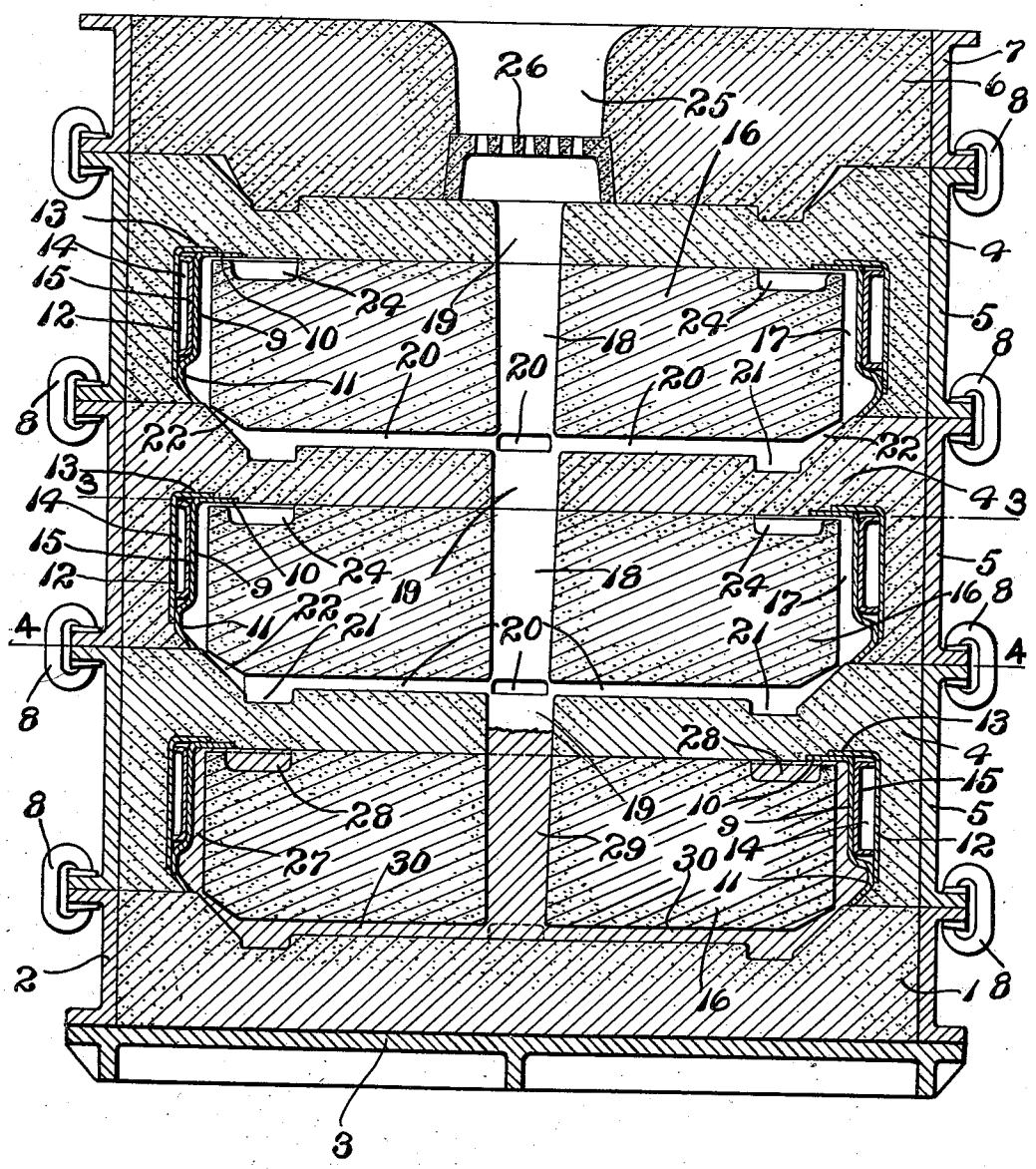
Nov. 29, 1938. D. J. CAMPBELL ET AL 2,138,624

MOLD FOR MANUFACTURE OF BRAKE DRUMS

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Fig. 1.



