

(No Model.)

2 Sheets—Sheet 1.

W. PENMAN.
MOLD FOR CASTING CHAINS.

No. 354,732.

Patented Dec. 21, 1886.

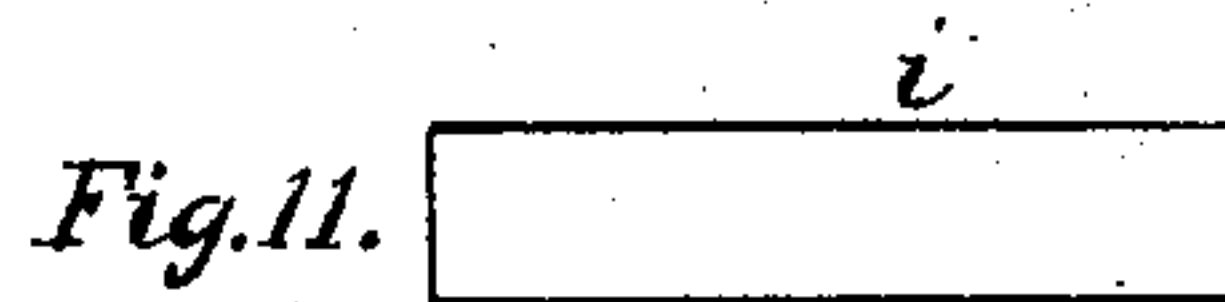
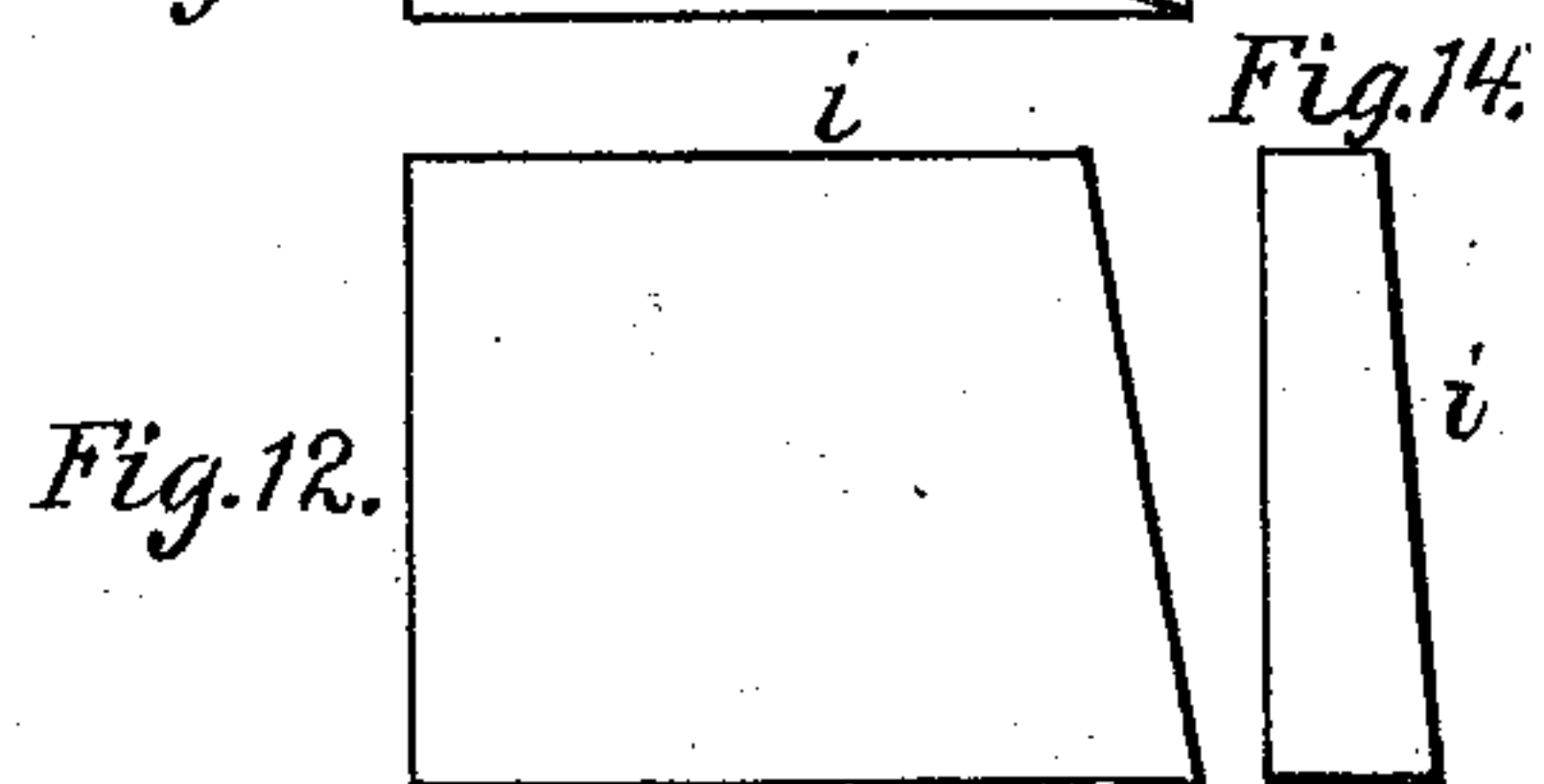
