Feb. 14, 1933. M. L. DOELMAN 1,897,925

MOLD

Filed March 2, 1931 2 Sheets-Sheet 1

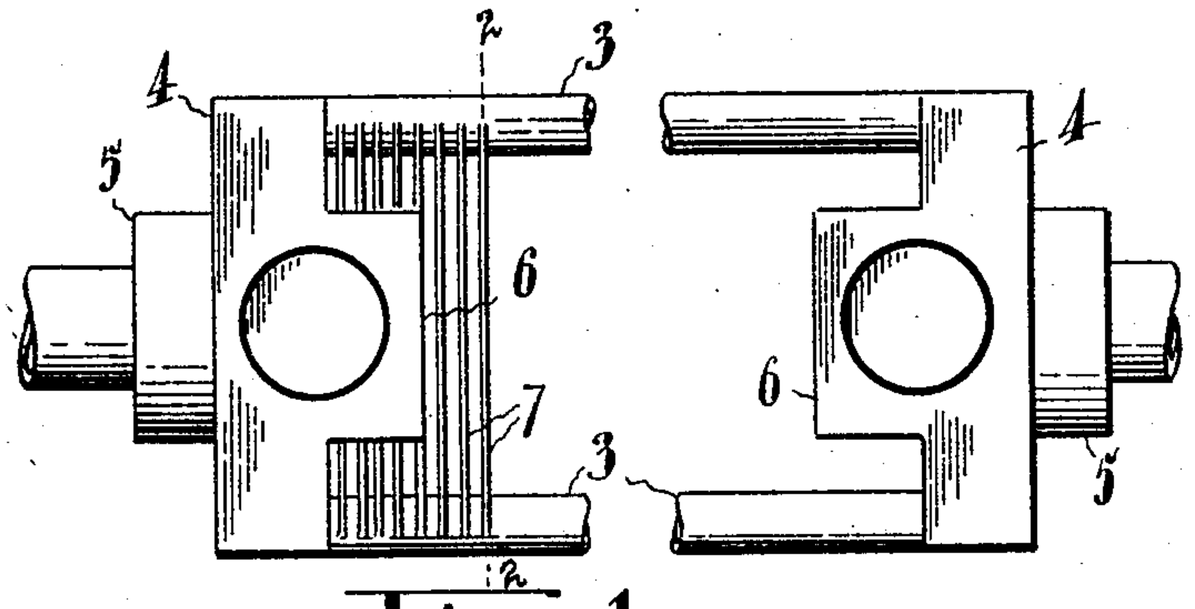


Fig. 1.

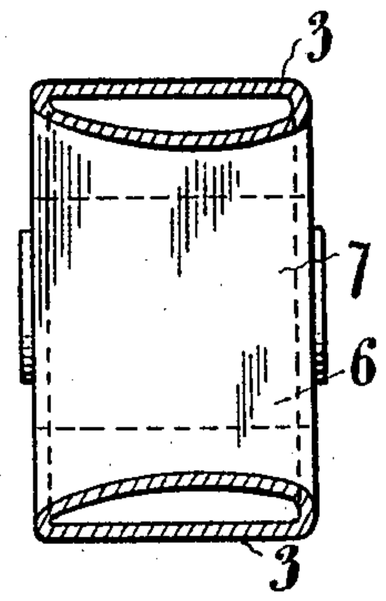


Fig 2.

