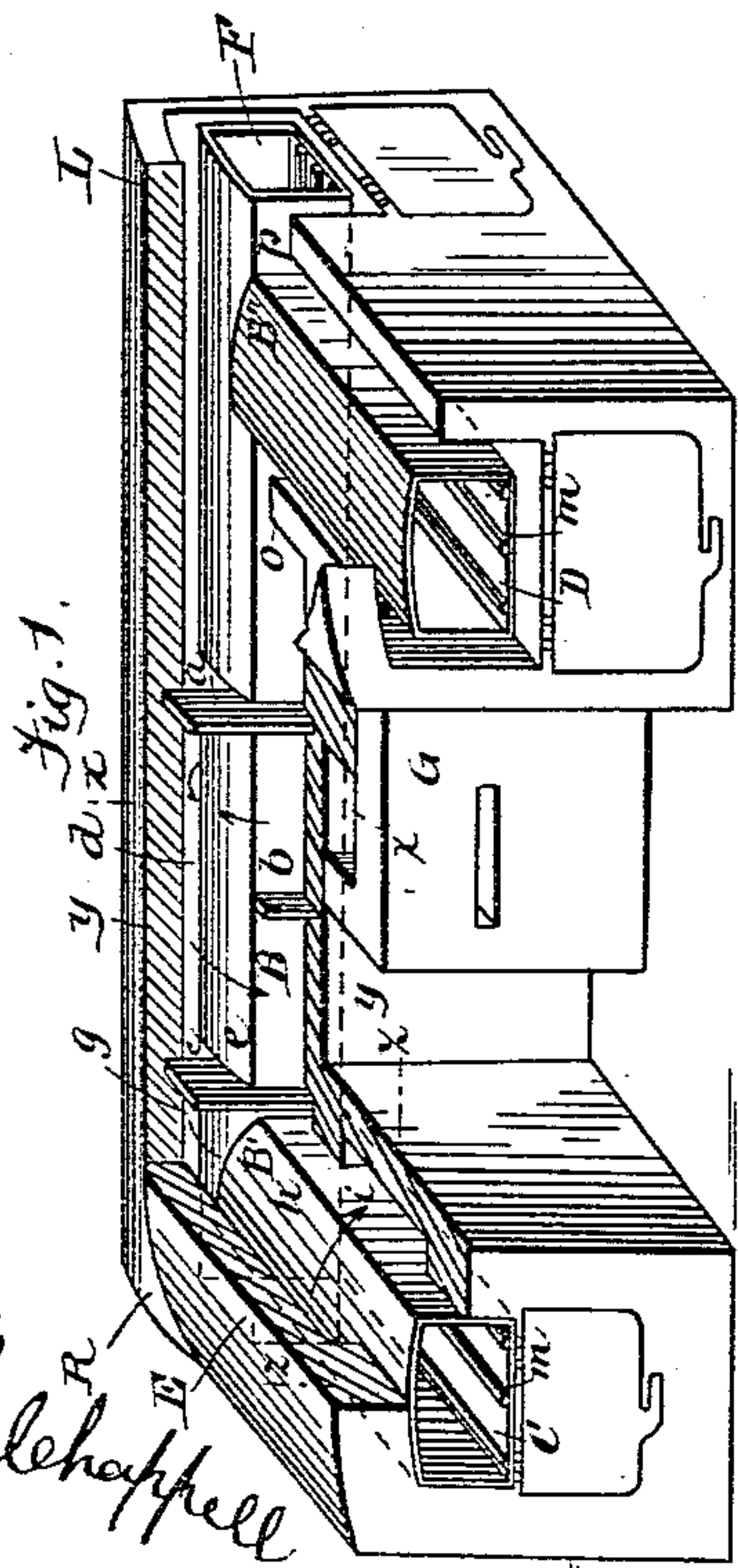
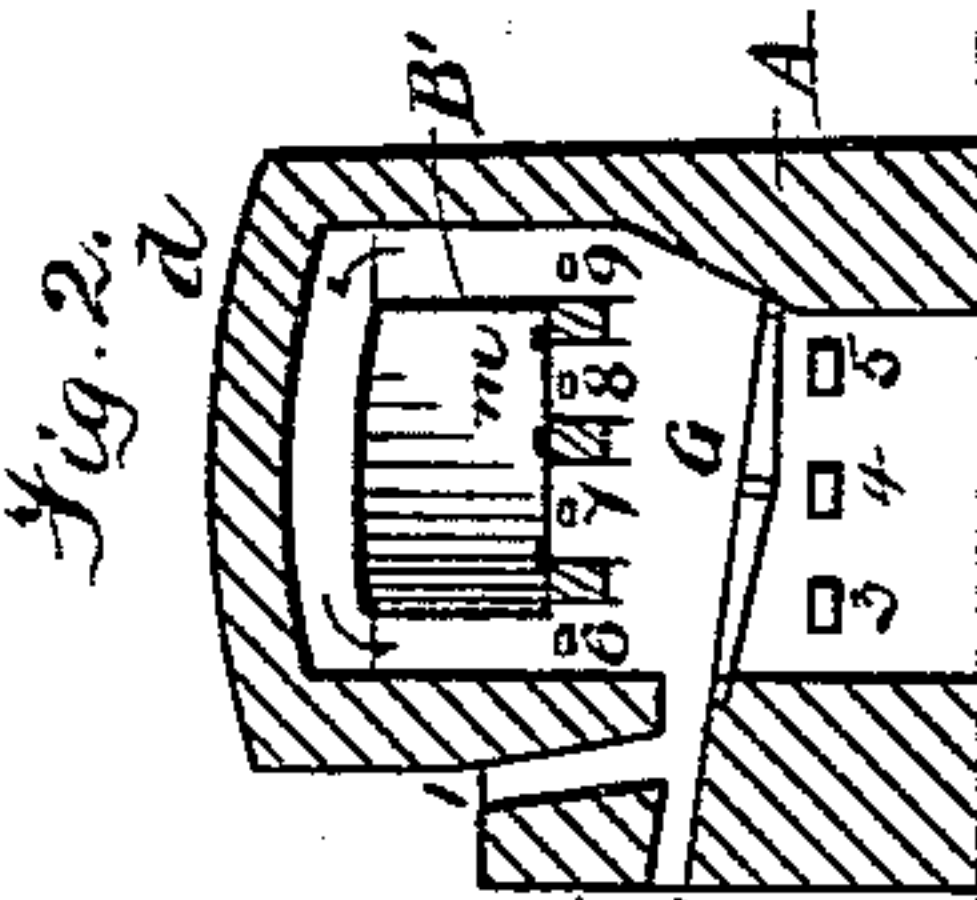
