No. 776,578. PATENTED DEC. 6, 1904.

J. R. WHITNEY.

CHILL.

APPLICATION FILED JUNE 1, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

Improved Chill.

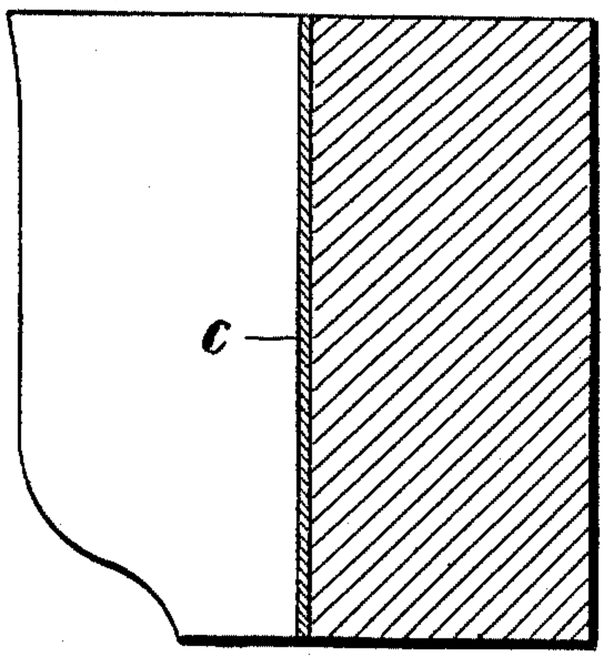


Fig. 7.

Former Design.

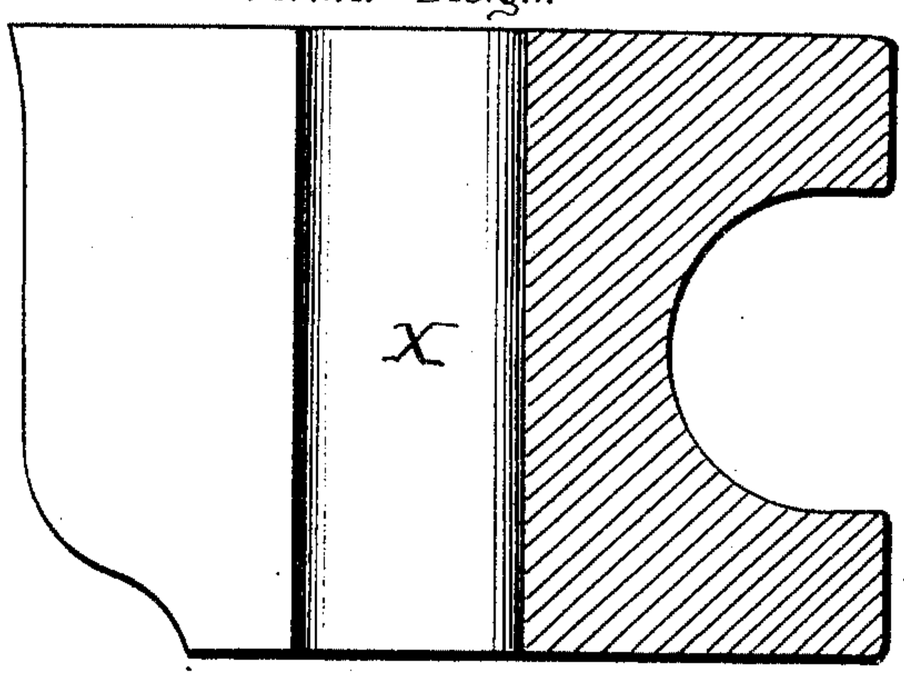


Fig. 2.

Improved Chill.