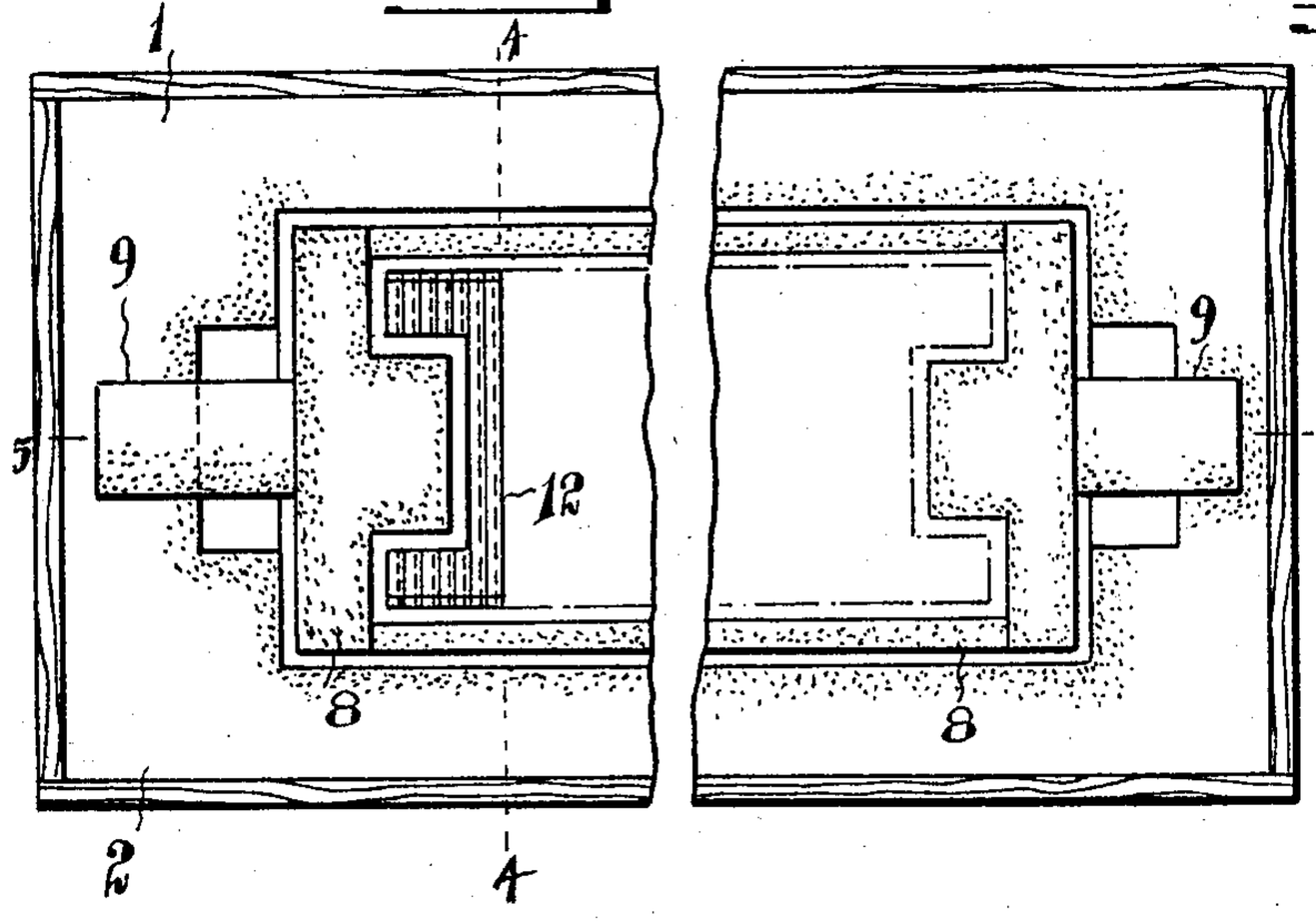


Fig. 3.

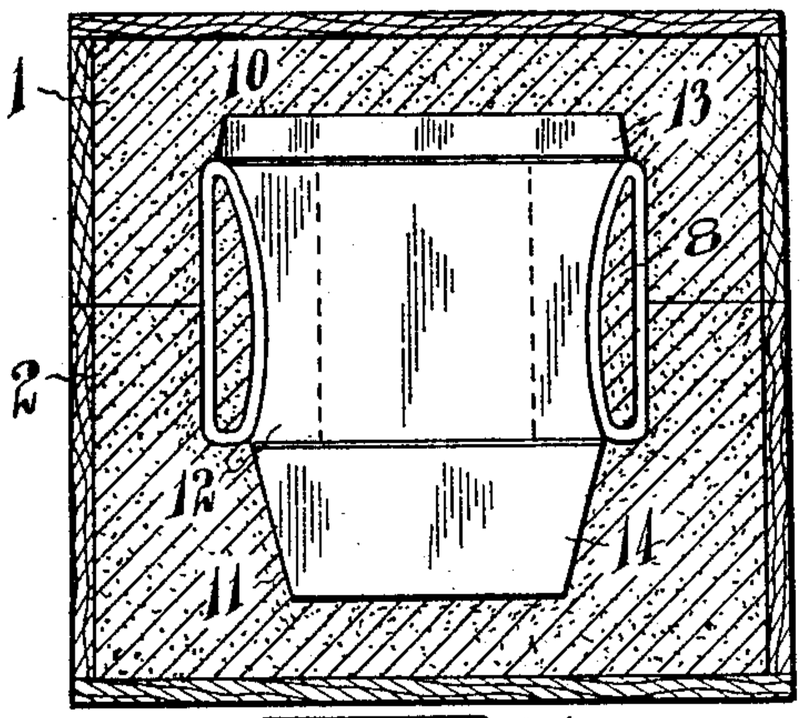


Fig. 4.