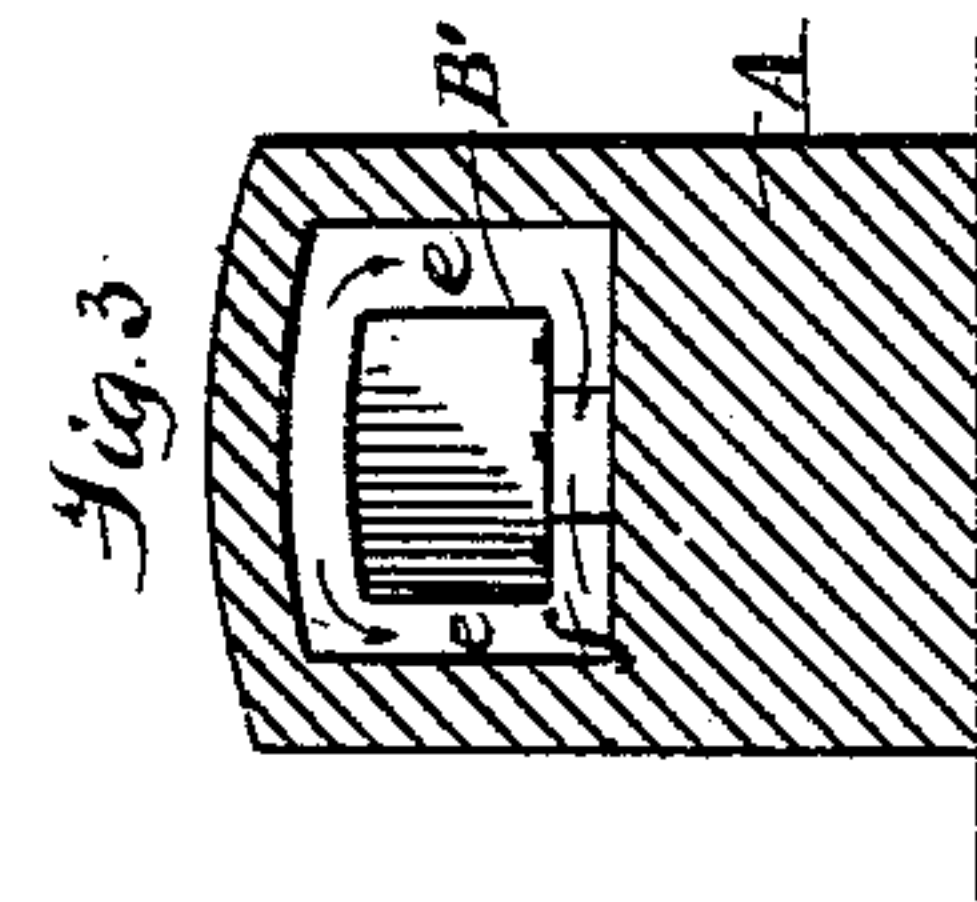
