

No. 612,779.

Patented Oct. 18, 1898.

C. MALPAS, Dec'd.

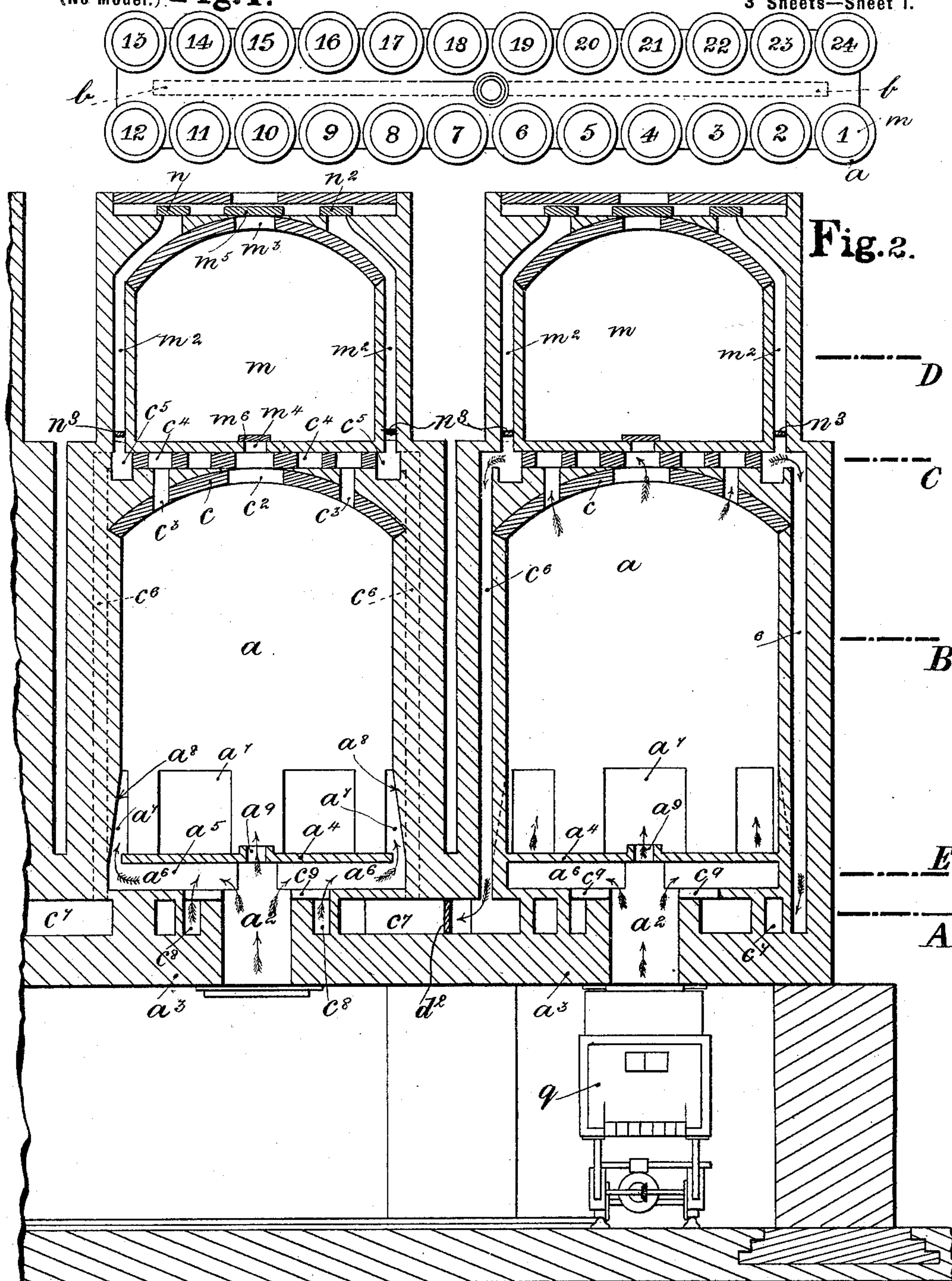
M. G. MALPAS, Administrator.

KILN OR OVEN.

(Application filed July 20, 1898.)

(No Model.) **Fig. 1.**

3 Sheets—Sheet 1.



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3 Sheets—Sheet 2.

Fig. 3.

