(No Model.)

F. GANDY.

CORE FOR CASTING HOLLOW CYLINDERS, PIPES, &c.

No. 526,029. Patented Sept. 18, 1894.

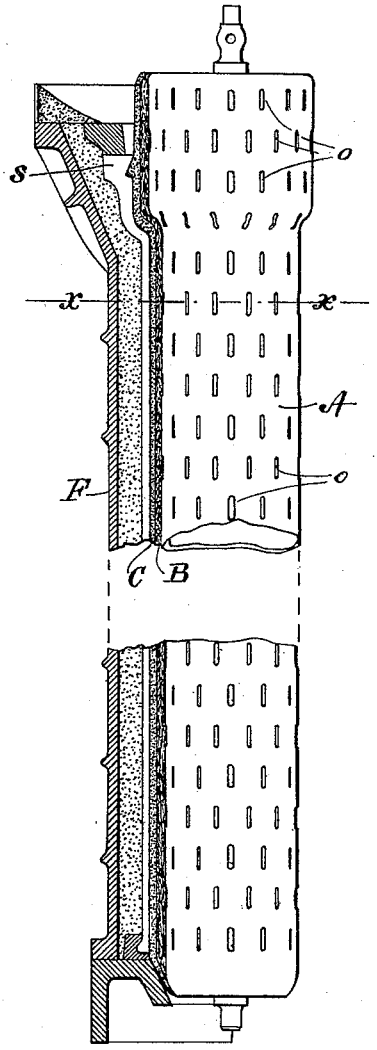

Fig. 1.

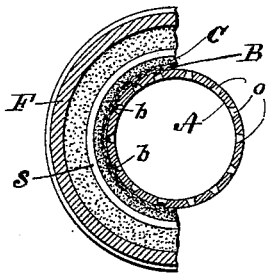

Fig. 2.

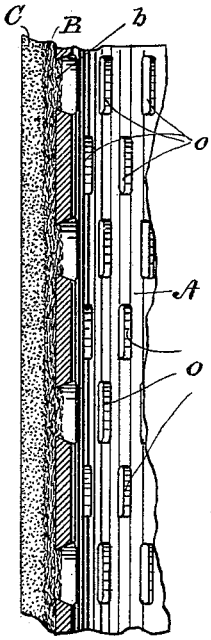

Fig. 3.

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UNITED STATES PATENT OFFICE.

FREDERICK GANDY, OF FERN BANK, OHIO.

CORE FOR CASTING HOLLOW CYLINDERS, PIPES, &c.

SPECIFICATION forming part of Letters Patent No. 526,029, dated September 18, 1894.

Application filed June 14, 1893. Serial No. 477,549. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK GANDY, a subject of the Queen of Great Britain, residing at Fern Bank, Hamilton county, Ohio, have invented new and useful Improvements in Cores for Casting Hollow Cylinders, Pipes, &c., of which the following is a specification.

My invention relates to cores used in casting hollow articles such as cylinders, pipes, &c. In producing the cores for said castings, particularly those of considerable size, the common practice is to wrap hay or straw about a cylindrical mandrel or core-bar; and upon this, form a coating of plastic loam, which, dressed and dried, constitutes the casting surface. The object of this is two fold:—first, to produce a porous foundation for the outer layer, to permit the escape of the gases engendered in casting; and, second, by the combustion and destruction of the straw-layer to permit the collapse of the loam coating and the ready withdrawal of the core-bar. This method of forming cores is objectionable on account of the expense and labor involved in providing and applying the hay-rope layer, and also because of the irregular resistance to the compression of the surrounding metal which produces more or less irregularity in the contour, dimensions, weight and integrity of the castings produced, often seriously impairing their usefulness for the intended purpose.

The object of my invention is to remedy these conditions, in both aspects, cheaply and at the same time produce a more rigid and efficient core, to the end of producing castings of superior uniformity in finish, dimensions and weight.

It consists in a core and the method of constructing the same consisting of a hollow, numerously perforated core-bar, upon which is first secured a coating of semi-combustible porous material and upon this a finishing coating of loam of the usual character; and it also consists in certain preferable details of construction and method all as hereinafter more fully described.

In the drawings hereto attached, illustrating the constructive features of the core bar as applied to the casting of water or gas pipe, I have shown in Figure 1, a partial axial plan of a flask prepared for the reception of the molten metal, with the core bar mounted therein, with its coatings sectioned; in Fig. 2, a horizontal cross section of the same parts in the plane, *x*, of Fig. 1; and in Fig. 3, an enlarged detail section of the core bar with its layers, showing the vent-holes and their function in relation to the inner and outer layers.

In the drawings, F, designates a flask prepared for the casting of a pipe in the space, *s*; and, A, the core-bar suited to the inner contour of the pipe to be cast. For the purpose of my invention, the core bar, A, is a cylindrical or preferably a slightly tapered, hollow casting of metal, having a large number of vent openings, *o*, through the shell. These openings are preferably elongated longitudinally with the bar, and expanded inwardly, as shown, and are "staggered" or otherwise so arranged as to distribute their functions as vents or outlets for the gases equally over the entire surface of the core bar.