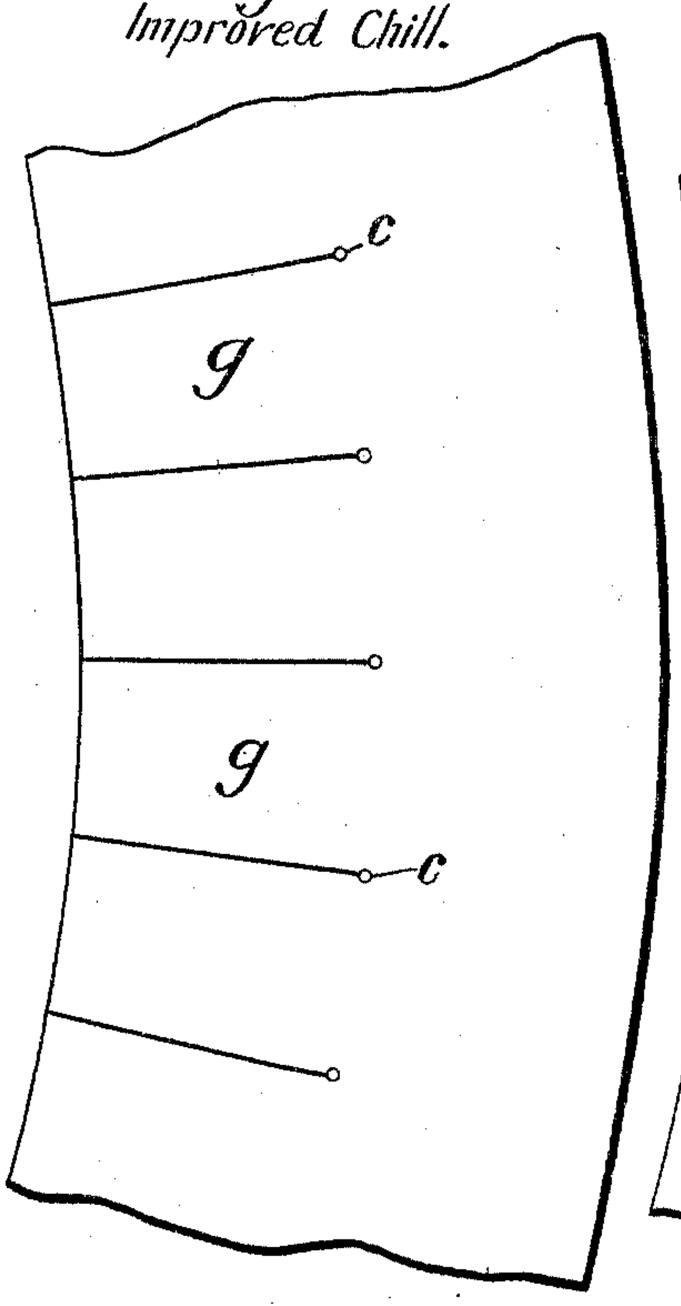