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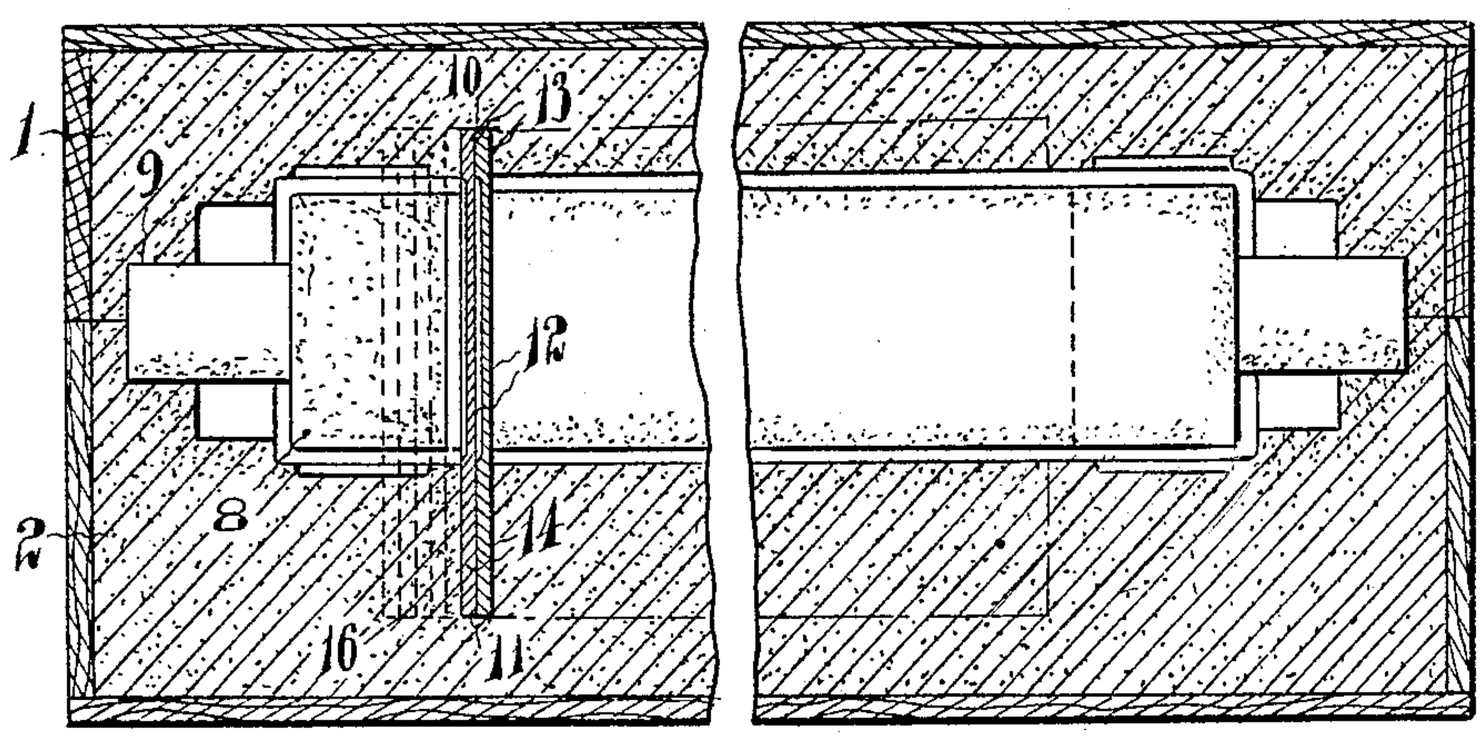


Fig. 5.

