

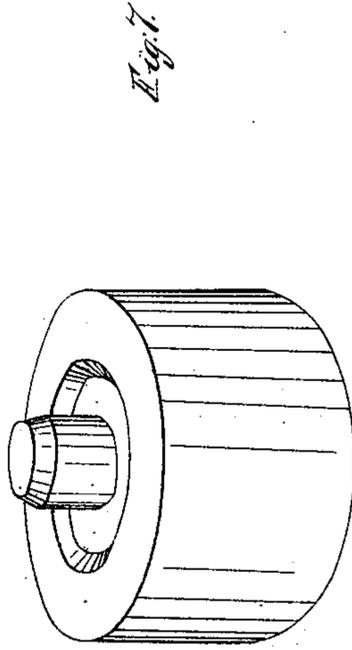
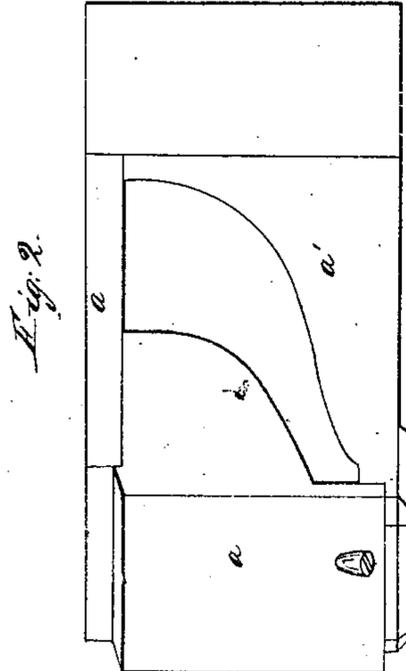