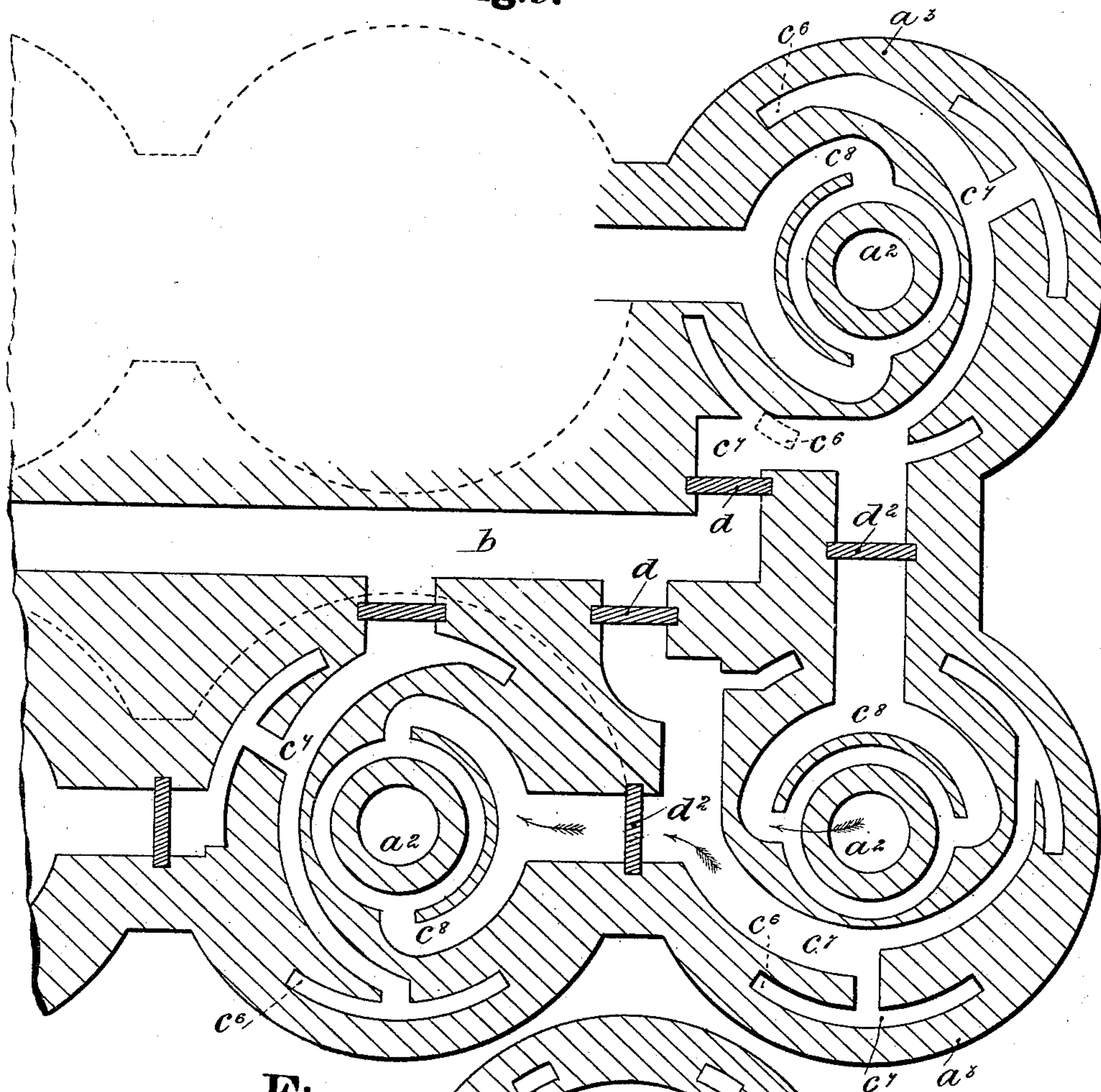