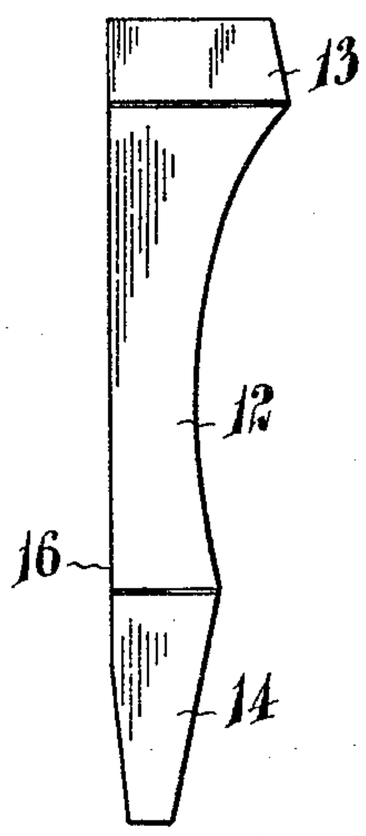


Fig. 7.


Fig. 6.

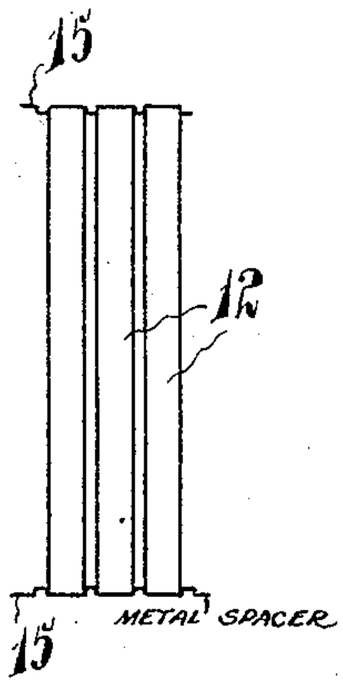


Fig. 9.

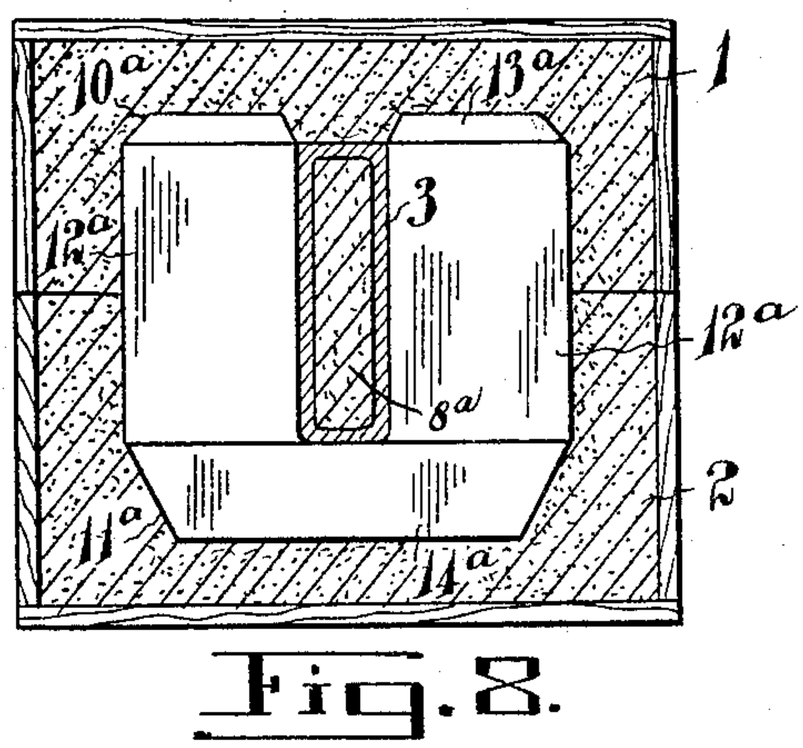


Fig. 8.

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# UNITED STATES PATENT OFFICE

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## MOLD

Application filed March 2, 1931. Serial No. 519,708.

This invention relates to the molding of bodies provided with a series of thin closely spaced projecting ribs, such, for example, as radiator castings formed with radiating fins.

Radiators in which the walls of the waterways are provided with such fins are commonly employed in vertical air flues located against or partly in the walls of rooms to be heated, the flues serving to induce a flow of air over the heat-transferring surfaces of the radiators and the conditions are such that to secure a maximum heat transfer from the radiator, the fins must be very thin and in perfect conducting relationship with the walls of the waterways. Owing to the difficulties met in casting such fins integral with the walls of the waterways, it has been usual to employ preformed sheet metal fins and to either cast the edges of such fins in the walls of the waterways or to provide some form of mechanical engagement. There are, however, objections to both methods, and my object is to devise a simple, cheap and effective system of molding, and means therefor, which will enable me to perfectly cast the fins integral with the waterways and of a thinness and relative length not previously obtainable commercially and with any desired spacing.