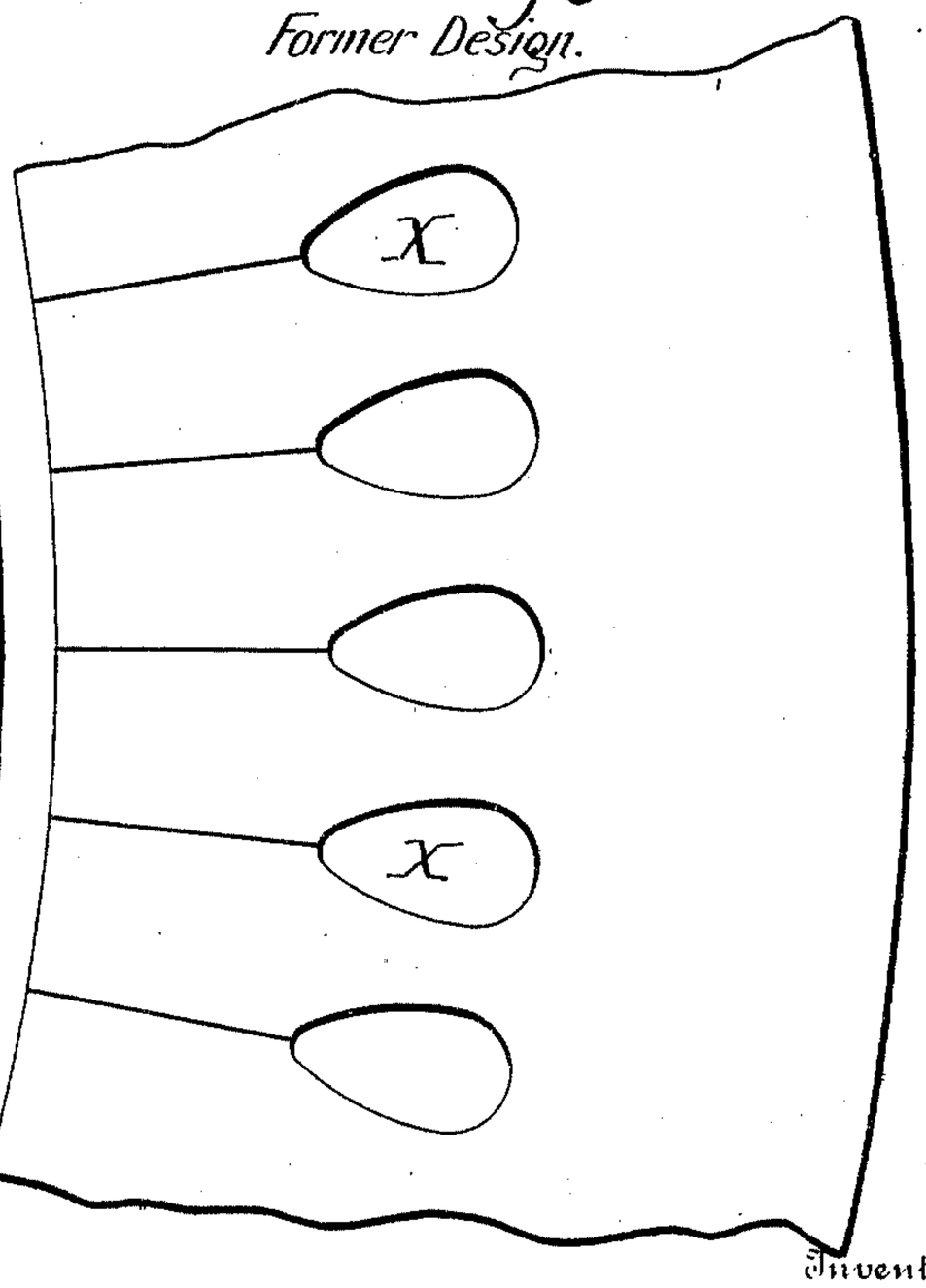