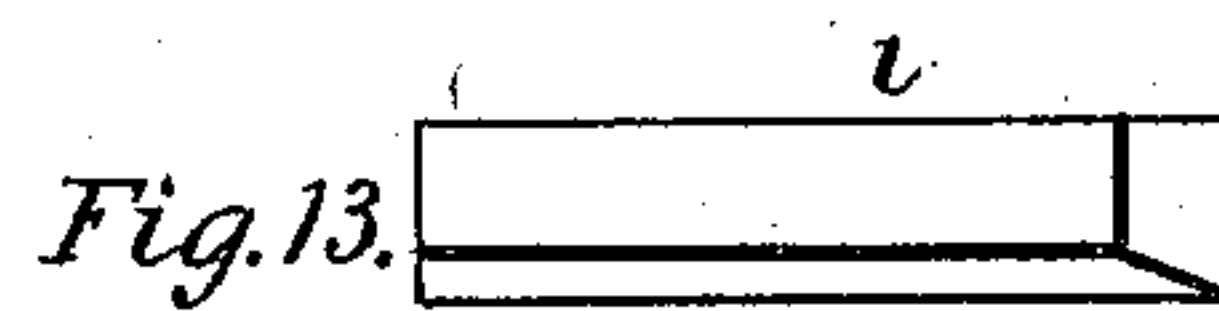
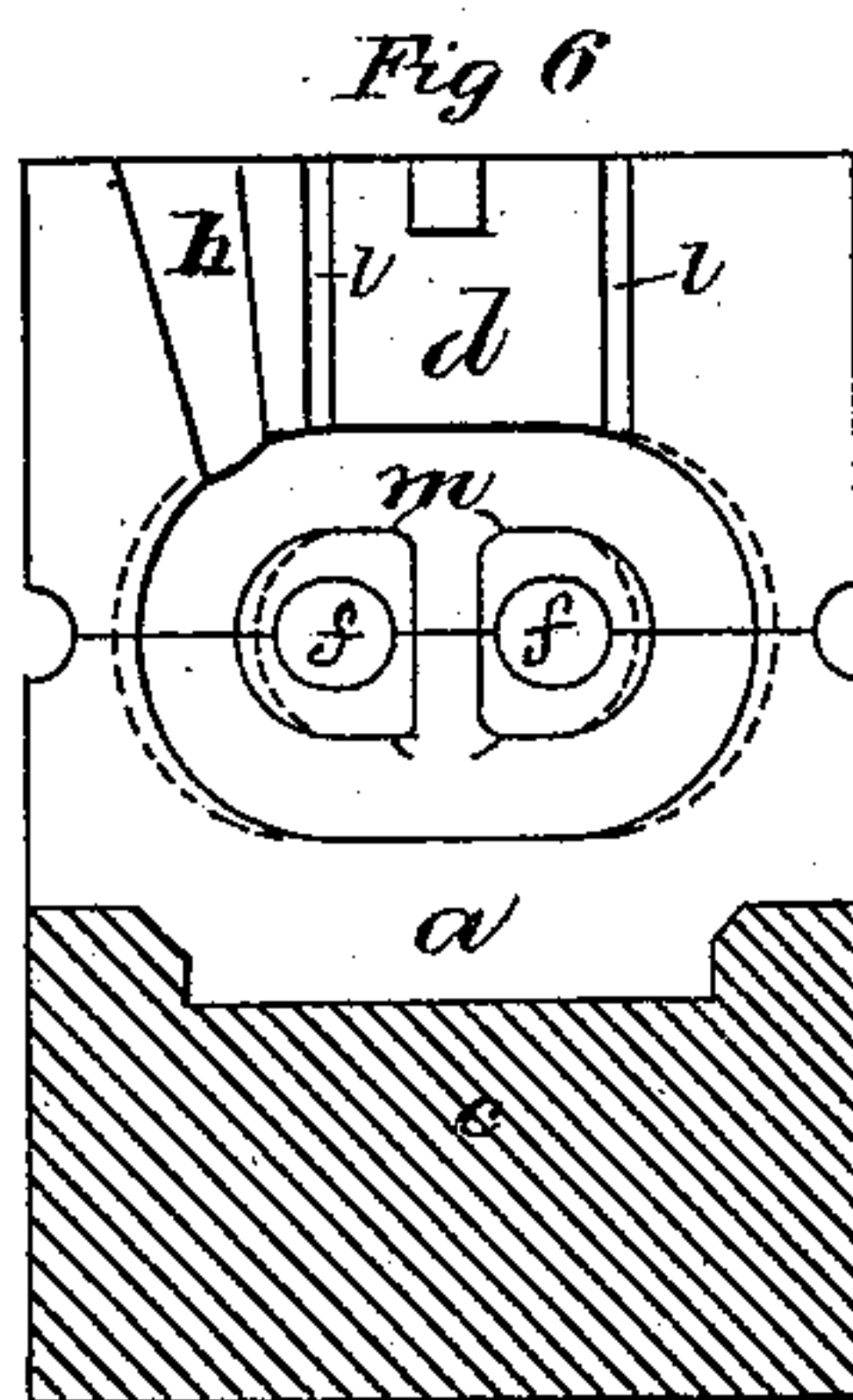