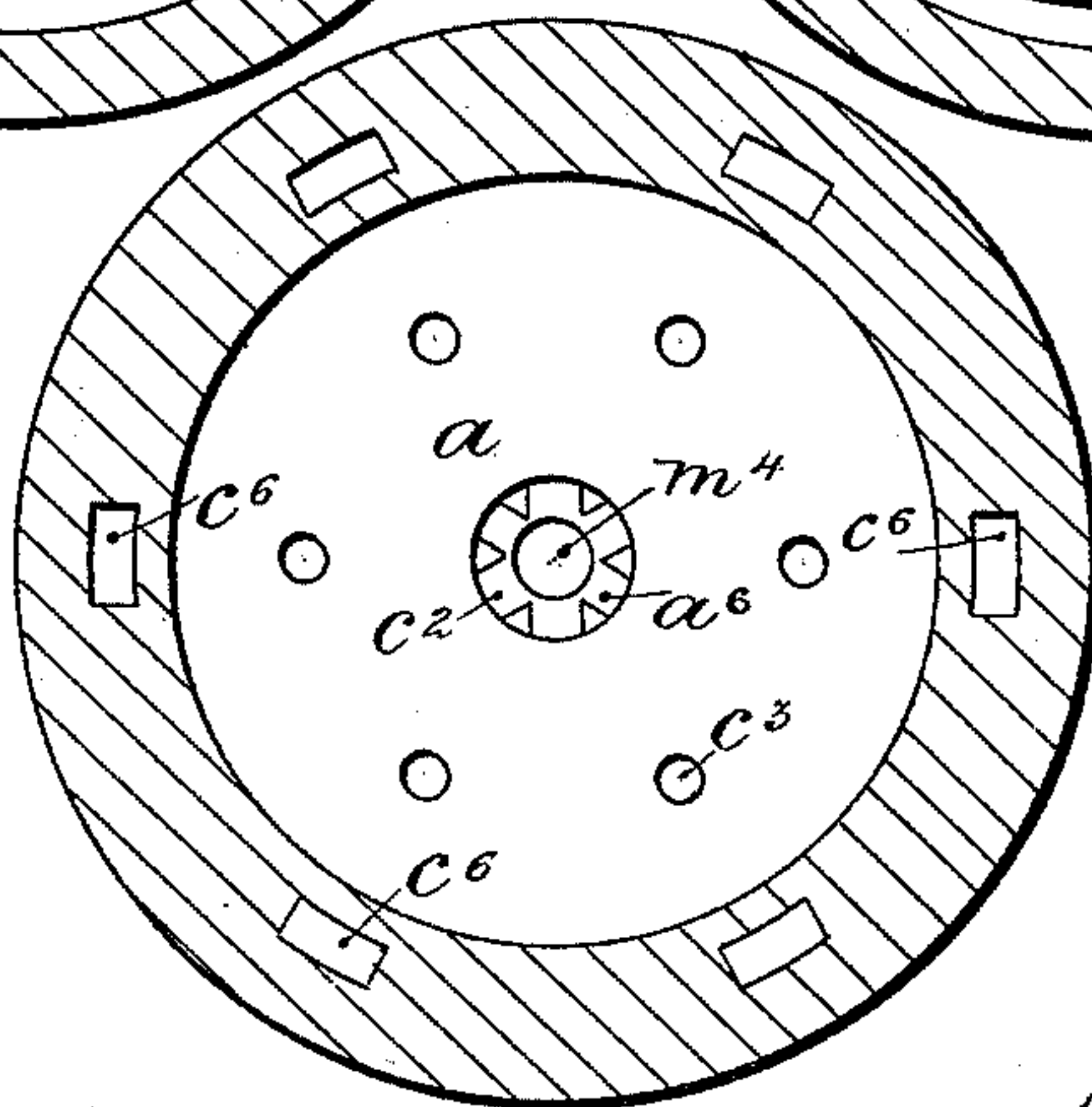