Fig. 8.

Former Design.



Witnesses

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J. R. WHITNEY.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

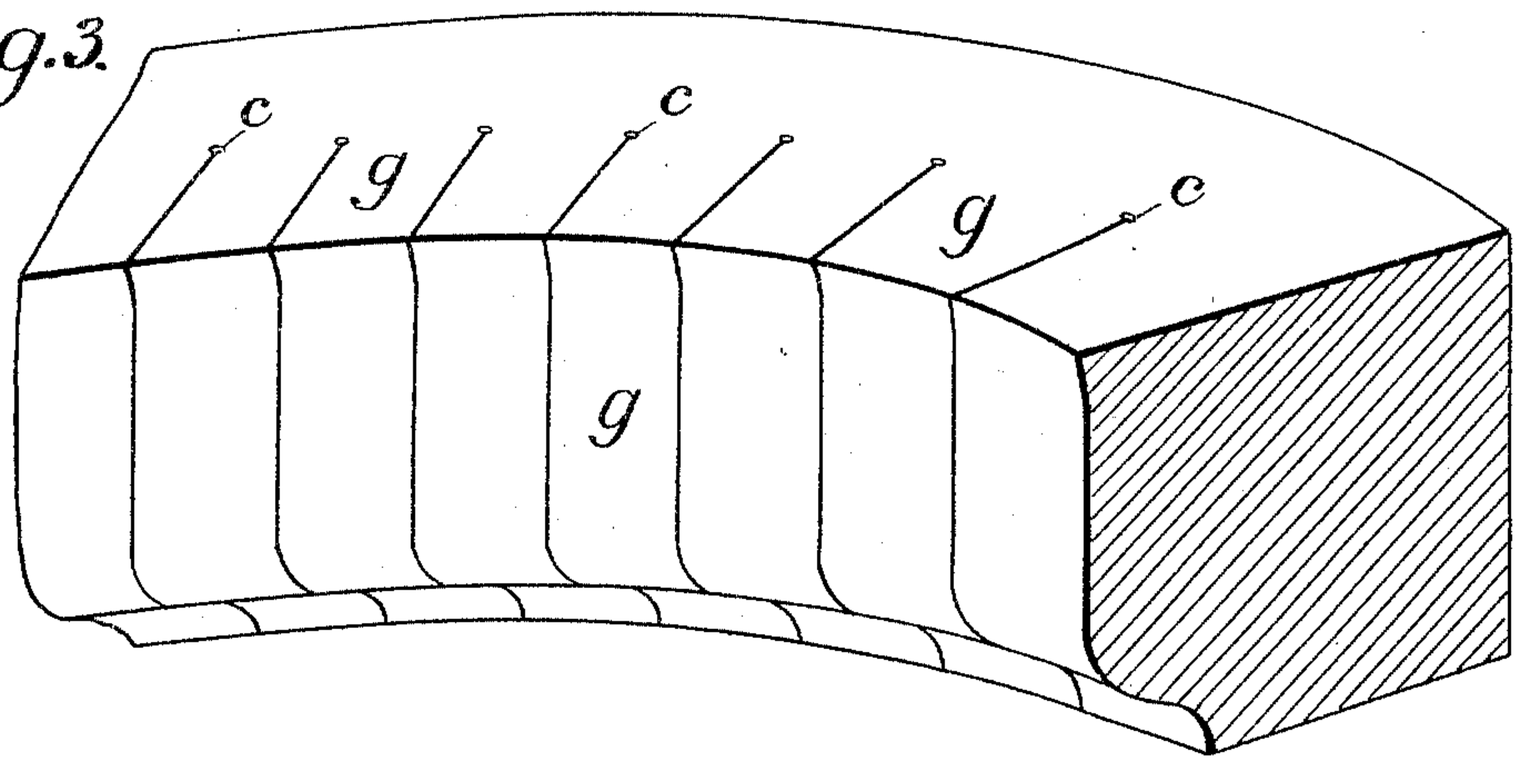


Fig. 4.