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Fig. 2

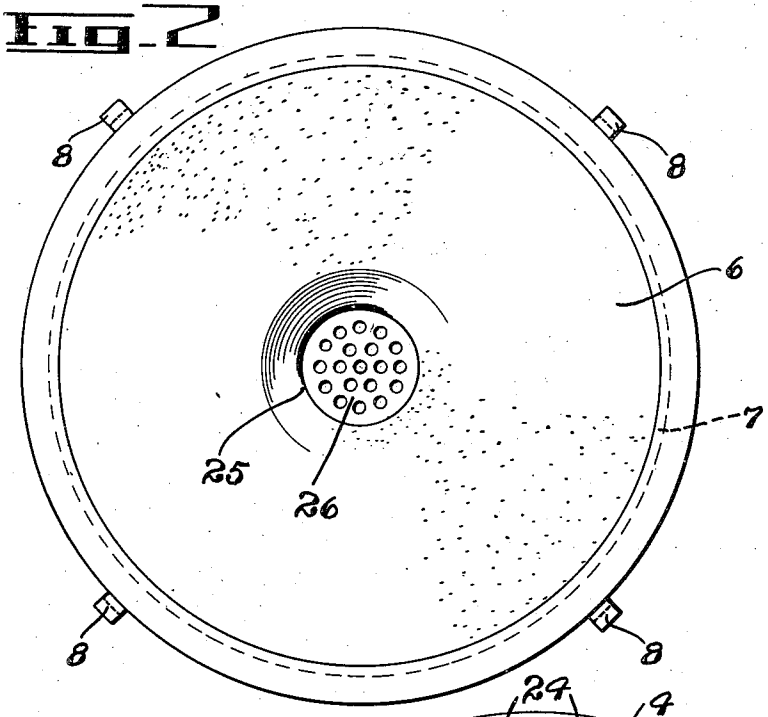
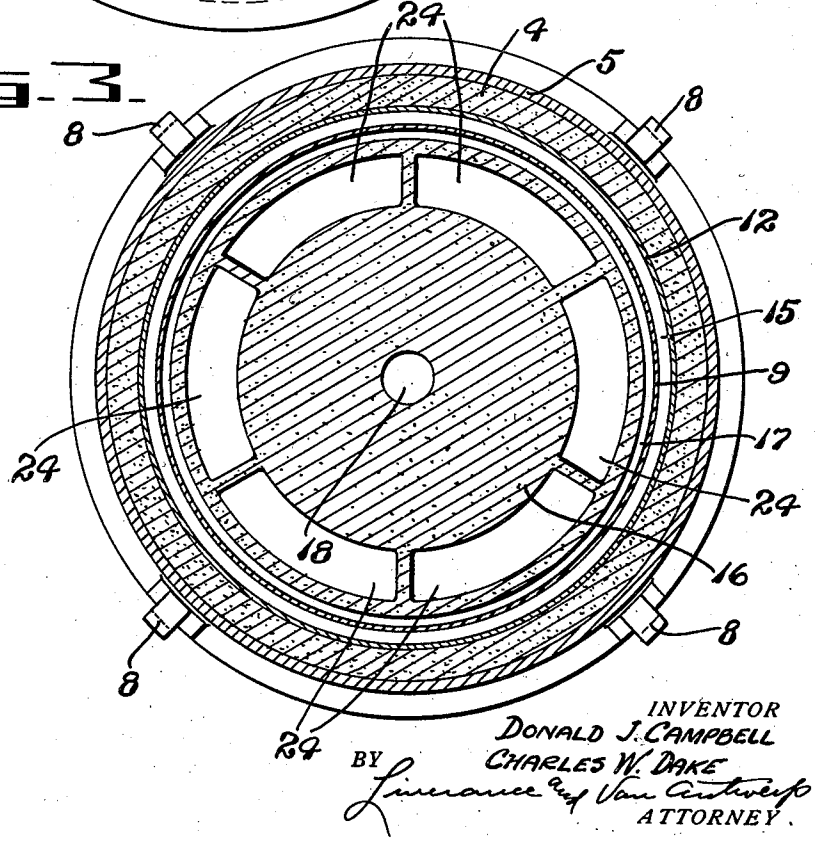


Fig. 3



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MOLD FOR MANUFACTURE OF BRAKE DRUMS

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Fig. 4.