Fig. 4.



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3 Sheets—Sheet 3.

Fig. 7.

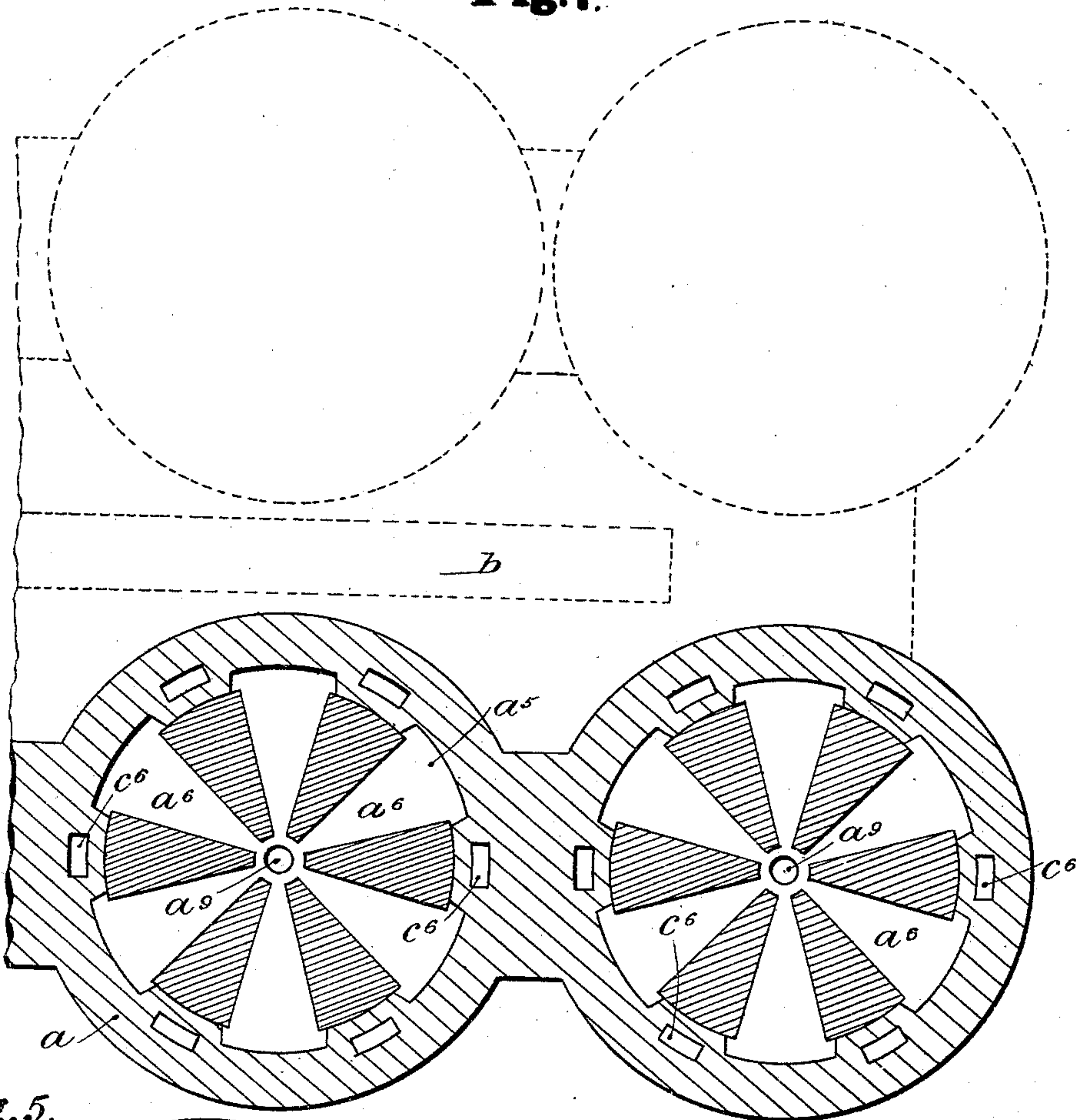


Fig. 5.