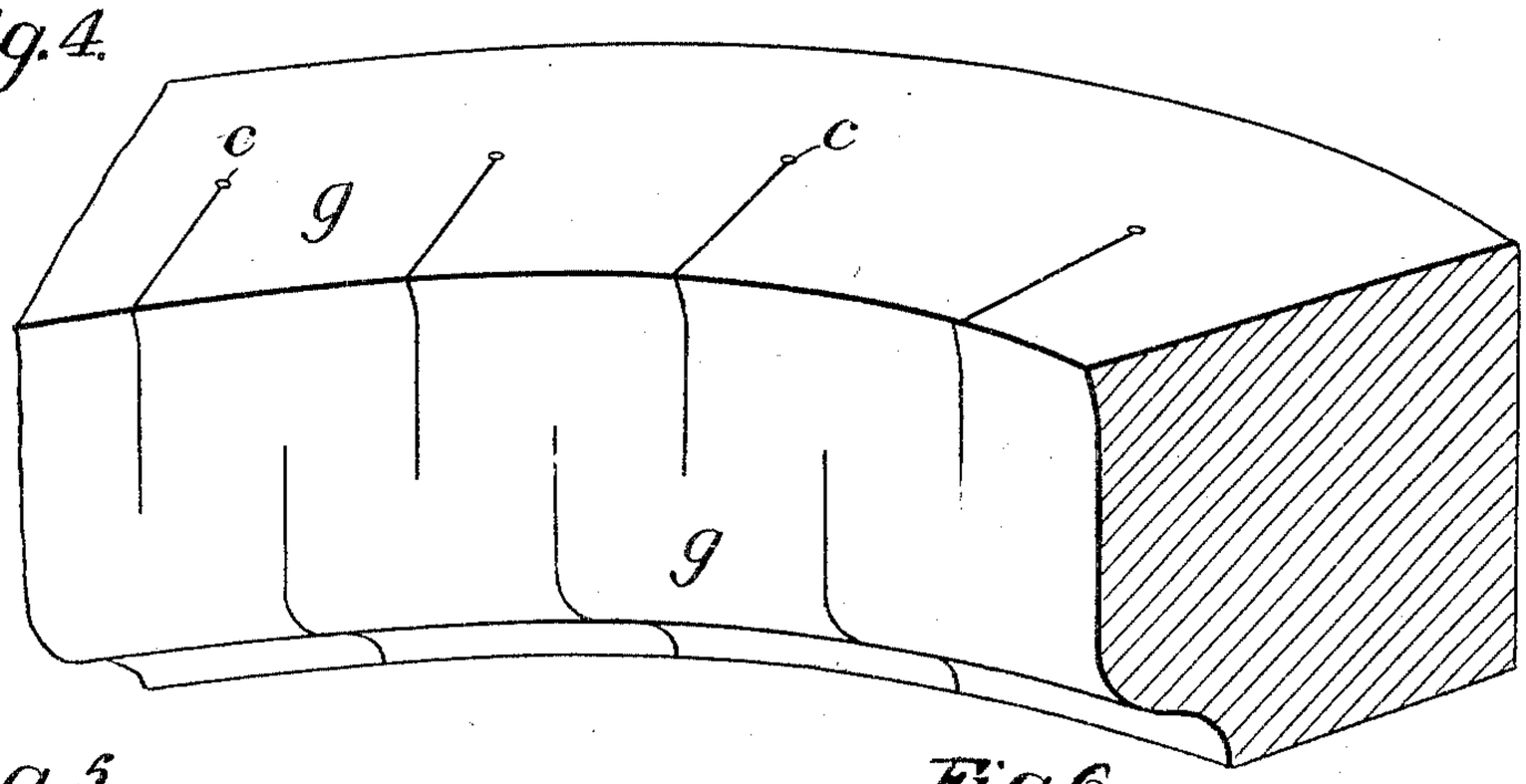


Fig. 5.