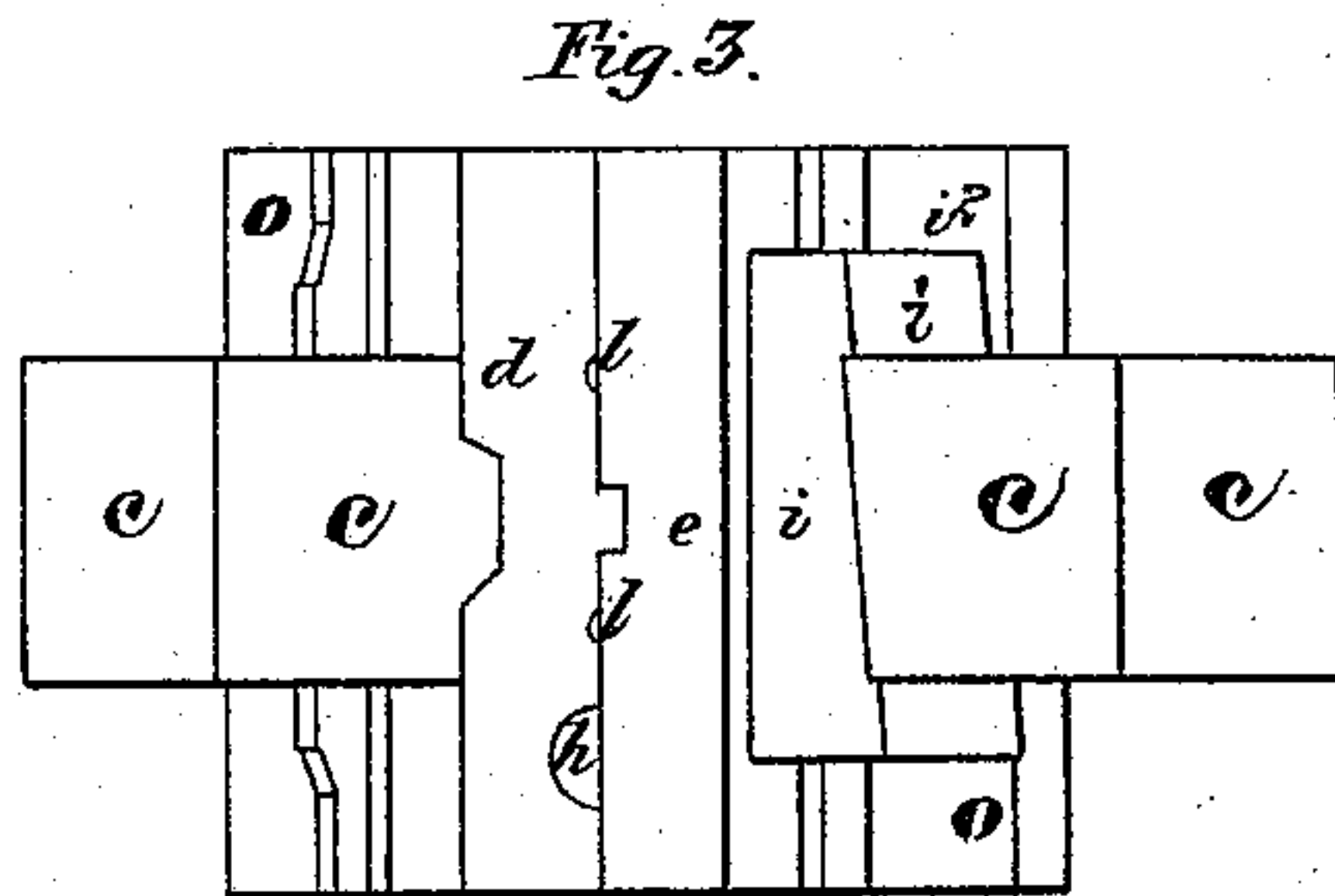
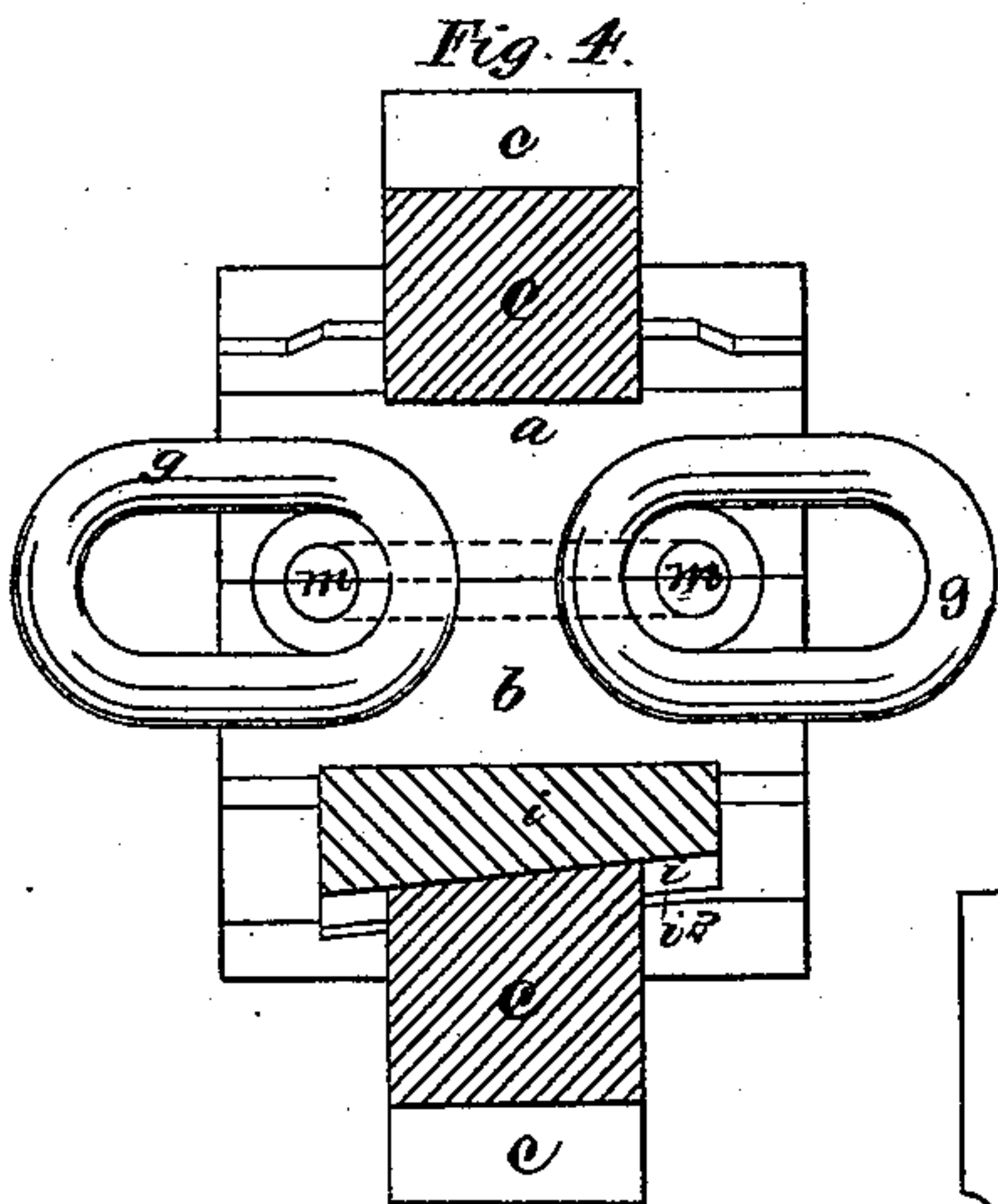
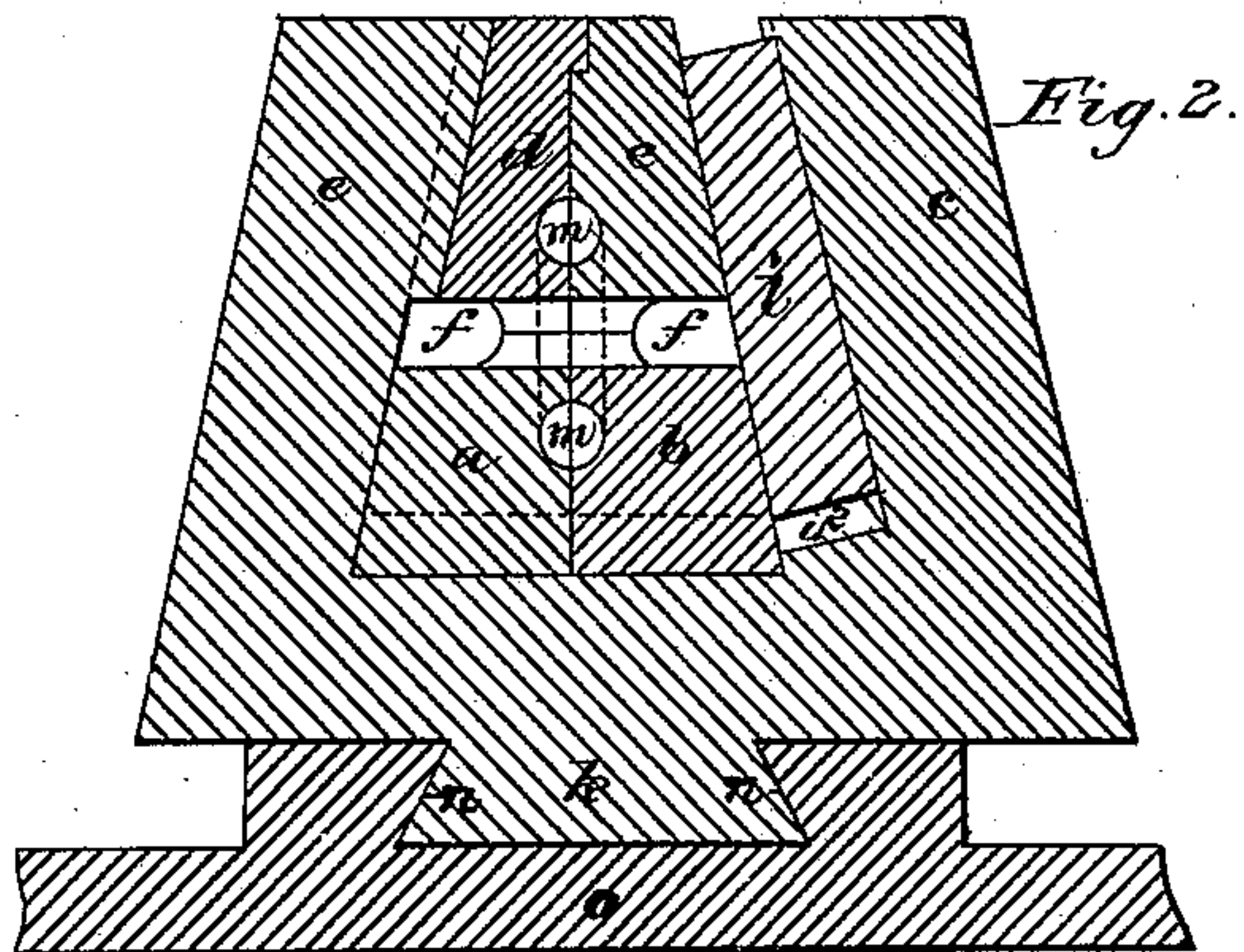