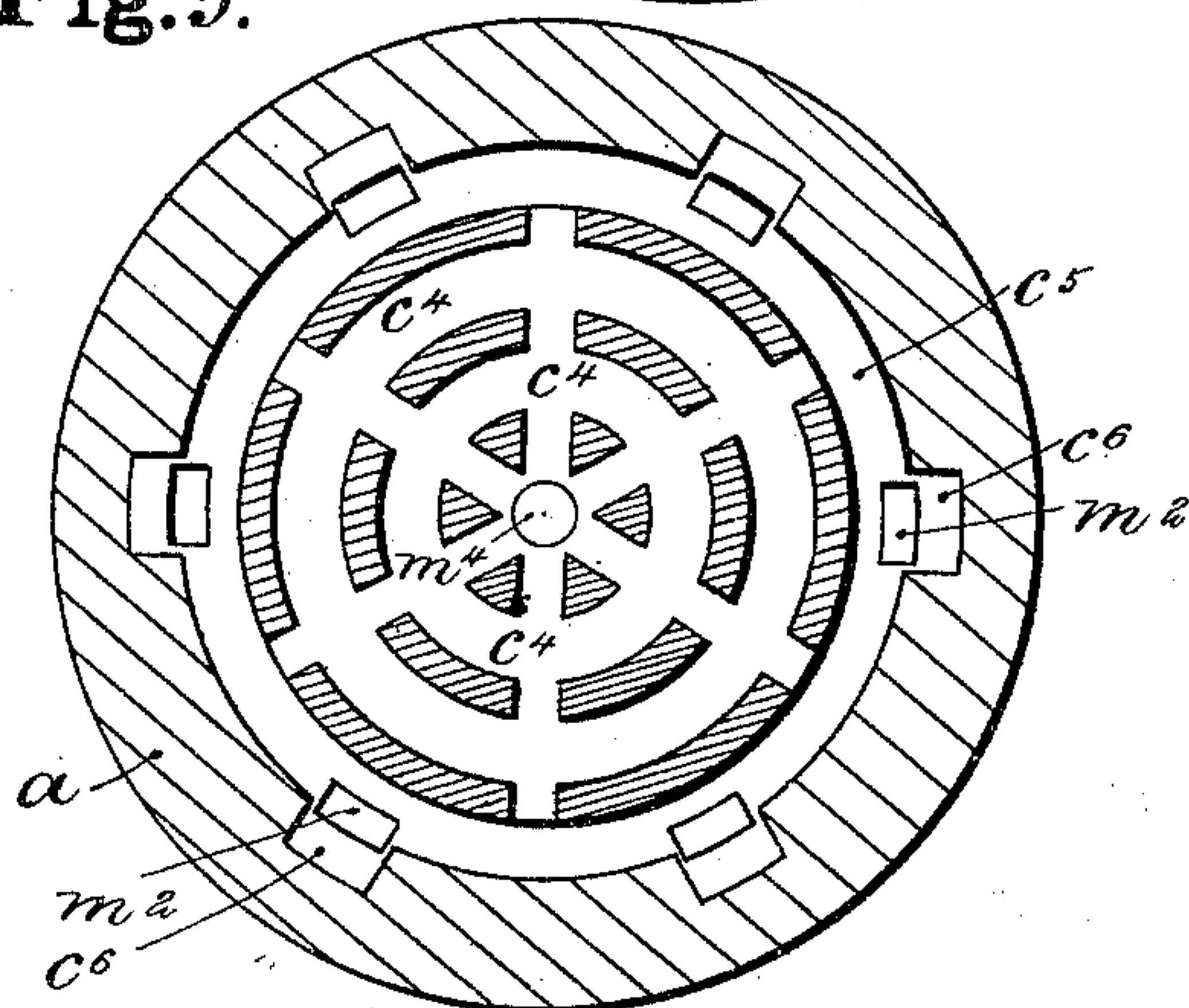
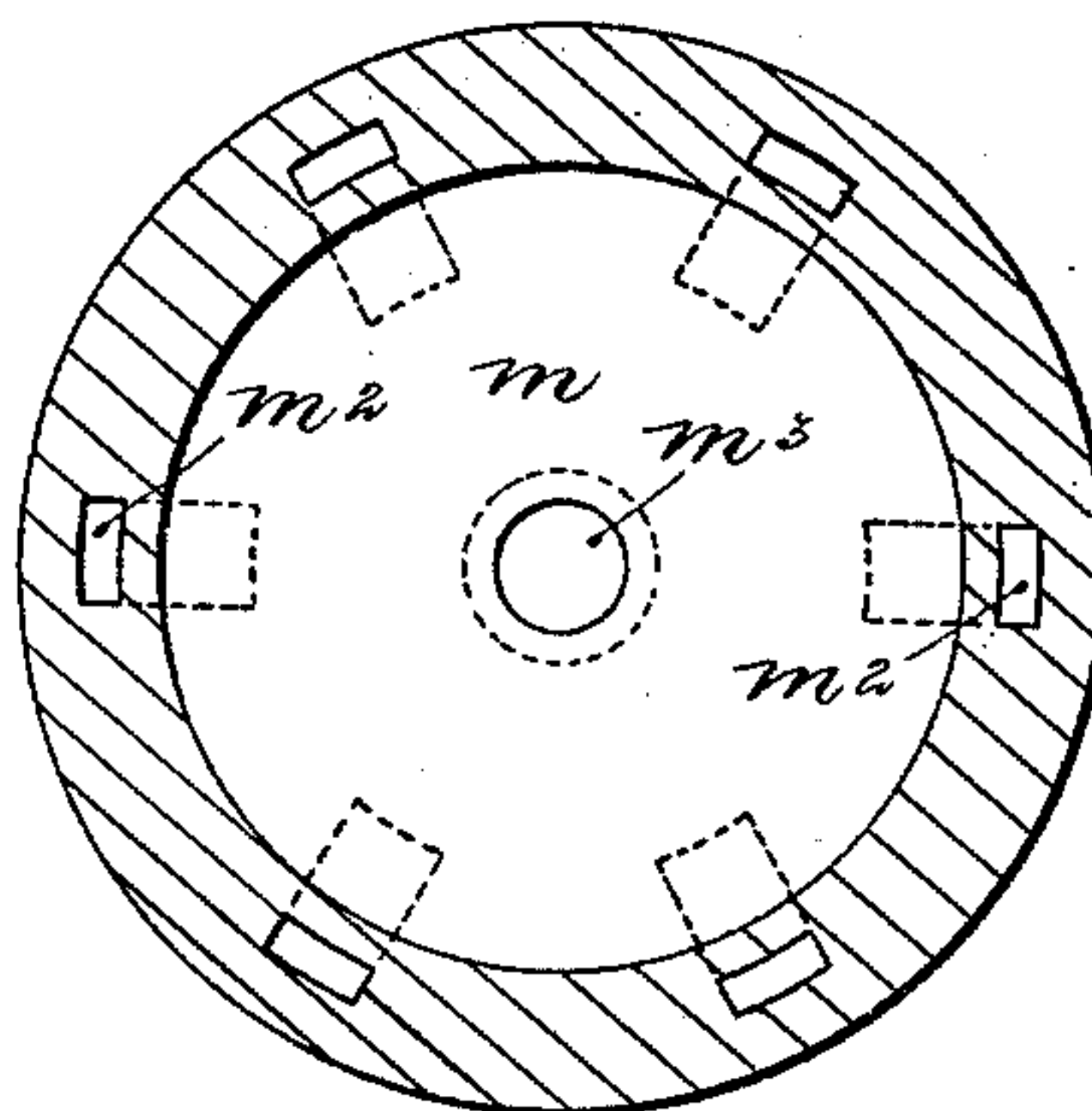