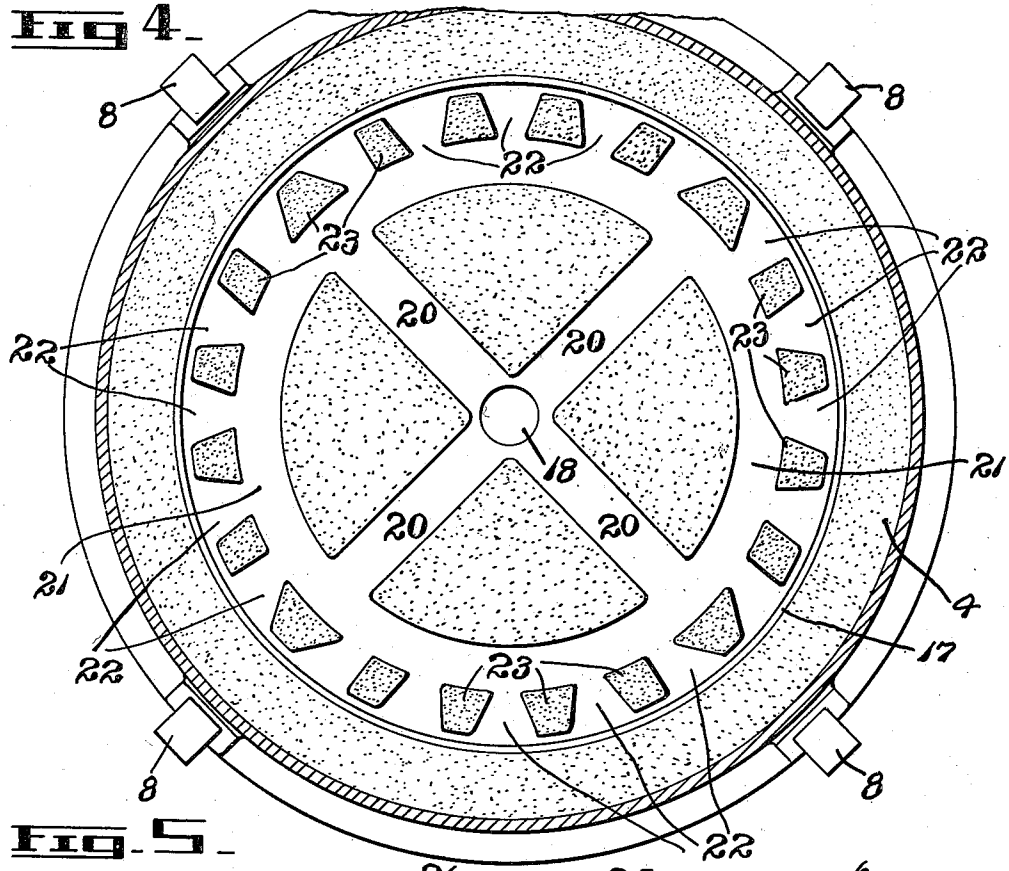
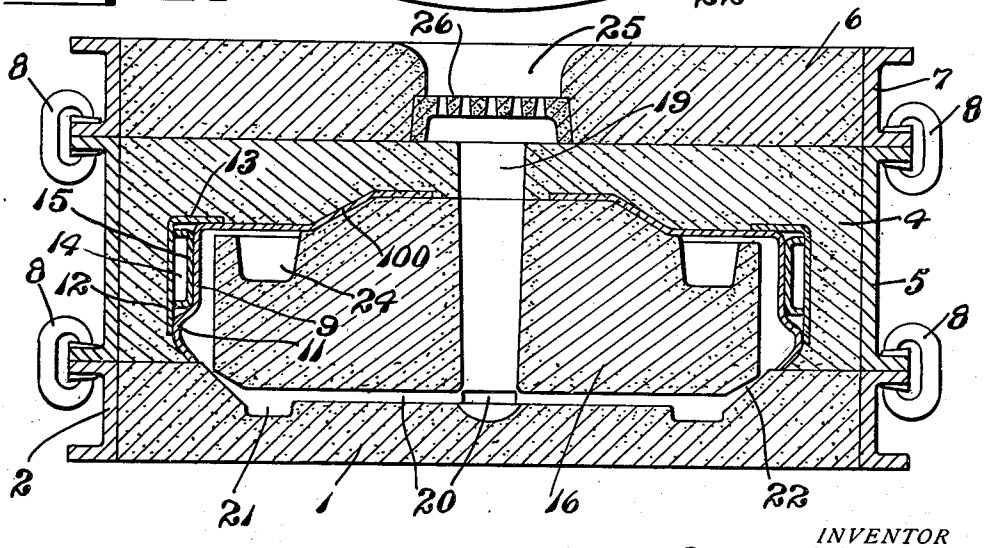