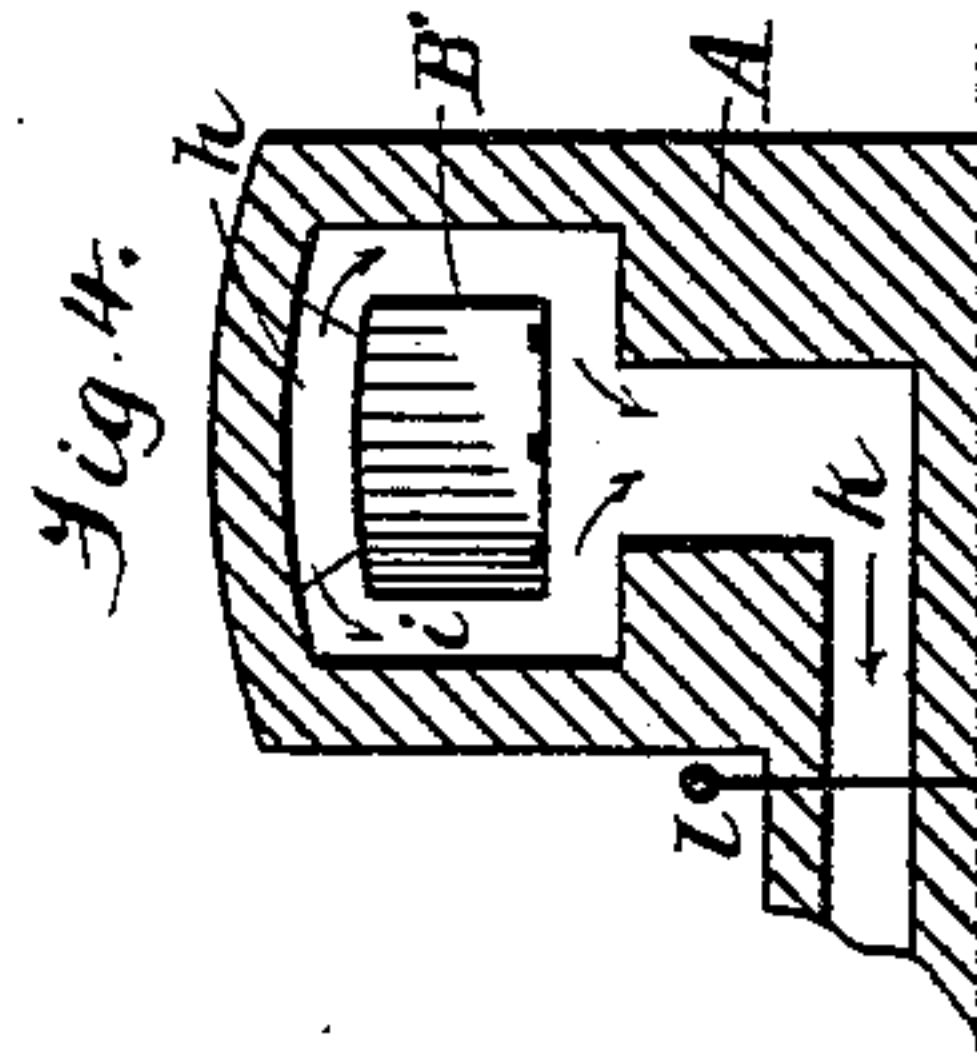
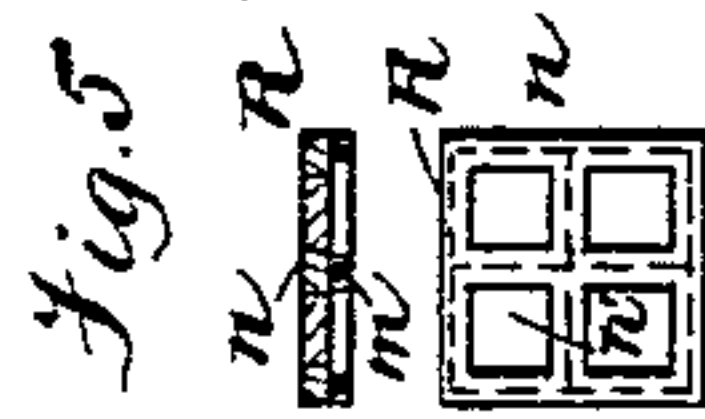