Fig. 6.



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UNITED STATES PATENT OFFICE.

MARK GLOVER MALPAS, OF TUNSTALL, ENGLAND, ADMINISTRATOR OF
CHARLES MALPAS, DECEASED.

KILN OR OVEN.

SPECIFICATION forming part of Letters Patent No. 612,779, dated October 18, 1898.

Application filed July 20, 1898. Serial No. 686,391. (No model.)

To all whom it may concern:

Be it known that CHARLES MALPAS, deceased, late a subject of the Queen of Great Britain, and a resident of Clanway, Tunstall, in the county of Stafford, England, did during his lifetime invent certain new and useful Improvements in Kilns or Ovens, of which the following is a specification.

This invention relates to kilns or ovens for firing potters' ware, bricks, tiles, and such like ceramic articles and for calcining various substances and has distinct reference to that class of kilns known as "continuous-firing" kilns. These continuous-firing kilns generally consist of a number of small kilns or ovens arranged in a series and so as to be in communication one with the other and to be progressively fired, cooled, and made ready for firing and operated by a moving or traveling fire. Such a system of kilns or ovens is set forth in the specification of English Patent No. 1,064 of 1875, which was granted to one Charles Malpas. It is in the arrangement and construction of such kilns wherein this invention resides; and the same has for its objects, primarily, a better utilization of the whole of the fire products and a more uniform heat throughout the entire ovens' surfaces, while, secondarily, the provision of supplementary ovens arranged upon the top of the ovens proper for the purpose of being used for "hardening on," the said supplementary ovens being so arranged as to be capable of being heated or fired by the products from the fire as they leave the ovens proper to pass to the next oven in turn.

By the aid of the accompanying sheets of drawings and the reference letters and figures thereon the invention will be clearly understood.

In the said sheets a diagrammatic plan of a series or block of kilns arranged according to this invention is shown in Figure 1, the said series or block taking the form of two opposite rows of twelve ovens or kilns, each of which is in communication with a common chimney-flue and with those ovens or kilns next or adjacent to it. The said kilns or ovens in this view are all of a likeness in construction, and each is fired in its turn by a traveling fire. In this view the kilns are

marked 1 2 3, and so on, and *b* represents a chimney-flue which is arranged between the rows and which is in communication with each oven. Fig. 2 represents a longitudinal vertical section taken through ovens Nos. 1 and 2 and a portion of No. 3; and Fig. 3 is a horizontal section of ovens Nos. 1, 2, and 24 and portions of 3, 22, and 23, (the last two in diagram only,) taken upon the dotted line A, Fig. 2. Fig. 4 is a horizontal section upon the dotted line B, Fig. 2, of the oven No. 1, looking upward, while Figs. 5 and 6 are horizontal sections, looking upward, upon the dotted lines C D, respectively, of oven No. 1 and its supplementary hardening-on chamber. Fig. 7 is a horizontal section of Fig. 2 upon the dotted line E.

