

(No Model.)

M. H. FLETCHER.
CORE AND ART OF MAKING SAME.

No. 578,080.

Patented Mar. 2, 1897.

Fig. 1-

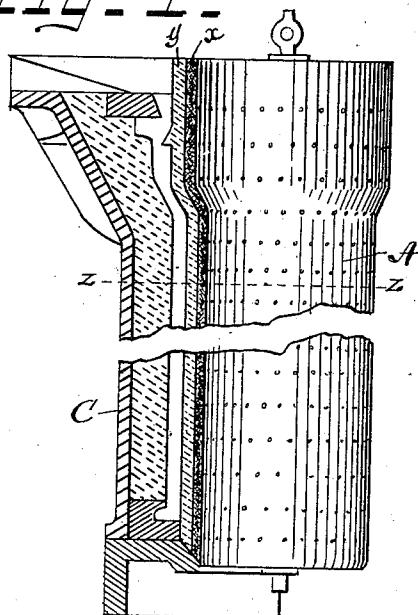


Fig. 2-

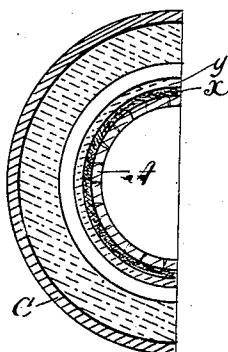
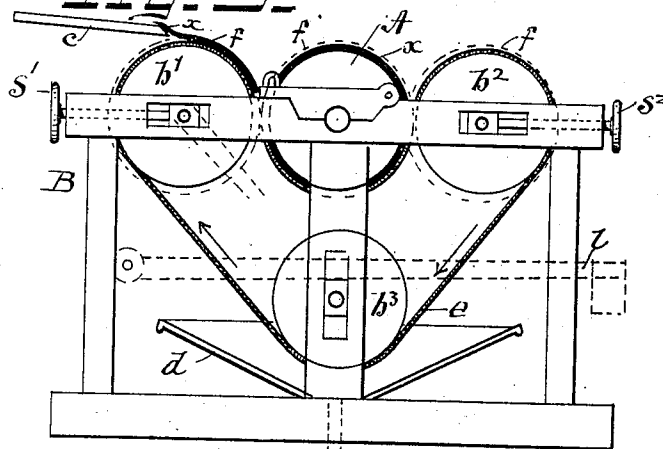


Fig. 3-



Witnesses:
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UNITED STATES PATENT OFFICE.

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CORE AND ART OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 578,080, dated March 2, 1897.

Application filed November 11, 1895. Serial No. 568,536. (No model.)

To all whom it may concern:

Be it known that I, MORDECAI H. FLETCHER, a citizen of the United States, residing at Cincinnati, Ohio, have invented new and useful Improvements in Cores and the Art of Making Same, of which the following is a specification.

My invention relates to cores for casting hollow articles where a core-bar or equivalent skeleton is employed as a basis upon which the ultimate core of loam, &c., is built up, and is intended to provide a core embodying a combustible foundation for the loam upon the bar to be destroyed by the heat of the casting, so that the bar may be removed without interference from the shrinkage of the casting, and the cooling of the casting facilitated by allowing free access of air to the cast article.

To this end my invention consists in an improved core for the casting of hollow articles of metal, such as pipe-sections, cylinders, &c.; also in the construction and composition of a combustible foundation layer for the coating of loam or other earthy material placed upon a core-bar or other support, whereby the heat of the casting chars or practically destroys the foundation beneath the loam, thereby enabling the core-bar to be withdrawn without impediment from the shrinkage of the casting, and also allowing shrinkage to take place freely.

My invention as applied to cores for the manufacture of iron pipe is illustrated in the accompanying drawings.

Figure 1 is a partial sectional view of a pipe-flask and mold, showing my improved core placed in the mold ready for the casting. Fig. 2 is a cross-section of the same in the plane z of Fig. 1. Fig. 3 is an end elevation of a machine for forming and applying the combustible foundation to the core-bar.

In the manufacture of cast-iron pipe, cylinders, and other hollow articles the core generally consists of a central supporting-skeleton known as the "core-bar," (which is generally a perforated metal tube,) upon which is built up the ultimate core in the following manner: First, the bar is wound about with a rope of hay or dried grass in adjacent coils from end to end. Upon this is applied a layer of moist clay material, which is dried by plac-

ing the bar in an oven. Upon the surface of the clay covering the rope is then built up the layer of "loam," which, when suitably dressed and dried, constitutes the core proper, against which the molten metal is run, and which defines the interior surface and opening of the hollow article.

By the heat of the molten metal conducted through the loam and clay layers the hay rope is burned away, so as to permit the withdrawal of the core-bar as soon as the metal "sets," without which the shrinkage of the casting would bind the core-bar and endanger the casting, besides preventing removal of the bar. The removal of the core-bar also facilitates the cooling of the casting.

My improvement relates to the building up of composite cores, with similar objects in view, differing however in certain essential particulars, which effect considerable saving of cost, labor, time, material, &c., besides improving the core itself and the pipe cast therefrom.

In building up the core I proceed as follows: I first take a quantity of combustible matter, such, for example, as sawdust, ground leaves, ground straw, coarse wood-pulp, or any material having the general characteristics of solidity and combustibility in a divided or comminuted state and treat the same with a fluid cementing agent, such, for example, as common starch mixed with water, which is by heat converted into a highly adhesive semi-fluid mass, and in drying binds the solid particles together.