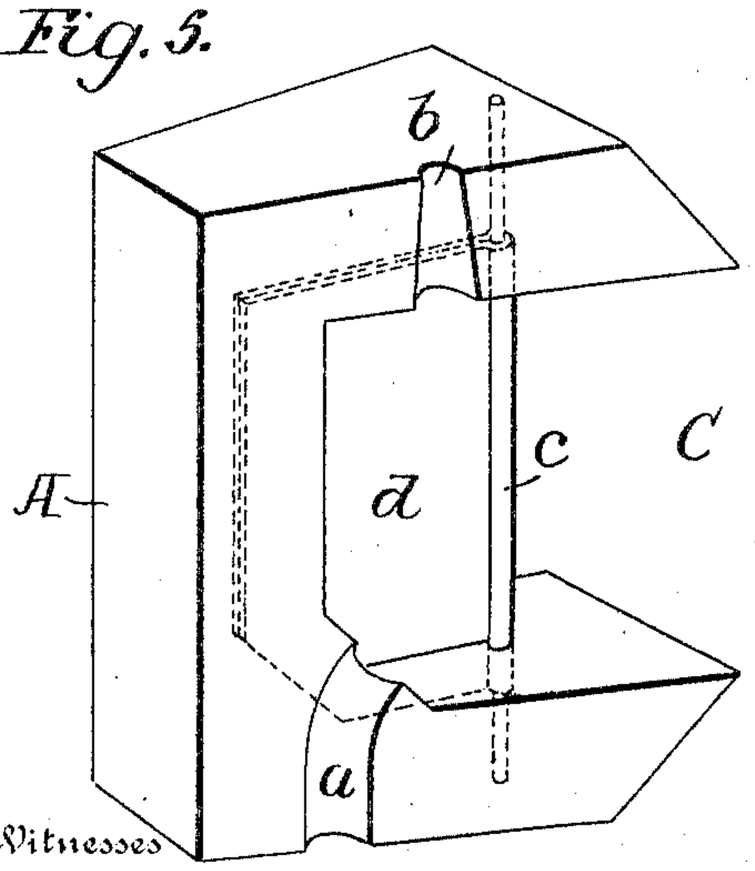
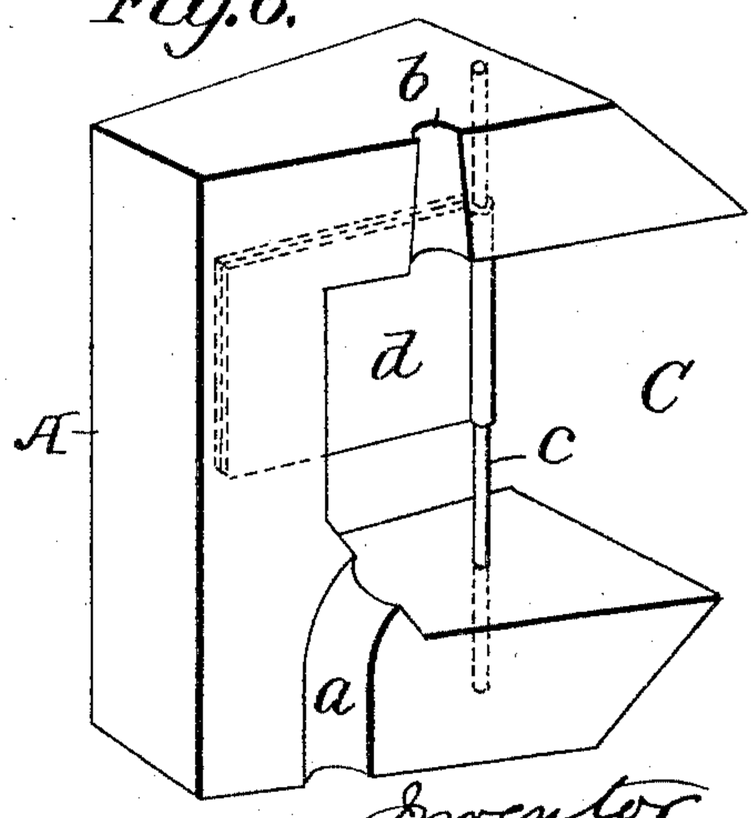


Fig. 6.



Witnesses

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No. 776,578. Patented December 6, 1904.

UNITED STATES PATENT OFFICE.

JOHN R. WHITNEY, OF RADNOR TOWNSHIP, DELAWARE COUNTY, PENNSYLVANIA.

CHILL.

SPECIFICATION forming part of Letters Patent No. 776,578, dated December 6, 1904.

Application filed June 1, 1903. Serial No. 159,660. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. WHITNEY, a citizen of the United States, residing in the township of Radnor, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in Chills, of which the following is a specification.