Fig. 5.



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Fig. 6.

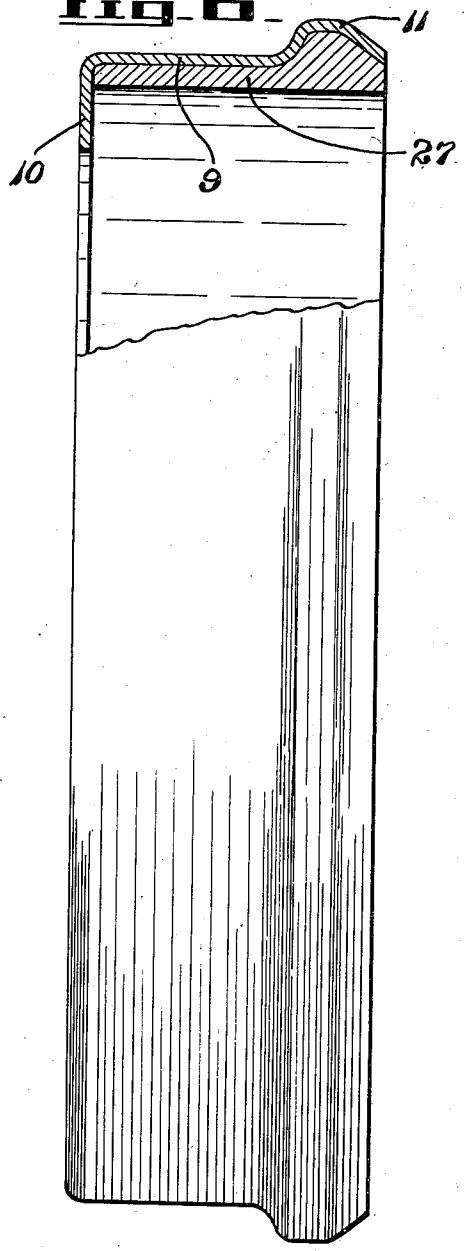


Fig. 8.

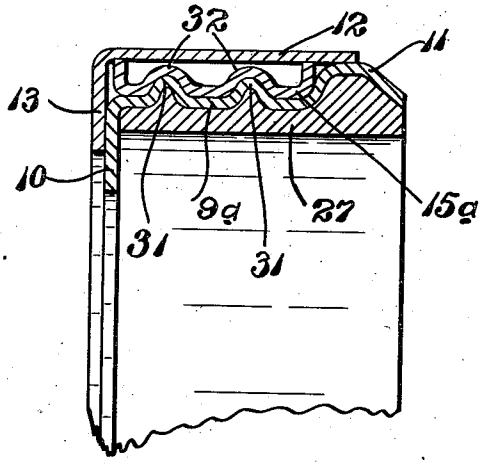
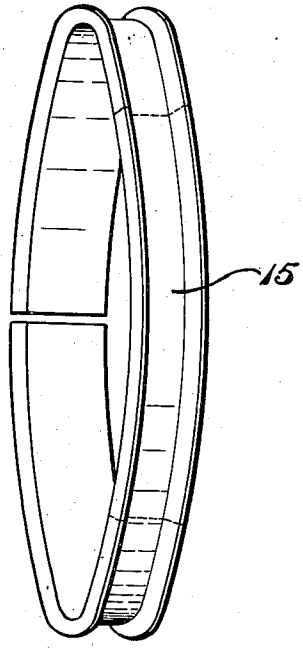


Fig. 7.