I attain my object by forming in a molding flask a cavity for the casting. In this cavity are positioned a series of core sections suitably spaced to form the fins.

In the preferred arrangement I form longitudinal imprints at opposite sides of the cavity, and the core sections have their opposite ends received in these recesses. Intermediate of the ends these sections are reduced in thickness, thus leaving narrow spaces into which the molten metal flows, when the mold is poured, to form the fins.

The invention is hereinafter more specifically described and is illustrated in the accompanying drawings in which

Fig. 1 is a plan view of a casting made by my process;

Fig. 2 is a cross section of the same on the line 2—2 in Fig. 1;

Fig. 3 a plan view of part of a drag with the waterway core in position and some of the core sections for the fins;

Fig. 4 a cross section of part of a molding flask on the line 4—4 in Fig. 3;

Fig. 5 a section on the line 5—5 in Fig. 3;

Fig. 6 a cross section of a side elevation;

Fig. 7 a front elevation of one of the small core sections;

Fig. 8 a view similar to Fig. 4 showing a modification; and

Fig. 9 a side elevation showing a modification of the core sections and separate spacer therefor.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

Referring particularly to Figures 1 to 5 of the drawings, 2 is the drag of a molding flask and 1 the cope. In the cope and drag in the usual way a cavity is formed by means of the usual pattern which, of course, in its external contours resembles the finished article illustrated in Fig. 1. This particular casting comprises waterways 3 connected with headers 4, in the ends of which are formed the collars 5 for the connection of the inlet and outlet pipes for the heating fluid. The casting is also formed with the hollow bosses 6 increasing the size of the hollow interior of the headers to facilitate the dividing of the inflow between the hollow waterways.

These waterways are connected by the cast fins 7. These may be of any desired thickness and spaced for the passage therebetween of the air to be heated. In the particular embodiment shown the ribs are of approximately twenty-one gauge and are spaced six to the inch. Externally the waterways may be of any desired shape, though it is preferable, in order that they may be fitted closely in a flue, that the outer sides are flat while the inner sides may be curved or shaped in any suitable manner to facilitate the flow of air when the casting is functioning as a radiator.

On reference particularly to Figs. 2, 3 and 4, 8 is a core suitably shaped to form the

hollow interior of the waterways, headers, collars and bosses of the finished casting.

In forming the cavity in the molding flask core imprints 9 are formed at the ends of the mold cavity for the support of the core 8. In a preferred form, by means of suitable prints on the pattern, longitudinal imprints 10 and 11 are formed in the cope and drag respectively of the flask. The spaces between the ribs or fins 7 are formed by core sections 12 provided with the parts 13 and 14 which fit respectively into the recesses 10 and 11 and the edges of the core sections are spaced from the core 8 a distance equal to the thickness of the walls of the waterways 3.

On reference particularly to Fig. 6, it will be seen that the parts 13 and 14 are of greater thickness than the middle of the core section, so that, when the core sections are placed in position between the sides of the core 8, a space is left between adjoining sections into which the molten metal may flow to form the ribs 7 when the mold is poured.

The spacing of the core sections may also be effected without employing the longitudinal imprints as shown in Fig. 9. In this construction the ends 13 and 14 are omitted and the spacing is effected by metal spacers 15 inserted in the mold and other modifications are also possible.

It will be noted that the intermediate part of each core section 12 (see Fig. 4) is so positioned that the upper and lower edges of the ribs come substantially flush with the top and bottom of the cavities in the mold forming the walls of the waterways. Consequently, when a finished casting is removed and ground on its upper and lower faces, the ribs of the casting are properly spaced and come substantially flush with the upper edges of the waterways 3. The width of these core sections is such that they may be readily positioned after the core 8 is in position. The parts 13 and 14 of the core sections being in contact, they completely fill the recesses 10 and 11 and exclude molten metal therefrom. At the ends where there are narrow spaces between the waterways 3 and bosses 6 of the finished casting narrow cores 16 are employed instead of the full width cores shown in Fig. 4.

In Fig. 8 I show a modification of the apparatus employed adapted for casting projecting ribs on each side of a single waterway. Like parts in this drawing are numbered to correspond with the parts shown in the other figures of the drawings with the addition of distinguishing character *a*. In all essential respects the core sections are the same, but two series $12^a$ are necessarily employed, one at each side of the waterway 3, but which may be connected at one end as shown. With the arrangement shown in Fig. 8 the core sections $12^a$ are first positioned and afterwards the core $8^a$.