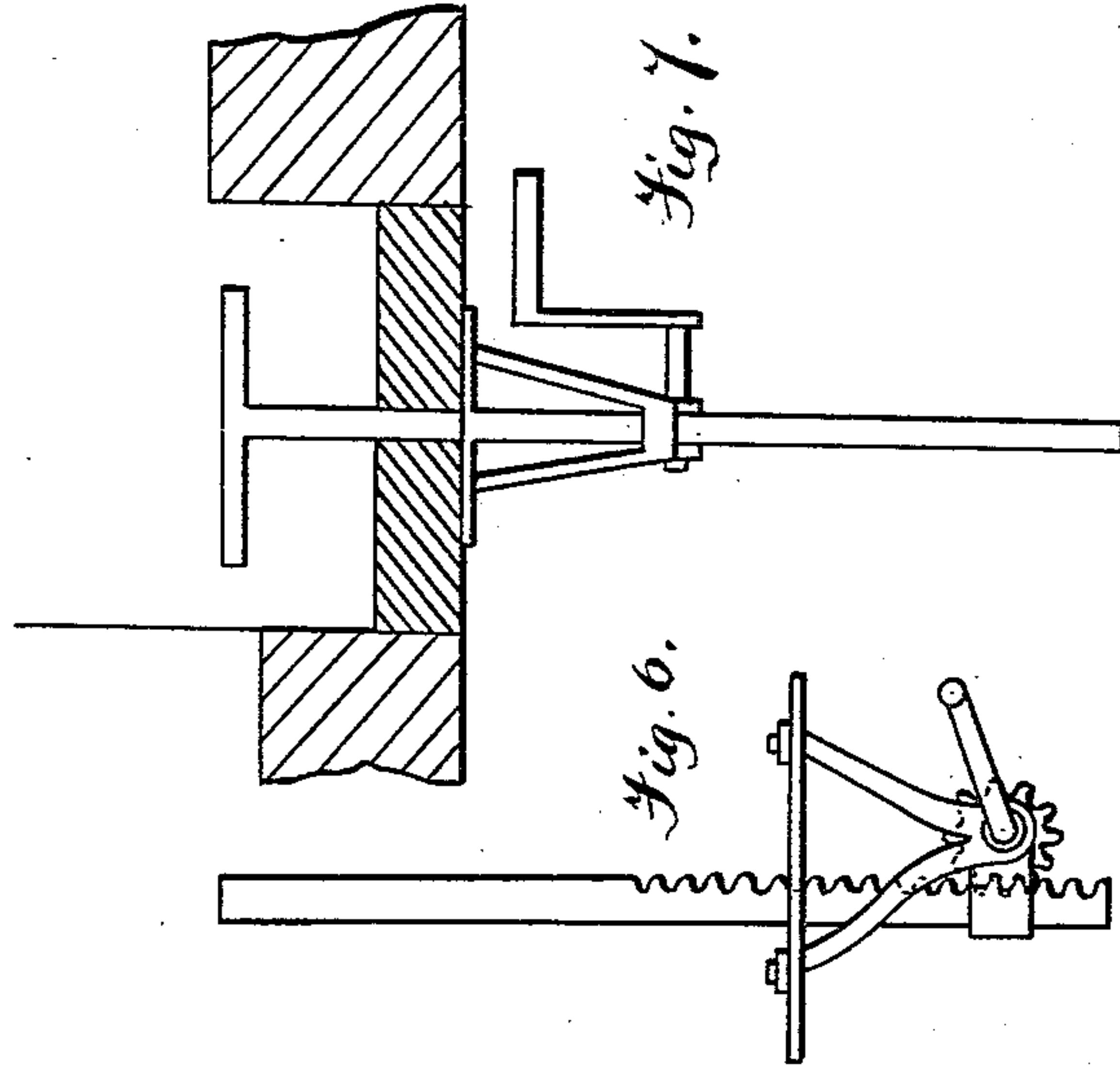