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Patented Nov. 29, 1938 2,138,624

UNITED STATES PATENT OFFICE

2,138,624

MOLD FOR MANUFACTURE OF BRAKE DRUMS

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Application April 26, 1937, Serial No. 138,962

8 Claims. (Cl. 22—116)

This invention relates to improvements in molds for brake drum manufacture, and particularly to a mold for producing brake drums of composite wrought steel and cast iron brake drums such as are used on motor vehicles.

The brake drum which is to be produced includes a wrought metal brake drum shell or band which is lined with a lining of cast metal molecularly bonded therewith to provide in effect an integral brake drum structure through which heat generated in the drum during the operation of the brake mechanism, when the braking shoes frictionally engage thereagainst, passes uniformly through the drum where it is readily dissipated by the surrounding atmosphere. The brake drum when completed includes a supporting back or web also of wrought metal which may be either integral with the wrought metal shell described or separately attached as by spot welding, riveting or other suitable connecting means.

In our invention a novel mold and apparatus is provided for effectively casting molten metal into engagement with the inner side of the wrought metal shell in such a manner as to secure an intermolecular joinder of the cast metal with the wrought metal shell, thereby providing a lining of cast metal secured to the shell or band which serves as a support for the cast metal and gives resistance against breakage while the cast metal provides a superior braking surface. The invention includes many novel details of structure in the mold for practically and effectively attaining the intermolecular joinder of the cast metal with the supporting shell or ring therefor and without chilling the molten metal or warping and distorting the shell. The temperature of the molten metal as poured into the mold is very high and above the melting point of the supporting shell metal in order to attain the intermolecular joinder of the two. In commercial practice the brake drum shell is of sheet steel and the cast metal is cast iron alloyed as may be desired.

An understanding of the improvements or invention for the attainment of the ends stated, as well as many others not specifically enumerated at this time, may be had from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a vertical section through a mold by means of which a plurality of cast metal linings of the composite brake drums may be simultaneously cast.

Fig. 2 is a plan view of the mold, shown in Fig. 1.

Figs. 3 and 4 are horizontal sections substantially on the planes of lines 3—3 and 4—4 of Fig. 1.

Fig. 5 is a vertical section, somewhat similar to that shown in Fig. 1, except the casting of the liner to but one brake drum shell of a formed steel shell is secured, and shows the method as employed in producing one drum only.

Fig. 6 is an elevation and partial section of a completed drum shell or band.

Fig. 7 is a perspective view of one form of reinforcing ring which is located around the sheet metal shell for supporting the shell against enlargement, the inner side of which the molten casting metal is deposited against, and

Fig. 8 is a fragmentary section showing a modification in such reinforcing ring to be used in lining a brake drum shell provided with annular ribs for providing better heat dissipation from the completed brake drum.

Like reference characters refer to like parts in the different figures of the drawings.

Referring to Fig. 1, a mold made of a plurality of superimposed sections or portions is provided. The lower mold section 1 is contained in a surrounding flask 2 and rests upon a base 3. A plurality of duplicate mold sections 4, as many as may be conveniently used, are placed in superimposed relation, one over the other, above the lower mold section 1, said mold sections 4 being retained within flasks 5. Above the uppermost mold section 4 is a cope section 6 within flask 7. The adjacent upper and lower edge portions of the several flasks 2, 4 and 6 have outwardly extending flanges over which, at proper spaced apart points, clamps 8 are located to hold the sections together.

Each of the mold sections 4 has a central cavity, open at its under side, within which is located the wrought metal brake drum shell or band 9, which is of substantially cylindrical form and at its upper edges as located in the mold, has an inturned horizontal annular flange 10. The lower edge portion of the shell 9 is shaped preferably with an outwardly extending comparatively wide annular rib 11, the lower edge of which terminates substantially flush with the lower side of the mold section 4. The mold sections 4, as well as the sections 1 and 6, are made from suitable molding sand deposited in the flasks in accordance with usual molding practice around a suitable pattern and also around the sheet metal shell 9 and the flange 10 thereof and also

over the auxiliary heat conserving and shell reinforcing rings 15 or 15 and 15a which are now about to be described.