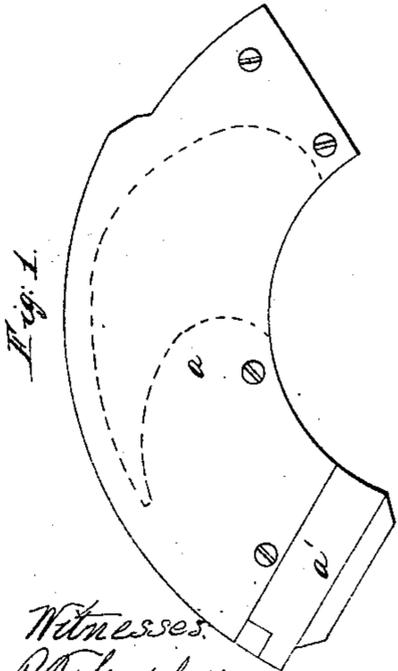
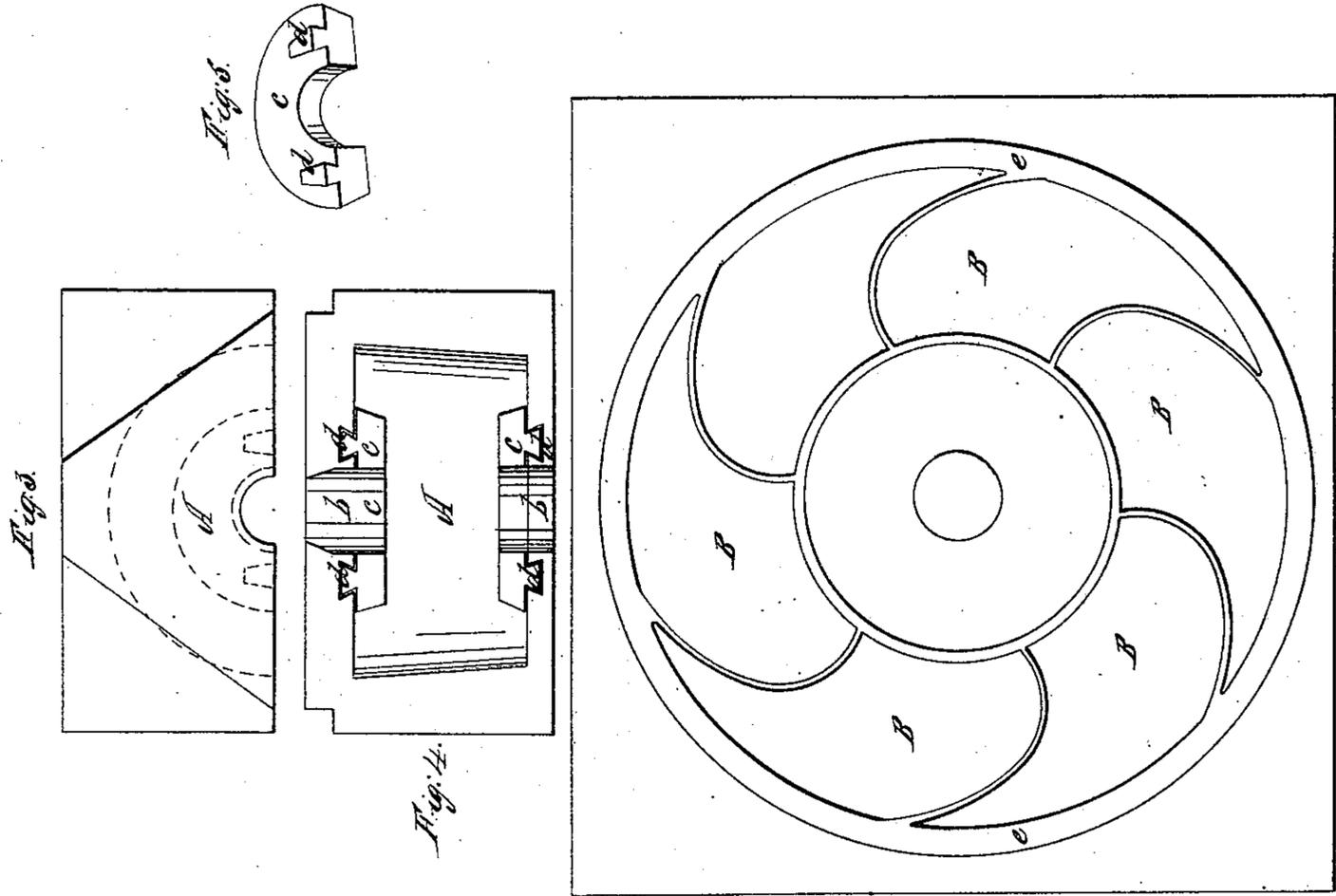
A. C. Emmick,