(No Model.)

J. FÜRBRINGER.
MUFFLE FURNACE.

No. 560,157.

Patented May 12, 1896.



Attest;
Robert A. Schaffell
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By his Atty
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UNITED STATES PATENT OFFICE.

JOHANN FÜRBRINGER, OF SCHIRNDING, GERMANY, ASSIGNOR TO JULIUS ERNST WINZER, OF HAMBURG, GERMANY.

MUFFLE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 560,157, dated May 12, 1896.

Application filed March 14, 1895. Serial No. 542,068. (No model.) Patented in Austria October 22, 1894, No. 44/6,133, and in England November 16, 1894, No. 21,326.

To all whom it may concern:

Be it known that I, JOHANN FÜRBRINGER, of Schirnding, Bavaria, German Empire, have invented new and useful Improvements in
5 Furnaces for Burning Ceramic Ware, (patented in Great Britain, No. 21,326, dated November 16, 1894, and in Austria, No. 44/6,133, dated October 22, 1894;) and I do hereby declare that the following is a full, clear, and
10 exact description of the same.

This invention has for its object an improved muffle-furnace which admits of convenient and continuous working. Hitherto
15 kilns have been filled with the goods, then gradually got up to the required heat and gradually cooled again.

My invention differs from all preceding ones in that the furnace is kept continuously going without the heat being increased or
20 lessened and the goods are passed or traveled through the furnace, the furnace being arranged so that the hottest part is in the center and the goods introduced into a comparatively cool portion and gradually traveled
25 through the center to another comparatively cool portion, from which they are taken out. The goods are thus gradually heated to the required heat and gradually cooled down; but the process is continuous, as the goods
30 are intermittently being put in at one end and taken out at the other.

The invention is best described by aid of the accompanying drawings, in which—

Figure 1 is an isometrical view, partly in
35 section, of the improved muffle-furnace. Figs. 2 to 4 are cross-sections of the same on the lines xx yy zz of Fig. 1. Fig. 5 shows a pan or tray; Figs. 6 and 7, details of screw device.

40 The muffle-furnace A in plan is of a U-shaped form, and contains the muffle B. This latter in its central parts—that is to say, where it is exposed to the greatest heat—consists of fire-clay plates, while the two rectangular
45 branches B' B'' are made of iron plates to allow of an easy or rapid heating or cooling, owing to their being good conductors of heat.

50 a b c are partitions for the firing introduced into the chamber G, the partitions a c extending up to the roof of the furnace and the par-

tion b to the upper edge of the muffle-passage. The heated gases rise between the walls a and b , pass at d over the muffle, flow around this latter at e , reunite in the passage
55 f , Fig. 3, rise at g , Fig. 1, again upward, and finally, after again flowing over the muffle-passage at h , escape through the flues i into the smoke-chamber k , which is provided with a regulating damper or slide l , Fig. 4.