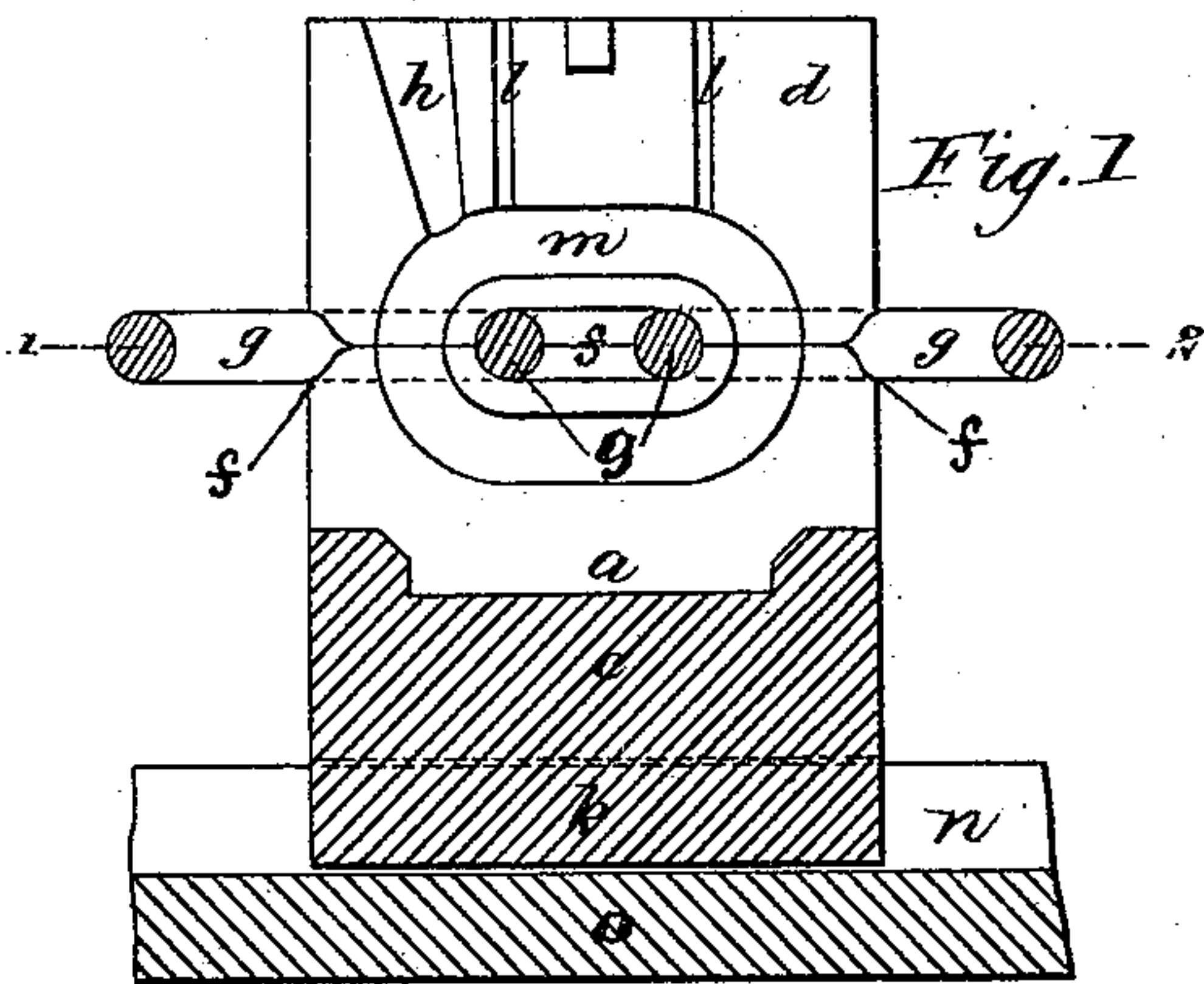
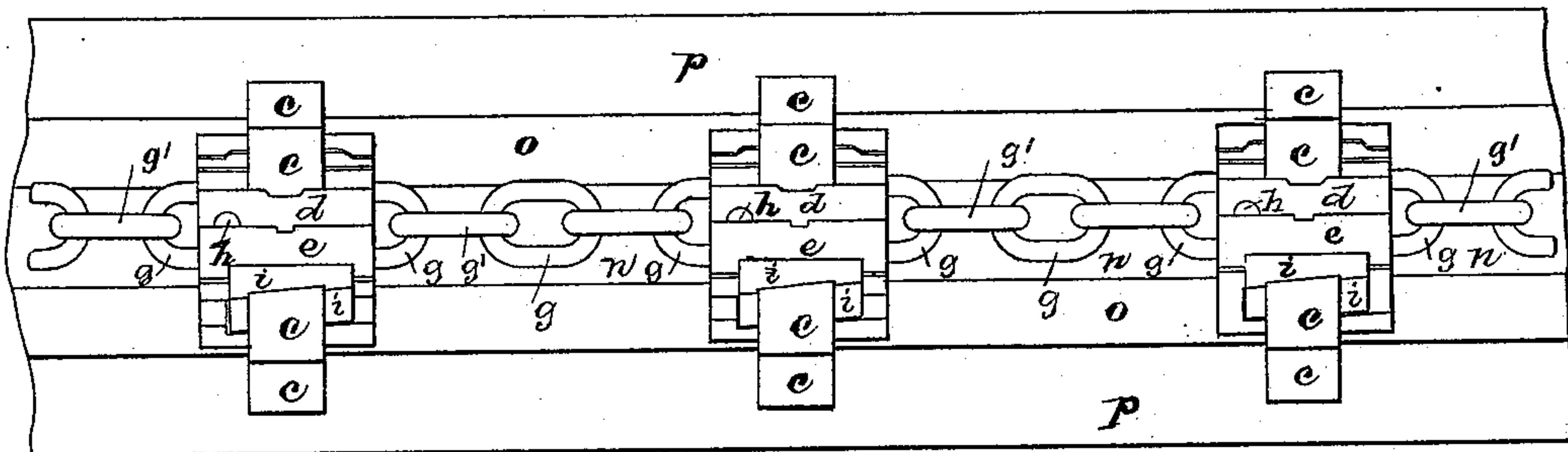