My invention relates to that class of chills for casting car-wheels known as "contracting" chills; and it consists in constructing them in a practically solid form—that is, without any series of openings or perforations in which the kerfs terminate, and thus avoiding an increase in the thickness or width of the chill, as has heretofore been deemed necessary; in extending the slots or kerfs when desired for only a part of the depth between the upper and lower faces of the chill and alternately from the opposite faces, and in constructing the cores so as to effectively and economically produce the improved chill, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a section of my improved solid self-adjusting chill. Fig. 2 is a part plan view. Fig. 3 is a perspective view of a part of my chill, showing the kerfs as extending from face to face. Fig. 4 is a part perspective view of the chill, showing the kerfs as extending alternately from the upper and lower faces to a little more than half-way between them; Fig. 5, a perspective view of the core required to make the kerfs as seen in Fig. 3; Fig. 6, a similar view showing the core required to make the chill shown in Fig. 4. Fig. 7 is a section of a contracting chill now in use and typical of others. Fig. 8 is a top view of Fig. 7.

In that class of chills heretofore made and designated as "contracting" chills each chill, consisting of a ring, has had in some cases its inner face divided, in the process of casting, by slots or kerfs, each one extending radially outward to a comparatively large opening or perforation X, Figs. 7 and 8. When the slots or kerfs have been cut by means of a saw, these cored-out openings or perforations have been continued so close to the inner face of the chill as to leave only a distance not exceeding three-quarters of an inch from the said inner face in order to reduce the thickness of the metal at the points where it has to be sawed. It has heretofore also been considered necessary to make these cored-out openings or perforations wide and deep in order that the fingers or segments between the slots or kerfs should be of extended length radially, upon the theory that by thus increasing their length there would be secured simultaneously a considerable expansion of these fingers or segments toward the center of the chill, thus following up the contraction of the cast-iron forming the wheel as it cooled from the molten to the solid state, and so keeping the wheel and chill in contact with each other to produce a more uniform chilling effect upon the tread of the wheel. Experience has demonstrated to me, however, that the value and effect of the so-called "contracting" chill is not due to any material extent to the expansion of these separated fingers or segments toward the center, but is mainly due to their lateral expansion in the direction of the circumference, which results in closing up the slots or kerfs, thus preventing any increase in the diameter of the chill itself and any strain upon the same when suddenly heated. The chill therefore does not materially contract in its diameter, but simply retains practically its original dimensions, and as molten iron, like water, expands as it solidifies by thus maintaining the size of the chill this expansion of the molten iron in solidifying secures the desired contact between the wheel and chill until all the chilling effect required is produced on the tread of the wheel. Thereafter as the chill becomes heated throughout it expands, while the further cooling and contraction of the wheel results in breaking the contact between the chill and the wheel, so that the latter may be easily removed from the flask. This being the action in chills having their inner portions slotted or divided, I find that the desired results may be secured without enlarging them, as heretofore, but by making them of the same outside diameter as the ordinary solid unkerfed chills, thereby reducing that diameter three to four or more inches less than in the contracting chills

now in use and considerably reducing the weight of the chill and the space it occupies in the foundry. At the same time the depth of the kerfs is not materially less than those now cut in all such chills, and by my improved process of construction the kerfs instead of extending all the way through from face to face of the chill may be extended when desired alternately from each face to only half or two-thirds the distance between the upper and lower faces, thus leaving each segment solid with the body of the chill for a considerable portion of its length. It will be evident that it would not be practicable to thus form the slots for half the thickness of the ordinary solid chilling-ring, and especially so when the kerfs extend only half-way between its upper and lower faces, by sawing or cutting the same mechanically, and I therefore have devised means for producing them in the act of casting without coring it at regular intervals, so as to produce the large openings or perforations heretofore considered necessary.