2 Sheets, Sheet 1.

Casting Water Wheels.

N^o 40,998.

Patented Dec. 22, 1863.



Witnesses.
R. P. Campbell
John P. Jacoby.

Towerton
A. C. Emmick.
 by *his Atty*
Mason, Parvick & Edwards.

A. C. Emmick,

2 Sheets, Sheet 2.

Casting Water Wheels.

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Fig. 8.

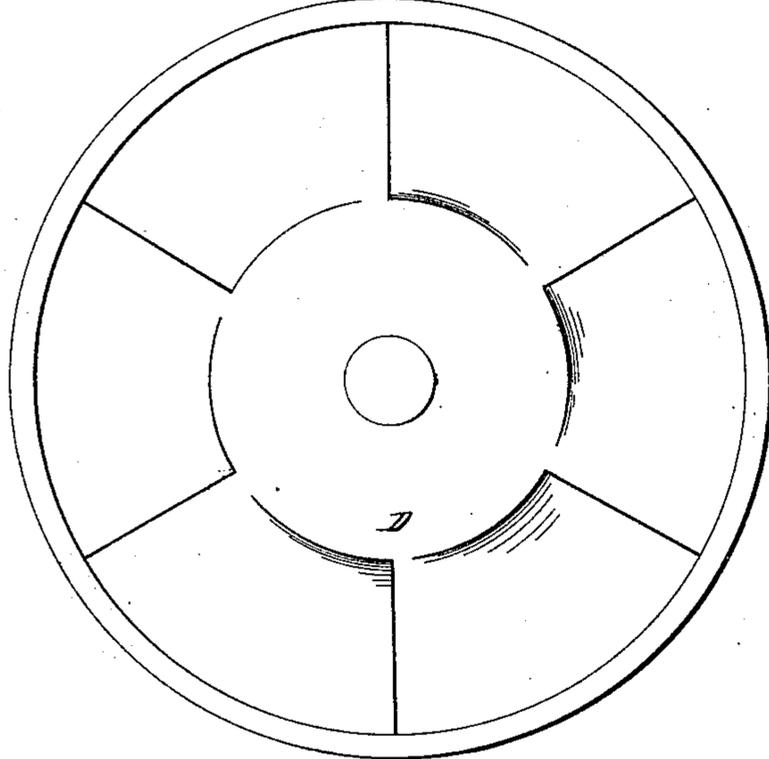


Fig. 9.

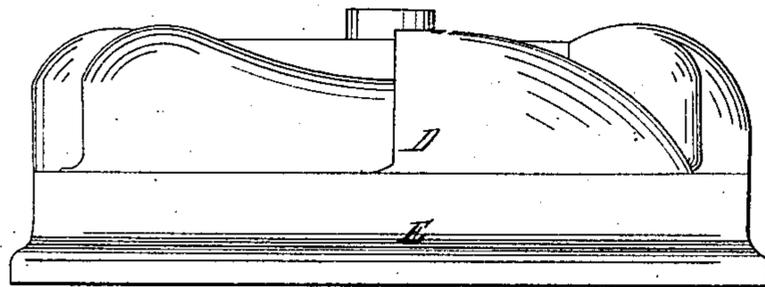
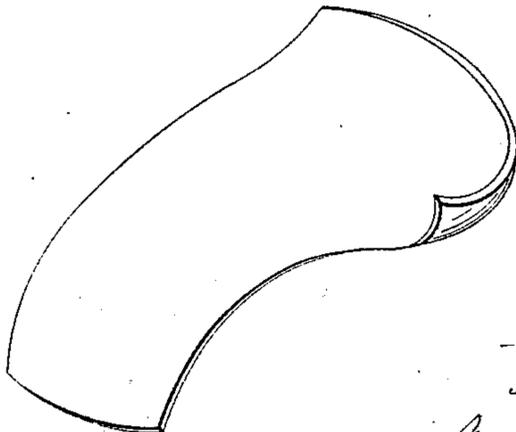


Fig. 10.



Witnesses:

R. T. Campbell

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UNITED STATES PATENT OFFICE.

A. C. EMMICK, OF COLUMBUS, OHIO.

IMPROVEMENT IN CASTING THE ANDREWS & KALBACH WATER-WHEEL.

Specification forming part of Letters Patent No. 40,998, dated December 22, 1863.

To all whom it may concern:

Be it known that I, A. C. EMMICK, of Columbus, in the county of Franklin and State of Ohio, have invented a new Mode of Casting the Andrews & Kalbach Water-Wheel; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a top view of the core-box in which the cores are made for casting the buckets of the wheel. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is a top view of one-half of the core-box for casting the inner wall of the wheel. Fig. 4 is a side elevation of Fig. 3. Fig. 5 is a perspective view of one of the semicircular false cores of the box of Figs. 3 and 4. Fig. 6 is a perspective of the central core produced by the box, Figs. 3 and 4. Fig. 7 is a plan view of the cores set up in a flask and prepared for the casting. Fig. 8 is a top view of the pattern for a six-bucket wheel. Fig. 9 is a side elevation of Fig. 8, showing the two halves of this pattern. Fig. 10 is a perspective view showing the shape of the buckets.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to a new and useful improvement in casting the cast-metal wheel patented by Abraham Andrews and Harrison Kalbach, August 30, 1859. This wheel is provided with curved concave buckets, and they have hitherto been formed by casting the buckets separately and then placing or setting them up in a mold and casting the rim and center or hub of the wheel around the buckets. This plan or mode of casting does not form a durable wheel, as the buckets are liable to become detached or knocked out, in which event the wheel is rendered useless.