Fig. 5



Attest:
Geo. Wheelock
Victor A. Lewis

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William Penman
By Knight Bros.
his atty.

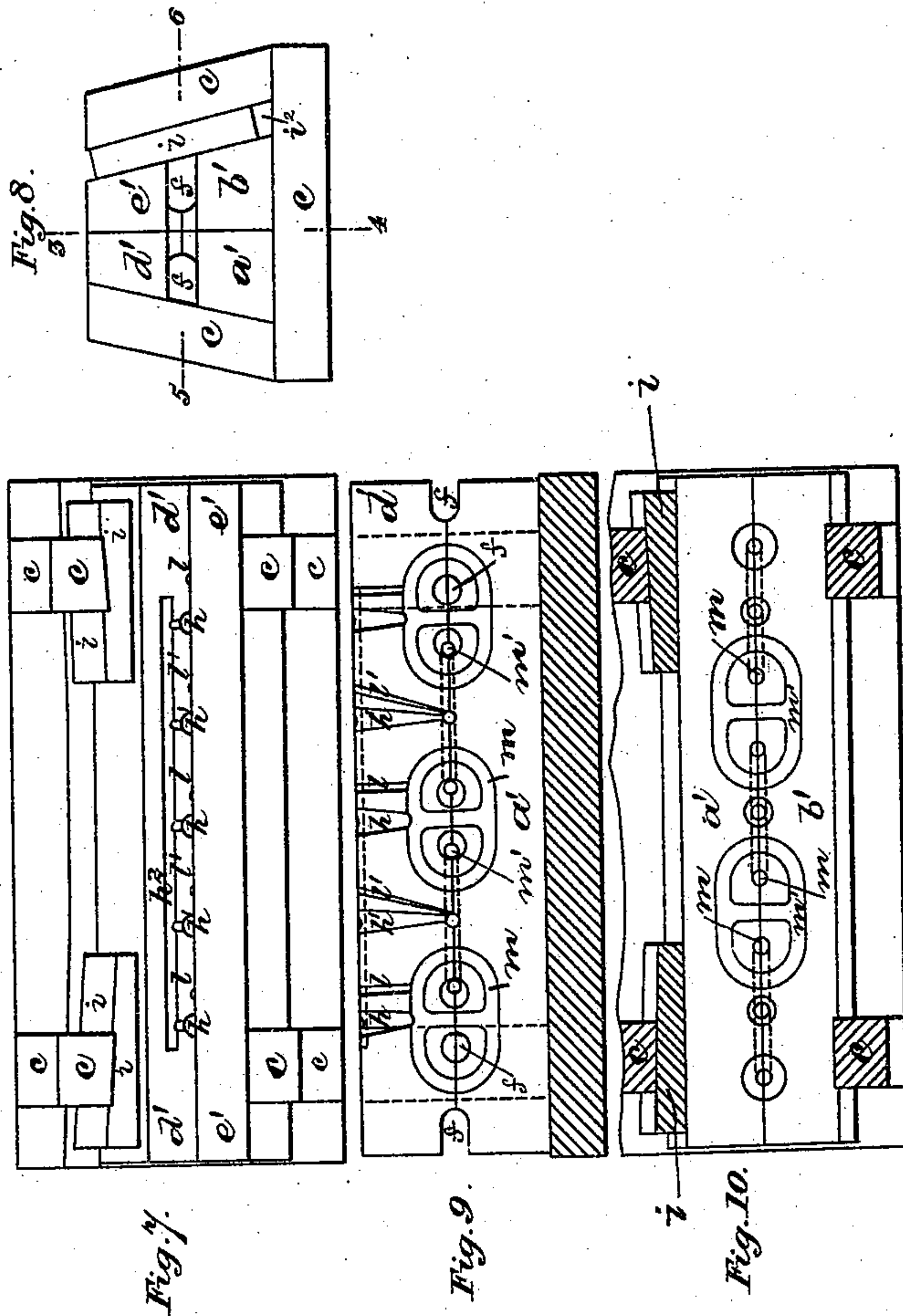
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Inventor,
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UNITED STATES PATENT OFFICE.