Around the brake drum ring 9 a cylindrical channular ring 12 of sheet metal is located in spaced relation, at its upper edges having an inturned preferably continuous annular flange 13 which extends over the flange 10. This provides a continuous annular air space 14 between the shell 9 and ring 12. A strengthening and reinforcing ring 15 of a shallow channel shape in cross section and having outwardly extending flanges at the upper and lower edges of the band portion when the channel is located in the space 14, bears against the outer side of the shell 9 above the pressed or roller out rib 11. The channel ring 15 is split at one side as shown in Fig. 7.

A core 16 is located within the recess of each mold section 4 which is surrounded by the brake drum shell 9, there being defined between its periphery and the inner side of the shell 9 a mold cavity 17. The cores 16 have alined vertical sprues 18, the upper ends of which join with the sprue openings 19 at the upper part of each of the mold sections 4, as shown. Associated with each mold section 4, are radial gates 20 extending outwardly, joining with the said sprue openings 19, and at their outer ends connected to circular groove 21 from which a large number of spaced apart gates 22 extend outward and connect with the lower end of the mold cavity 17. The gates at 22 are spaced apart by interposed spacing projections 23, preferably from the mold section 4, and, as shown in Fig. 4, the gates at 22 widen laterally and decrease in vertical dimension from their inner ends outwardly. This provides for a substantially uniform rate of flow velocity from the gates into the mold cavity 17 and continuously around the lower end of the whole of cavity 17 when the molten metal is poured into the mold. The upper pouring section 6 which does not have any mold cavity 17 to be filled with molten iron is therefore shaped at its lower side to fill the radial gates 20 and groove 21 at the upper side of the next adjacent lower section 4.

At the upper side of each of the cores 16 are one or more recesses 24 (see Fig. 3) which provide overflow reservoirs for the surplus melted iron flowed through the mold cavity in contact with the inner periphery of the drum shell to heat the surface thereof to a temperature that will permit the cast metal lining to become molecularly joined with the drum shell and when it has reached the uppermost points in the cavity 17.

As shown, the upper or cope section 6 has a central pouring opening 25 at the lower part of which is a skim gate 26 resting upon the upper side of the next lowermost section 4. The metal, when poured into the opening at 25, passes through the gate 26 and first fills the gates and the mold cavity connected therewith in the lowermost of the sections, thereby lining the shell 9 and its rib 11 with the cast metal. The gates are filled with metal 30 and the sprues with the metal at 29, while the overflow pockets at 24 are filled with the metal indicated at 28 in Fig. 1. The pouring of the molten metal is continued until it has reached above the skim gate 26.

With this construction of mold the sheet metal shells 9 are spaced from the sand of the mold sections 4 by the rings 12 and 15, thereby providing insulating air spaces 14 which prevents quick dissipation of heat and chilling of the molten metal when it impinges and engages the inner sides of the rings 9. The channel rings 15 in said annular air spaces hold the rings 9 against outward deformation which otherwise would occur on account of the softening and lessening of resistance of the rings 9 when the very high temperature molten metal comes thereagainst. When molten iron is used as the metal to be cast to make the lining 17 and comes against a steel brake drum shell 9 the temperature of the molten iron preferably will be considerably above that normally used in regular foundry practice. The temperature of molten iron as taken from cupolas in foundry practice is usually near 2500° F., but it may reach 2600° F. Therefore, heating such molten iron as it is taken from the foundry cupola in an electric or other furnace to raise the temperature for example to a higher temperature such as 2850° F. or at times to 3000° F. is desirable and is preferred for the attainment of successful molecular fusion of the cast iron to the steel shell 9, which fusion must be such that there is a complete intermolecular joinder of the cast iron and steel over their entire opposed areas where they come into contact engagement with each other. The annular rib 11 in the shell 9 is to provide an increased body of cast iron at the open side of the brake drum so as to resist rupture and withstand stresses which the brake drum has to withstand.

In Fig. 5 a steel brake drum shell is shown having the steel shell 9 and a continuous supporting web or back 100 which is merely a continuation of a flange 10 as shown in Fig. 1. When a shell 9 having an inturned flange 10 is lined with the cast metal at 27 so as to provide a composite steel and cast iron member, such as shown in Fig. 6, the drum is completed by permanently connecting a separate sheet metal supporting back to the flange at 10, usually by spot welding. In the mold shown in Fig. 5 the supporting back is present in the sheet metal part of the drum by the continuation of the flange 10 into a back 100 as shown in Fig. 5.