The traveling fire *q*, which is shown in Fig. 2 under the kiln No. 1, travels upon rails in the ordinary way and is brought under each kiln or oven progressively, a turn-table being provided upon each corner of the series or block of kilns for the purpose of shunting the said fire or altering its course as it proceeds down the rows.

With reference to the aforesaid drawings each kiln or oven is formed of a fire-brick hollow structure *a*, having in its side a suitable opening to admit of the putting in and pulling out of the saggars, and a main firing-flue *a*² is centrally and vertically disposed through its base *a*³, the latter being elevated or built up from the ground to allow of the working of the traveling fire *q*. The actual floor *a*⁴ of each oven is elevated above its main firing-flue, so as to form a shallow chamber *a*⁵ of an equal diameter to the inside of the oven between it and the said flue, and this chamber is built with a number of channels or passages *a*⁶, (preferably radially disposed,) which communicate from the main firing-flue *a*² to inlet-passages *a*⁷, formed within and around the lower portions of the inner walls of the oven's interior and floor. The passages *a*⁷ and channels *a*⁶ are clearly shown in kiln No. 2, Fig. 2, and in Fig. 7, the direction the products from the firing-flue take therein being indicated by arrows. The inlet-passages *a*⁷ are preferably inclined, as at *a*⁸, in order to lead the products from the fire and from the main firing-flue somewhat to

the center of the kiln. A central opening a^9 is formed in the actual floor a^4 of the kiln, through which a portion of the products from the fire passes, and this admits of a central and direct playing of the fire upon the saggars, as well as a circuitous one from the kiln sides.

The crown or ceiling c of the hollow structure a is formed with a central outlet-opening c^2 and a number of outlet-passages c^3 within it, which lead to a combination of horizontally-disposed ring-flues c^4 , built within the top of the kiln a , and to a hardening-on chamber m , which latter may or may not be used with the kiln a . The ring-flues c^4 lead from the outlet opening and passages of the kiln a to a circular flue c^5 , common to all parts of the ring-flues, and from out of this a number of vertical passages c^6 lead, the said passages being formed within the walls of the kiln a , so as to run the full length of the same and lead into an under flue c^7 . These vertical passages c^6 may be of any number and size; but six only of them are shown in the drawings, and these are disposed in the walls of the kiln a intermediate between the inlet-passages a^7 , before described. The under flue c^7 is shown as a number of scroll passages, into which at points lead the whole of the vertical passages c^6 , and this under flue communicates both to the chimney-flue b and to the radial passages or channels a^6 of the kiln next in order for firing—viz., No. 2 kiln; but dampers d d^2 are fitted within the respective passages leading from the under flue c^7 to the parts named in order that the products from the fire may be either passed direct into the chimney-flue or into the radial passages a^7 at the will of the attendant.

Intervening between the under flue c^7 and the radial passages a^6 is an inner circular or scroll flue c^8 , horizontally disposed and built inside the passages of each under flue, and this radially disperses the products from the flue c^7 to the passages a^6 and the central opening a^9 , so that they pass into the kiln No. 2 upward and in the same way as the products pass direct from the fire in kiln No. 1. Openings c^9 are formed in the top of the base a^3 and adjacent to the scroll flue c^8 to establish communication between the latter and the parts a^6 and a^9 .

It is to be observed that in their play upon the saggars the flames or products from the fire have always an upward tendency, as well as passing, as it were, twice through each kiln—viz., first, in the inside, and, second, through its walls.

The hardening-on chamber m has a number of vertical flues m^2 within its walls, which lead from the circular flue c^5 in the top of the kiln a to the atmosphere or to any desired inclosure, and central openings m^3 m^4 are formed within the said chamber's walls and floor, which are provided with dampers m^5 m^6 for the purpose of either opening the kiln and the chamber to the atmosphere for

cooling or to close the said chamber to the atmosphere, but to open it to the kiln a at such time as only pure hot air or combustion is within it. Dampers n n^2 control the outlets of the vertical flues m^2 , and if necessary other dampers n^3 may be fitted to the lower portions of the said flues, where they lead from the circular flue c^5 , so that the hardening-on chamber can be shut off entirely from the products playing through the kiln a and its flues and passages.