WILLIAM PENMAN, OF GATESHEAD-ON-TYNE, COUNTY OF DURHAM, ENGLAND, ASSIGNOR TO HIMSELF, LANCELOT TULIP PENMAN, AND WILLIAM GIBSON, ALL OF SAME PLACE.

MOLD FOR CASTING CHAINS.

SPECIFICATION forming part of Letters Patent No. 354,732, dated December 21, 1886.

Application filed December 19, 1884. Serial No. 150,766. (No model.) Patented in England March 7, 1882, No. 1,105.

To all whom it may concern:

Be is known that I, WILLIAM PENMAN, coal and lime merchant, a subject of the Queen of Great Britain and Ireland, and residing at Gateshead-on-Tyne, in the county of Durham, England, have invented certain Improvements in Molds or Apparatus for the Manufacture of Chains of Cast-Steel or other Metal, (for which I have obtained a patent in Great Britain, No. 1,105, dated March 7, 1882,) of which the following is a specification.

My invention has for its object to provide improved molds or apparatus for the manufacture of chains for ships and other purposes, said molds being made of steel, iron, or brass, or of wrought-iron or other metal, and in two, three, or more sections, as hereinafter described.

In carrying my invention into effect, I first cast single links in the molds, and I then place such single links in another mold, in which another link is cast to connect the single links, and lengths thus formed may be similarly connected by placing the end links of two lengths in a similar mold and casting a connecting-link between them; or, in place of first casting single links and then casting other links for connecting them together, I may cast all the links together in one mold, as hereinafter described.

In order that my said invention may be fully understood, I shall now proceed more fully to describe the same, reference being had to the several figures on the annexed sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 is a vertical section of a mold at right angles to that shown in Fig. 2. Fig. 2 is a vertical section of the same at right angles to that shown in Fig. 1. Fig. 3 is a plan view. Fig. 4 is a horizontal section on the line 1 2, Fig. 1. Fig. 5 is a plan view of a series of these molds located on a bed-plate. Fig. 6 is a vertical section longitudinal of the link-cavities, showing a modification. Fig. 7 is a plan view of a mold for casting both horizontal and vertical links. Fig. 8 is an end view of the same. Fig. 9 is a vertical section longitudinal of the link-cavities. Fig. 10 is a

horizontal section on the line 5 6, Fig. 8. Fig. 11 is a rear elevation of my preferred form of wedge or chock. Fig. 12 is a side elevation. Fig. 13 is a front elevation. Fig. 14 is a plan view.

Molds made in two or three sections are provided for casting the single or separate links of the chain. If the molds be made in three sections, the lower section will form the base of the "mold" and will be in one piece; but the upper part of the mold will be made in two sections, and will be placed side by side on the lower or base sections. Thus when the three different sections are properly placed together they will between them form a complete mold for one link for the intended chain, with or without a passage for the formation in the cast link of a stud-bar or cross-piece in the center. The mold will then be ready to receive the molten steel or other metal, which is run into the mold through a hole or "get" made at a suitable part of the mold.

The molds when made in two sections are suited for casting single links with the molds in a vertical position. Each section of the mold will be placed side by side, and will between them contain the necessary space for the formation of the required link. As this casting of the single links will be readily understood from the foregoing description, I do not consider it necessary to illustrate the molds by drawings, as their forms will depend upon the form of the link to be produced.

The parts of the mold will of course be placed tightly together—for instance, by being held in a frame, cradle, or holder and forced together by wedges, screws, or other means. The molds made in four sections or pieces are intended for all the other links of the chain—that is to say, for those which will join or connect the single links cast, as hereinbefore described, in order to form a complete chain. These molds are represented in Figs. 1, 2, 3, 4, 5, and 6.

The two sections *a b* of the mold will form the base or bottom portion of the mold, being placed side by side in a frame, cradle, or holder, *c*. The other two sections, *d e*, form the upper portion of the mold, and will also be

placed side by side on the parts *a b*, which form the base. When all the four sections are thus properly placed together, they will between them contain a space, *m*, forming a mold for a link with a hole or get, *h*, and air-holes *l*, for the admission of molten metal for the formation by casting of a link to connect two single links, *g*, (or end links of lengths of chain,) placed in the spaces *f*, which are provided for their reception, as will be understood by reference to Figs. 1 and 4, where two single links, *g*, are shown in position. With one or a set of such molds a chain of any shape or pattern and length, or of any number of links, or of any weight or thickness, can be made by casting, and the "cutting" and "welding" of each link is avoided. These molds may be employed in making and joining together the several links of a chain, as follows:

One-half of the number of the links *g* for the chain may be cast singly or separately in the molds hereinbefore first described, and when these single links are sufficiently cool they will be placed in the molds, secondly hereinbefore described, there being a link at each or either end of the mold, the loop of each passing into the space *f*, inclosed by the mold proper for the link in this last-mentioned mold, as shown in Figs. 1 and 4.

h is the opening or get for the passage of the molten metal to form the connecting-link. Before any molten metal is let into this space a series of metal or wooden or other wedges or chocks, *i*, will be passed between the frame, holder, or cradle *c*, and the parts of the mold for the purpose of pressing the parts together and preventing the links already made and placed in position, as aforesaid, from combining with, adhering to, or being injured by the hot molten metal about to be run into the space wherein the connecting-link is formed.