My invention consists in casting all the parts composing the wheel—*i. e.*, rim, buckets, and hub—in one solid piece and at one operation of casting by forming, by means of a suitable mold, cores for the buckets, or, rather, for the spaces between the buckets, and setting these cores up in a mold, as will be hereinafter fully explained.

In the accompanying drawings, Figs. 1 and 2, I have shown the mold-box in which the cores are made for the spaces between the buckets of the wheel. This mold or core-box is

made up of three detachable parts, *a a a'*, screwed together, so that it can be taken apart for removing the core, which is made of sand rammed into the curved space in the box, in the usual manner of making cores. These cores, when produced from their mold, present on their upper and lower surfaces the form of the upper and lower surfaces, respectively, of the buckets which are produced in casting the wheel, as will be hereinafter described.

The core-box in which the core is made for casting the central wall or hub of the wheel consists of two halves, one half, *A*, of which is represented in Figs. 3 and 4 of the drawings. The central hole, *b b*, is intended for producing the axis of the wheel, and the annular projections *c c* around this hole produce in a cast wheel projections corresponding to them, which thicken, and consequently strengthen, the wheel at these points. These annular projections (one-half of each is shown in the drawings) are removable and attached to the core-box, or halves thereof, by means of dovetail tenons *d d*, fitting into corresponding recesses, as shown in Figs. 3, 4, and 5. This attachment of the pieces *c c* or false cores to each half of the core-box allows the core to be drawn, leaving corresponding depressions in it, as represented in Fig. 6 of the drawings. The cores being thus formed, the pattern (represented in Figs. 8 and 9, Sheet 2) is placed in a suitable flask, which is afterward filled with sand tamped down, in the usual manner of molding patterns. This pattern, which consists of two parts, *D E*, is now withdrawn from the sand, leaving the sand mold in a proper condition for receiving the cores, which I have above described. This pattern *D E* forms a mold of the shape and size of the external surface of the buckets, hub, and the rim of the wheel.

The pattern *D E* is made for a wheel having six buckets. This will require a core (made from the box of Figs. 1 and 2) for each bucket; and these cores are arranged in a circle in such a relation with each other as to leave spaces between their curved upper and lower curved surfaces, the widths of which spaces are equal to the thickness of the buckets. The central core, Fig. 5, is now introduced within the central space inclosed by the bucket-cores, leaving a space all around this central core

and the inner edges of the bucket-cores to receive the metal which forms the hub of the wheel. A like space is also left between the cores B B, Fig. 6, for receiving the metal which forms the rim of the wheel, (indicated by letter *e*, Fig. 6.)

The plan view, Fig. 7, represents the mold, produced as above described, with all the bucket-cores in it. The white spaces represent that portion of the mold which is to receive the metal in casting the wheel, and the dark spaces inclosed by the outer white circle represent the cores arranged in their places, as above described. The sand surrounding the whole is supposed to be confined in a flask.

The old mode of casting the buckets separately and then placing them in a mold and casting the rim and hub around them does not form a strong and durable wheel. The buckets of the old wheels are liable to be forced out from the rim or case and hub by the action of drift-wood or other substances which are lia-

ble to pass into the wheel and strike forcibly against the buckets. In the perfect casting, where the entire wheel is of one homogeneous piece, there is no liability of any of its parts becoming detached or deranged from the above causes.

I do not claim, broadly, casting the several parts of a water-wheel in one piece, for there are some kinds of wheels which are thus cast, the form and arrangement of the parts admitting of it without any difficulty whatever.

I claim, therefore, as new and desire to secure by Letters Patent—

Casting the Andrews & Kalbach water-wheels in one homogeneous piece and at one operation, in the manner and by means of a mold or molds constructed and arranged substantially as described.

A. C. EMMICK.

Witnesses:

ADAMS STEWART,
S. W. STIMSON.