In preparing the material for the layer I find it desirable to place in a suitable vat or tank a quantity of starch water—a convenient proportion being (with a wide permissible variation in either direction) fifty pounds of water to one of starch—and apply heat to the boiling-point to convert the starch water into a semifluid paste with sufficient excess of water to allow for absorption of moisture by the sawdust or other material, which is then added and thoroughly mixed, so that the resulting product shall be of the semifluid consistency of "thin" mortar. Following then the preferable method of applying the layer to the core-bar I take a flexible web or apron, of wire cloth or fabric having meshes sufficiently open to permit air to pass through freely,

spread upon it a layer of the plastic material so prepared, and wrap it around the bar with sufficient pressure to force the layer uniformly into contact with the bar and express the excess of fluid material. A convenient apparatus for performing this operation commercially is shown in Fig. 3 and embodies the following construction:

In a suitable supporting-frame B are journaled two long rolls b' b^2 , spaced apart sufficiently to receive between them the core-bar A, for which suitable journal-bearings are provided in the frame. A third roller b^3 is carried below the others in the lower bight of an endless web or apron e and suitably guided in vertical slots of the frame.

Provision may be made for increasing the weight of the roll b^3 , as by weights or weighted levers l , bearing upon its journals or the blocks in which they are carried.

The web e is preferably made of wire-cloth, but any loosely-woven fabric or porous or perforated material of sufficient strength will answer the purpose. The web passes over the rollers b' b^2 , under the core-bar A, and is held taut by weight or downward pressure of the third roll b^3 , as indicated. The rolls b' b^2 are also preferably provided with means of adjustment, such as set-screws s' s^2 , for increasing or diminishing the distance between themselves and the core-bar A to regulate the thickness of the layer to be superimposed on the core-bar and to accommodate the varying diameters of the latter. The rolls b' b^2 and the intervening core-bar A are geared together by spur-gears f (indicated by dotted lines) to rotate in unison. A suitable catch-basin d is also provided for the liquid cement squeezed out of the layer, and thus prevents any waste. The core-bar being placed in position, as indicated, a quantity of the material in a semifluid state is placed upon a feed-in platen c and moved forward to or is otherwise deposited in a layer x , of proper thickness, upon the web e at the upper side of the roll b' , whence it is carried downward beneath and forced into contact with the core-bar A by the movement of the web e . The described arrangement of the endless web and the action of the suspended roll b^3 produce compression upon the layer x , by which its particles are forced into contact with each other and the layer into contact with the core-bar, and all surplus cement or paste is squeezed out and caught in the basin d .

While other cementing agents may be used, I find the action of starch to be most desirable, owing to the change in the starch produced by hydrating under heat. The introduction of heat and moisture causes the starch cells to expand, and it is converted into a pasty mass enveloping the particles of combustible material. The excess of starchy paste gives the mass a plastic or semifluid character, like thin mortar, so that it may be easily fed to the web in a sheet or layer somewhat thicker than is required for the ultimate

purpose. In passing under the core-bar the web compresses the layer radially, squeezing out the excess of paste through the meshes of the web and causing the particles to adhere firmly to each other and the layer to adhere firmly to the core-bar. The thickness of the layer depends upon the quantity of material fed and its liquid consistency and the relative pressure produced by the weighted roll b^3 , all of which may be varied to suit the particular case.

While I have thus described and shown apparatus for producing and attaching the layer which for commercial purposes I regard as the best, I do not confine myself to this or any other particular method or apparatus for the purpose.

The layer x applied to the bar is to be made to adhere firmly to the bar. This may be done by transferring the core-bar A to a drying-oven, or the core-bar may be sufficiently heated previously to applying the coating to dry the same without subsequent treatment, or the moisture may be expelled by pressure. As soon as the combustible layer is sufficiently dry the final loam coating y is applied directly to the same and is then finished and dried in the usual manner, the firm character of the combustible layer and the inequalities of the surface constituting a secure holding for the loam without the intervening clay layer, such as used with the hay rope.

The heat of the casting practically destroys the combustible layer, enabling the core-bar to be withdrawn from the flask C with freedom as soon as the metal sets.

It will be sufficiently obvious that a wide range of materials may be resorted to in forming the combustible layer. The solid matter may be any substance capable of being ground, shredded, or otherwise so comminuted as to form with the cementing agent a somewhat plastic mass to be applied as described and to be dried into a firm and adhesive layer adapted to receive and retain the loam coating and adapted, further, to be destroyed as a solid mass by the heat of the casting.

Sawdust, comminuted leaves, twigs, stems, shrubs, grasses, straw, refuse grain, or other vegetable matter or any combustible material may be used for the purpose, according to local conditions. There is also a considerable range of selection as to the cementing agent, since with slight additional trouble or expense many others, such as glues, mucilaginous gums, &c., can be used with good practical results. What I have described, however, both as to material and method is deemed the best under the conditions of cost and convenience after many experiments and successful results.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. The improved core for casting hollow objects of metal, consisting of a metal core-bar, having applied thereto a concentric combus-

tible layer of finely-divided woody matter or vegetable fiber held together by a cement that loses its cementing quality when highly heated, and upon this a second or finishing layer
5 of loam to form the casting-surface, substantially as set forth.

2. A combustible foundation for the loam surface of cores, consisting of a comminuted, woody fiber, or similar material moistened
10 with starch paste and applied to and dried

upon a core-bar as an independent layer, substantially as set forth.

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

MORDECAI H. FLETCHER.

Witnesses:

L. M. HOSEA,

FRANK K. BOWMAN.