I prefer to make the wedges taper both from side to side and from top to bottom, as shown in Figs. 4, 5, 12, 13, and 14, so that as they are driven into their spaces they rise upward upon an incline, *i'*, formed on the frame or cradle, and effectually force the parts of the mold together. So soon as the said wedges or "chocks" are properly placed and fixed in position the molten steel or other metal will be run through the opening or get *h* into the mold, and thus every connecting-link *g'* will be formed, and the entire chain itself will be ultimately manufactured without the processes of cutting and welding, and at a great saving of labor and expense, and the chain made according to my said invention will be completed without a single joint or weld.

The frames or cradles *c* of the molds for the formation of the connecting-links may have dovetail feet, as at *k*, which are adapted to slide in a similar groove, *n*, in a bed-plate, *o*, so that a number of the said molds being mounted upon the bed-plate to slide in these grooves, the said molds can be moved to various distances apart, to accommodate any length of chain between them to connect any

length of chain together by casting a connecting-link between them. Fig. 5 represents such a bed-plate on a table, *p*, in plan, provided with three molds; but it will be understood that any number may be so employed.

I will now proceed to describe the manner in which the molds may be formed to cast together all the links of a chain, referring to Figs. 7, 8, 9, and 10.

The mold is formed in four sections or parts, *a' b' d' e'*, containing between them the spaces *m m'* for all the links to be formed, so arranged that all the links can be cast together. I have shown a mold for casting together five links; but it will be understood that the mold may in a similar manner be arranged to cast a greater or lesser number of links. All the alternate links are cast, say, in a vertical position, and the others in the horizontal position, the spaces *m m'* being arranged as will be readily understood by reference to the drawings.

Each space *m* for each vertical link will be provided with a get or passage, *h*, and each space *m'* will be provided with a get or passage, *h'*, for the molten metal, and also with a hole or holes for the escape of air, as at *l* and *l'*. The gets may be connected at top by a common channel at *h''*.

The mold is shown as having the sections thereof in one piece or continuous length; but it will be understood that the said sections may be made in lengths made of several parts. In any case the sections and parts of the mold will be held in a suitable frame, cradle, or holder, and forced or held together by wedges, chocks or screws, or their equivalents, essentially as hereinbefore described.

The molds hereinbefore described and illustrated may be made in more than four sections, provided that all the sections, when placed together, form between them the necessary mold or space for the casting of the link.

It will be understood that the mold may be adapted for casting the links vertically, horizontally, or in any suitable position.

Any suitable means may be employed for forcing the parts of the molds together. For example, screws could be substituted for or used in connection with the wedges illustrated in the drawings. The molds may be made of a size and shape suited to cast links of any required size or shape with or without connecting-bars or stud-pieces in the center. Fig. 6 is a section of a form of mold suited for casting a connecting-link with such a cross-piece.

All the molds will be provided with air passages or outlets, as at *l*, to allow of the escape of air when the metal is run or poured into the mold.

In order to strengthen the links, the ends may be formed thicker than the other parts, as indicated in dotted lines in Fig. 6.

The chains, after casting, are or may be annealed or otherwise treated to strengthen them in any known or suitable manner, but preferably by taking them direct from the mold, and while still hot, and placing them in dry ashes,

sand, or lime, or like material, and allowing them to cool therein. The said material may be either hot or cool when the chains are placed therein.

5 Having now described and particularly ascertained the nature of my said invention and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that what I consider to be novel and
10 original, and therefore claim as my invention, is—

1. The combination of a cradle, *c*, lower mold-sections, upper mold-sections, and securing-chock, the mold-sections being formed
15 with link-space *m* and end spaces, *f*, between them, and the upper sections being formed with get-hole *h* and air-hole *l* between them, substantially as set forth.

2. The combination of a cradle, *c*, lower
20 mold-sections, upper mold-sections, and securing-chock, the mold-sections being formed with link-spaces *m* and *m'* and end spaces, *f*, between them, and the upper mold-sections being formed with get-holes *h* and *h'* and air-
25 holes *l* and *l'* between them, substantially as set forth.

3. The combination of a bed-plate, a series of cradles, tongue-and-groove connection between the cradles and bed-plate, the chain mold-sections, and chock, substantially as set
30 forth.

4. The combination of a cradle, *c*, lower mold-sections, upper mold-sections, and the chock *i*, the cradle being formed with an incline, *i*², and the chock being tapered both
35 from side to side and from top to bottom, substantially as set forth.

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

WILLIAM PENMAN.

Witnesses:

WM. DAGGETT,
Solicitor and Notary Public, Newcastle-upon-Tyne.

WM. LEACH,
3 *Percy Terrace, Gateshead, in the county of Durham, Clerk to Messieurs Clayton & Gibson, Newcastle-upon-Tyne, Solicitors.*