In Fig. 8 the steel shell 9a, having the flange 10, is provided with outwardly extending heat dissipating corrugations 31 which are filled when the cast iron liner 27 is cast as molten metal thereagainst. In such case the strengthening and reinforcing ring 15a is split transversely and correspondingly corrugated, as at 32 in the band portion thereof to fit over the ribs 31.

With this mold and with the method of casting described composite brake drums of steel and cast iron wherein the steel is used as an outer supporting shell for a cast iron braking band within and molecularly bonded to the steel shell is readily produced in a practical manner.

A divisional application covering only the method above described has been filed and bears filing date as of May 9, 1938, and Serial No. 206,756.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

We claim:

1. For use in brake drum manufacture, a flask having a sand mold therein, said mold having a cavity extending upwardly at its underside, a core within said cavity of less cross sectional area than the cavity of the mold thereby providing an annular recess between said mold and core, said core having a sprue hole extending therethrough with gates at the lower side thereof leading to the said recess extended around the core, a sheet metal brake drum shell around the core and spaced therefrom and also spaced from the sides of said mold cavity, and a metal shield ring

located in said mold cavity and against the outer sides thereof defining a continuous annular air space between the same and said shell.

2. For use in brake drum manufacture, the construction containing the elements in combination defined in claim 1, combined with a reinforcing ring located between the outer side of said shell and the inner side of said shield for supporting said shell against deformation.

3. For use in brake drum manufacture, the construction containing the elements in combination defined in claim 1, combined with a reinforcing ring of sheet metal having a channel cross section, having a web thereof lying against the outer side of said shell and the flanges extending outwardly and bearing against the inner side of said shield ring, as and for the purposes specified.

4. A molding apparatus comprising a drag and a cope, each including a surrounding flask and a sand mold therein, said cope mold having a substantially cylindrical cavity in its lower side extending toward but short of the upper side thereof, a substantially cylindrical core located in said cavity, having its peripheral surfaces spaced from the sides of said cavity, said core and cope having vertical sprue openings and there being gates between said core and drag mold leading from the lower end of the core sprue opening to the recess around the core, a sheet metal shield of cylindrical form located within said cope mold cavity and against the periphery of the mold, a sheet metal substantially cylindrical shell located within said cavity and spaced from both said shield and core, the upper end of said shell having an inturned horizontal flange extending over the outer edge portions of said core.

5. A construction containing the elements in combination defined in claim 4, said core adjacent its outer edges resting upon said drag mold on the plurality of spaced apart supporting posts extending between the core and drag mold adjacent the outer edges of the core, said gates from the lower end of the sprue opening extending radially outward and said drag mold in its upper side having a continuous circular groove therein connecting the outer ends of the gates and located at the inner sides of said posts, as specified.

6. A construction containing the elements in combination as defined in claim 4, said drag mold at its upper side having a continuous circular groove therein at below and adjacent the outer portions of said core, supporting posts in spaced apart relation between the core and drag mold exterior of said groove, providing a plurality of spaced apart gates leading from the groove to the mold recess between the core and said band, said last mentioned gates progressively increasing in width and decreasing in height outwardly, as specified.

7. For use in brake drum manufacture, a mold comprising upper and lower mold sections, a plurality of other mold sections interposed therebetween, each of said last named sections having a substantially cylindrical mold cavity with a substantially cylindrical core therein, an annular recess between said core and the inner periphery of said cavity, a sprue hole in said core communicating with an opening in said upper section, an overflow cavity between some of said sections communicating with said annular recess, a circular groove in spaced relation to said recess and sprue hole, a plurality of gates extending from said sprue hole to said groove, a plurality of gates extending from said groove to said mold recess, a wrought metal brake drum shell in said recess, a cylindrical channular ring surrounding the outer periphery of said shell and in part radially spaced therefrom.

8. The combination of elements as defined in claim 7, said channular ring also engaging said shell in part, and a reinforcing ring interposed between said shell and said ring.

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