Immediately upon the perforated outer surface of the core-bar, I place the layer, B, of material formed and applied as follows:—The material of the layer is preferably about one third part pulverized earthy material, (such as the spent core-dirt of the pipe-works which may have with it a small proportion of new or unburned loam or clay, as may be necessary) one third part sawdust or woody fibrous material, and one third part horse droppings; these being thoroughly mingled and made into a plastic mass with water. The compound thus contains something over sixty per cent. (60%) of combustible material; and is a plastic and somewhat adhesive mass which is applied to the surface of the core bar and worked somewhat into the apertures, *o*, as illustrated in Figs. 2, and 3. The apertures, *o*, being expanded inwardly, there are thus formed retaining keys, *b*, to retain the layer in position.

The application to the core bar is made substantially in the manner and by means of the usual appliances (not shown) now employed for applying the outer layer of clay over the hay rope; and when applied, the layer is dressed to a uniform thickness and comparatively smooth surface. It is then thoroughly dried to expel all moisture. Inasmuch as the layer contains so large a proportion of woody fiber, which is very absorbent, the mass thus

contains an excess of moisture, the drying out of which renders it exceedingly porous. After the preparation of the inner layer, B, as described, the second or finishing layer of loam is applied in the usual manner and dressed to a true cylindrical surface throughout. By reason of the taper of the core-bar and its initial layer, the loam coating will thus be slightly thicker at the bottom than at the top of the core. The core is then subjected to a second drying and is finished in the usual manner. There is thus produced a core consisting of the perforated core-bar, A; a layer of partially combustible material B, surrounding the same and locked thereon by the keys *b*, of material projecting into the expanding apertures, *o;* and the usual outer layer C of loam forming the finished and smooth exterior. The large proportion and uniform distribution of the woody constituents of the initial layer, renders the mass of the initial layer exceedingly porous in its dry state; and, this constituent being combustible, is consumed by the intense heat of the adjacent molten metal of the casting, thus rendering the inner layer extremely friable.

The disintegration of the layer, B, during the casting operation is sufficiently slow to enable the outer layer C to retain its proper form until the metal "sets;" while at the same time the inner layer is sufficiently porous, in connection with the great number and uniform distribution of the apertures, *o*,—to afford the proper vent into the hollow interior of the core bar, A, for the gases engendered during the casting process, and also to freely admit air to effect combustion of the combustible material of the inner layer, B.

As a result of the proper application of the invention, the construction of cores is considerably economized and more accurate and uniform castings are produced besides largely decreasing the percentage of the failures or imperfect castings.

I prefer, as already stated, to give the core bar, A, a very slight taper in order to facilitate withdrawal after the cast metal has cooled and "set." This slight taper, while facilitating the withdrawal of the core-bar, is not detrimental to the casting because the entire coating of the core bar is of a material that is for the time being rigid and incompressible, so that the increased thickness of the coating toward the bottom is not detrimental. Tapering the core-bar is not, however, absolutely essential and in many cases, particularly in relatively short castings, a cylindrical core bar may be employed. The shape and arrangement of the vent apertures, also, may be varied; but I have adopted those shown as a matter of preference in practice for the reason given. The composition, both as to character proportion, of the constituents of the initial layer, B, may also vary largely according to local conditions and convenience. The general aim is to employ the most inexpensive materials; and those designated have been found to work well in practice.

The mucilaginous matter associated with the finely comminuted woody fiber found in horse droppings answers the purpose of more expensive material; but, as it is obvious that material and proportion may be varied, I do not confine myself to either of those stated.

I claim as my invention and desire to secure by Letters Patent—

1. An improvement in the art of forming cores for casting hollow cylinders, pipe &c., consisting in applying to the outer surface of a hollow perforated core-bar a concentric coating consisting of earthy matter mixed with a large percentage of combustible material, and upon this a finishing coat of loam substantially as set forth.

2. The improvement in the art of forming cores for casting hollow cylinders, pipe &c., consisting in first coating the peforated core bar with a plastic adhesive mass of moist earthy material containing a large percentage of combustible material in comminuted state; then drying the same to set and render it porous; and lastly, covering the said coating with a finishing coat of loam and drying the same in the usual manner, substantially as set forth.

3. The improved core for casting hollow, cylindrical pipes &c., consisting of a hollow perforated metal core-bar slightly tapered, having applied thereto exteriorly a concentric layer of earthy matter containing a large percentage of comminuted woody fiber or other combustible material, and a thin finishing coat of loam or similar surfacing material to form a casting surface whereby the heat from the cast metal renders friable and disintegrates the composite layer and enables the core bar to be withdrawn without disturbing the casting, substantially as set forth.

4. The improved core bar consisting of a hollow slightly tapered mandrel provided with vent apertures enlarging inwardly, thereby adapting it to receive and retain a plastic coating by means of the keys formed in the vent holes, substantially as set forth.

5. The improved core consisting of a hollow perforated and taper core bar, a concentric layer of partially combustible earthy material applied in a plastic state, and an outer or finishing coating of loam dressed to a true cylindrical surface, substantially as set forth.

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

FREDERICK GANDY.

Witnesses:
L. C. HOSEA,
L. M. HOSEA.