In working, the products from the fire q pass upward into the kiln No. 1 by way of the main firing-flue a^2 , the central opening a^9 , the radial channels a^6 , and the inlet-passages a^7 , and after playing upon the saggars they pass into the ring-flues c^4 by way of the openings and passages c^2 c^3 . Assuming the said products to be shut off from the hardening-on chamber, they then pass down the vertical passages c^6 into the under flue c^7 and from thence into the inner flue c^8 of kiln No. 2, where they are again directed into the interior of this kiln in an upward direction. From this kiln No. 2 they pass into kiln No. 3 by way of the ring-flues c^4 , the vertical passages c^6 , and the under flue c^7 of kiln No. 2 and the inner scroll flue c^8 of kiln No. 3, and so on through the series, each kiln having the products passed twice over its boundary surface—viz., top, bottom, and sides—and once inwardly and once outwardly.

It is to be understood that the kilns can be shut off from each other by the dampers at any time and the products passed into the chimney-flue and that the products from kiln No. 24 pass into the interior of kiln No. 1 in the same way as described in reference to kilns Nos. 1 and 2.

When the hardening-on chambers are used, the vertical flues m^2 are opened to the circular flue c^5 and the products are allowed to pass therethrough.

It must be observed that although the inner scroll flue c^8 is surrounded by its particular under flue c^7 there is no direct communication, as each respectively receives the products from the preceding kiln and passes it on to the next in order.

Having now described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In continuous-firing kilns or ovens, the combination with adjacent kilns each having flues at the top, of under flues c^7 leading both to the chimney-flue and to the base of the next kiln, a vertical main firing-flue a^2 for each kiln arranged centrally below the kiln and within the space occupied by said under flues, and vertical passages or flues c^6 arranged around the kilns in the walls thereof and leading from the said flues at the top of the kiln to the said under flues, substantially as described.

2. In continuous-firing kilns or ovens, the combination with adjacent kilns, of the vertical main firing-flues a^2 each arranged cen-

trally below its kiln and leading directly thereto, under flues c^7 arranged around the main firing-flue, scroll flues c^8 intermediate the main firing-flue and said under flues, and
 5 vertical passages c^6 arranged around the kiln in the walls thereof and leading from the top of a kiln to the under flues at its base, substantially as described.

3. In continuous-firing kilns or ovens, the
 10 combination with adjacent kilns, of the vertical main firing-flues a^2 arranged centrally within the kiln-bases and communicating with the kilns through central openings a^9 in the kiln-floor coincident with said main firing-
 15 flues, radiating channels a^6 leading from the main firing-flues, vertically-inclined passages a^7 leading from said radiating channels into the interior of the kiln at its sides, under
 20 flues c^7 , arranged in the kiln-bases around the central main firing-flue, and vertical passages c^6 arranged in the kiln-walls and leading from the kiln-top to said under flues, substantially as described.

4. In continuous-firing kilns or ovens, the
 25 combination with adjacent kilns each having ring-flues c^4 in its crown and provided at the bottom with a central vertical main firing-flue a^2 , of the radiating channels a^6 leading from said flues a^2 , vertically-inclined passages

a^7 leading from said channels into the kiln at
 the sides thereof, the under flues c^7 arranged
 around the vertical main flues a^2 , vertical
 passages c^6 leading from the top of the kiln
 through the flues c^4 and communicating with
 the said under flues, the scroll flues c^8 inter-
 mediate the under flues c^7 and main flues a^2
 and the openings c^9 between said scroll flues
 and radiating channels a^6 , substantially as
 described.

5. In continuous-firing kilns or ovens, the
 combination with the kilns proper, which have
 outlet-openings in their ceilings or crowns,
 of "hardening-on" secondary kilns or cham-
 bers m , which are in communication with the
 kilns proper, and which have vertical flues
 within their walls and inlet and outlet pas-
 sages closed by dampers, substantially as set
 forth.

In testimony whereof I have hereunto set
 my hand in the presence of two subscribing
 witnesses.

MARK GLOVER MALPAS,
Administrator of the estate of Charles Malpas,
deceased.

Witnesses:

MAY BURGSTRESSER,
 SYMMES B. HUTCHINSON.