To thus manufacture the chills, I make a series of cores, each consisting of a frame A, open at the outer side, as best shown in Fig. 5, with a solid rod or metal body *c* instead of a body of sand, as heretofore, extending across this open side and supporting one edge of a thin sheet *d*, of asbestos paper or other refractory material, which is folded around and secured to the rod or metal body *c* on one side and embedded at its other edges, as may be required, in the sand constituting the other three sides of the said frame A. The necessity of thus supporting the asbestos sheets arises from the fact that the kerfs to be produced must be of such narrow width that the molten metal cannot flow into the same, and no sheet thick enough to be self-supporting will produce a kerf of the necessary limited width. Each frame has an opening *a* in the lower member, through which the molten iron enters in casting the chill, and a riser-opening *b*. In order to make a chill, a series of these cores A, which expand in width toward the outer portions, as shown, Fig. 5, are arranged side by side, forming a ring in a properly-constructed mold. The open sides of the cores being closed by the section C of the sand mold, the molten metal fills the space between the frame A of the cores and the part C, thus embedding the rod or metal body *c* and sheets *d* in the casting, the asbestos preventing the segments from becoming solid with each other, and thus forming the required kerfs in the completed chill, which kerfs, it will be seen, are of uniform width throughout their length. I thus secure fingers or segments *g*, Figs. 2 and 4, of what I have found to be sufficient depth without the necessity of enlarging the thickness of the chill from the inner to the outer face or of producing large openings therein, and I thus not only reduce the weight and consequent cost, but so reduce the diameter of the chills that it is possible to set several more chills within a given area than heretofore.

It has also been found to be the fact that when the slots extend from the upper to the lower face of the chill, completely separating the segments *g g* from each other through the whole distance between these two faces, Fig. 3, there is difficulty in turning the inner face of the chill to the contour of any required templet owing to the yielding and springing of the segments under the action of the turning-tool. This results in the edges of the segments or fingers being fractured and broken away in many instances. To prevent this result, I prefer instead of extending the kerfs all the way through from the upper to the lower face of the chill to extend them for only one-half or a little more than one-half of that distance and alternately from the opposite faces, as indicated in Fig. 4. This is effected by making the asbestos sheets *d* narrower than the width of the frame A, so that each shall extend only part of the distance across the opening inclosed by the frame A, as shown in Figs. 4 and 6, the cores being set in the mold, so that the adjacent sheets shall extend alternately from the upper and lower faces of the chill. By this means each segment *g*, Fig. 4, is so supported that it will not spring under the action of the cutting-tool.

The asbestos sheets *d* consist of paper-pulp and finely-ground mineral asbestos. When these sheets are exposed to the heat of the molten metal in casting the chill, the paper is destroyed and the fine mineral asbestos drops out, leaving clean and clear kerfs in the casting. The metal bodies *c* used to support the sheets become firmly embedded in the casting, as before stated, and their projecting portions are readily broken off in cleaning the chill.

It will be seen that my improved chill differs from those made by slitting back to openings therein by having kerfs with uncut faces—that is, faces formed by casting against the thin cores—and of course the kerfs are much narrower than is possible when they are formed by a tool. The chill also differs from that incidentally shown in my Letters Patent No. 352,792 in that it is shown as having kerfs formed by sheets thick enough to be self-supporting, which would make them of such width that the molten metal could flow into the same, producing radial fins on the casting.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. A chill consisting of a ring having a continuous outer periphery and with the inner portion in sections separated by radial kerfs of uniform width that will not receive the molten metal, extending from the inner face to their terminations, substantially as set forth.

2. A chill consisting of a ring with a con-

tinuous outer periphery and divided at the inner part into sections by kerfs of uniform width that will not receive the molten metal extending alternately from the upper and lower faces of the chill, each for a part of the depth of the latter, substantially as set forth.

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

JOHN R. WHITNEY.

Witnesses:
CHARLES H. WHITNEY,
THEO. G. BACHRAU.