While in the continuous working muffle-
60 furnaces hitherto employed, the so-called “drawing muffle” of the main heated chamber was shut off from the warming and cooling muffles, and consequently, by reason of the sudden alteration of temperature, break-
65 ages of the goods, more particularly in the case of large articles, took place, in this improved muffle-furnace the heating-passage E F is interrupted by no partitions.

The pans or trays, Fig. 5, which are in-
70 serted at C and pushed forward on the rails m , gradually reach the hottest part of the muffle over the firing-chamber G and become constantly hotter. The cooling down also takes place equally gradually up to the exit
75 D, so that even in the case of large articles no breakage or cracking need be feared. The pans or trays, Fig. 5, consist of a frame R, of sheet metal, the bottom of which is formed of three iron bars n , riveted to this frame and
80 coated with fire-clay or earthenware plates n' . These iron bars n are arranged at such distances apart that when the pans are pushed forward they slide on the rails m . By this
85 mode of construction the pans are both lighter in weight and also of greater durability than those hitherto employed, which were constructed entirely of iron or of fire-clay and were either very heavy or very easily broken.

If after a long period of working of the fur-
90 nace the cooling-chamber should become too hot, or if it be desirable to accelerate the cooling process, air may be allowed to enter the passage op , which air flows round the muffle, cooling the latter and warming itself, and it
95 may then be conducted to the furnace in order to utilize the heat absorbed.

The fireplace of this furnace is constructed in the following manner: At 1, Fig. 2, the fuel is inserted, at 2 the grate is attended to
100

and the slag and ashes removed. This arrangement has for its object to enable the fuel to be brought already warmed to the grate for combustion.

3, 4, and 5 are air-passages, which convey underneath the grate heated air from the cooling-chamber B'. The air nozzles or openings 6 7 8 9 are also connected with the cooling-chamber B' and convey very hot air to the flames developed, so that a smokeless combustion takes place, and the fuel is utilized to its fullest extent.

In some furnaces instead of a single central muffle and two wings at right angles thereto I sometimes add a wing at the end of each of the two wings, extending outwardly, thus making four turns instead of two, all at right angles and commencing at the entrance first to the left, then to the right, then after passing the furnace again to the right, and lastly to the left.

In Figs. 6 and 7 a simple form of screw device is shown for screwing forward the carriages. The screw is of sufficient length in each case to screw a carriage forward its own length, and the various carriages are preferably square in plan and made an aliquot part of the length of the tunnels. Thus the central tunnel could be made to accommodate five square trays and each branch tunnel three square trays; or the trays can be made rectangular or other shape, but not as broad as they are long, and drawn out and turned round at each end of a length of the furnace, doors P being provided for the purpose.

The mode of action is as follows: The furnace being lighted and the tunnels heated, a tray of goods is inserted at C, and the door

closed. After a time it is shoved on and another added, and at intervals the process is repeated, the screws at K and L being alternately used to move the trays around the corners. The material is taken out at D, the material being fed in at one end and taken out at the other. If there be four bends, there are four screws, one at each turn. It will be obvious that the exact ground plan shown, or that of the modification described, need not be adhered to. The advantages of bending the muffle at right angles are, first, that the trays can be pushed on at intermediate points; second, the apparatus is arranged in smaller compass. It could, however, be arranged as a single long straight or curved tunnel, provided there be means devised for pushing on the trays at intervals, instead of having the whole lot pushed from one end.

I claim as my invention—

1. In combination with a muffle-furnace having bends, a screw device at each bend whereby trays in the furnace can be traveled forward past the bends substantially as described.

2. In combination with a muffle-furnace having bends, a forwarding device at each bend capable of being reciprocated in a line with the continuation from the bend whereby the contents can be traveled past the bend without opening the furnace.

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

JOHANN FÜRBRINGER.

Witnesses:

W. P. THOMPSON,
G. HUGHES.