The arrangements for pouring and venting the mold will be such as are ordinarily employed and are neither shown or described.

The mode of operation is to form a mold from a pattern in the ordinary way, position the core 8 with its ends in the imprints 9, fit the sectional cores in position with their upper and lower ends in the upper and lower longitudinal core imprints, or vice versa, place the core in position and pour the mold in the usual manner.

By proceeding as described and using the apparatus described I am enabled to satisfactorily form casting as desired with integral fins of substantially any desired gauge and with any desired spacing.

What I claim as my invention is:

1. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein; a longitudinally extending core for forming the hollow of the aforesaid member supported in the mold cavity and spaced from its walls; and a series of transverse parallel core sections positioned in the cavity aforesaid in spaced relation to one another and to the longitudinal core aforesaid, said core sections engaging the top and bottom of the mold cavity and forming spaced walls between which molten metal can flow to form the fins aforesaid.

2. A mold according to claim 1 in which the core sections are held in spaced relationship by parts integral with the sections themselves.

3. A mold according to claim 1 including metal spacers engaging the core sections at top and bottom to hold them in spaced relationship.

4. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein with end core imprints, and a bottom longitudinal core imprint; a longitudinally extending core, for forming the hollow of the aforesaid member, positioned by the end imprints aforesaid and spaced from the walls of the mold cavity; and a series of transverse parallel, core sections positioned in the cavity aforesaid in spaced relationship to the longitudinal core and with their lower ends received in the longitudinal imprint aforesaid, the adjacent surfaces of the parts of the core sections within said imprint being in contact and the parts above reduced in thickness to form between them spaces into which, when the mold is poured the molten metal can flow to form the fins.

5. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein with end core imprints, top longitudinal core imprint, and a bottom longitudinal core imprint; a longi-

tudinally extending core, for forming the hollow of the aforesaid member, positioned by the end imprints aforesaid and spaced from the walls of the mold cavity; and a series of transverse parallel, core sections positioned in the cavity aforesaid in spaced relationship to the longitudinal core and with their ends received in the longitudinal imprints aforesaid, the adjacent surfaces of the parts of the core sections within said imprints being in contact and the parts between reduced in thickness to form between them spaces into which, when the mold is poured the molten metal can flow to form the fins.

6. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein with end core imprints and a bottom longitudinal core imprint; a longitudinally extending centrally positioned core for forming the hollow of the aforesaid member, positioned by the end imprints; and a core for forming the spaces between the transverse ribs aforesaid comprising a base part fitted into and fitting the longitudinal bottom imprint and spaced from the longitudinal core, and a series of spaced plates extending up from the base to the top of the mold cavity at each side of and in spaced relation to the longitudinal core and forming spaced walls between which molten metal can flow to form the fins aforesaid.

7. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein with a bottom longitudinal core imprint; a longitudinally extending centrally positioned core for forming the hollow of the aforesaid member, supported in the mold cavity and spaced from its walls; and a core for forming the spaces between the transverse ribs aforesaid comprising a series of U-shaped parallel core sections positioned in the cavity aforesaid, each comprising a base part fitted into and fitting the longitudinal bottom imprint and spaced from the longitudinal core and plates of less thickness than the base part extending up to the top of the mold cavity at each side of and in spaced relationship to one another and the longitudinal core aforesaid, said plates engaging the top of the mold cavity and forming spaced walls between which metal may flow to form the fins aforesaid.

8. A mold for forming a longitudinal hollow member with transverse fins comprising a horizontally divided flask having a mold cavity formed therein with end core imprints, bottom and top longitudinal core imprints; a longitudinally extending core, for forming the hollow of the aforesaid member, positioned by the end imprints aforesaid and spaced from the walls of the mold cavity; and a core for forming the spaces between the transverse ribs aforesaid comprising a series of U-shaped parallel core sections positioned in the cavity aforesaid, each comprising a base part fitted into and fitting the longitudinal bottom imprint and spaced from the longitudinal core, plates of less thickness then the base extending up at each side of and in spaced relationship to the longitudinal core aforesaid, and top parts of the same thickness as the base part fitting in the top longitudinal core imprint, the plates forming spaced walls between which molten metal can flow to form the fins aforesaid.

Signed at Toronto, Canada, this 16th day of February, 1931.

MYRON L. DOELMAN.