(No Model.)

M. BYRNE.

SPARGER.

No. 434,538. Patented Aug. 19, 1890.

Fig: 1.

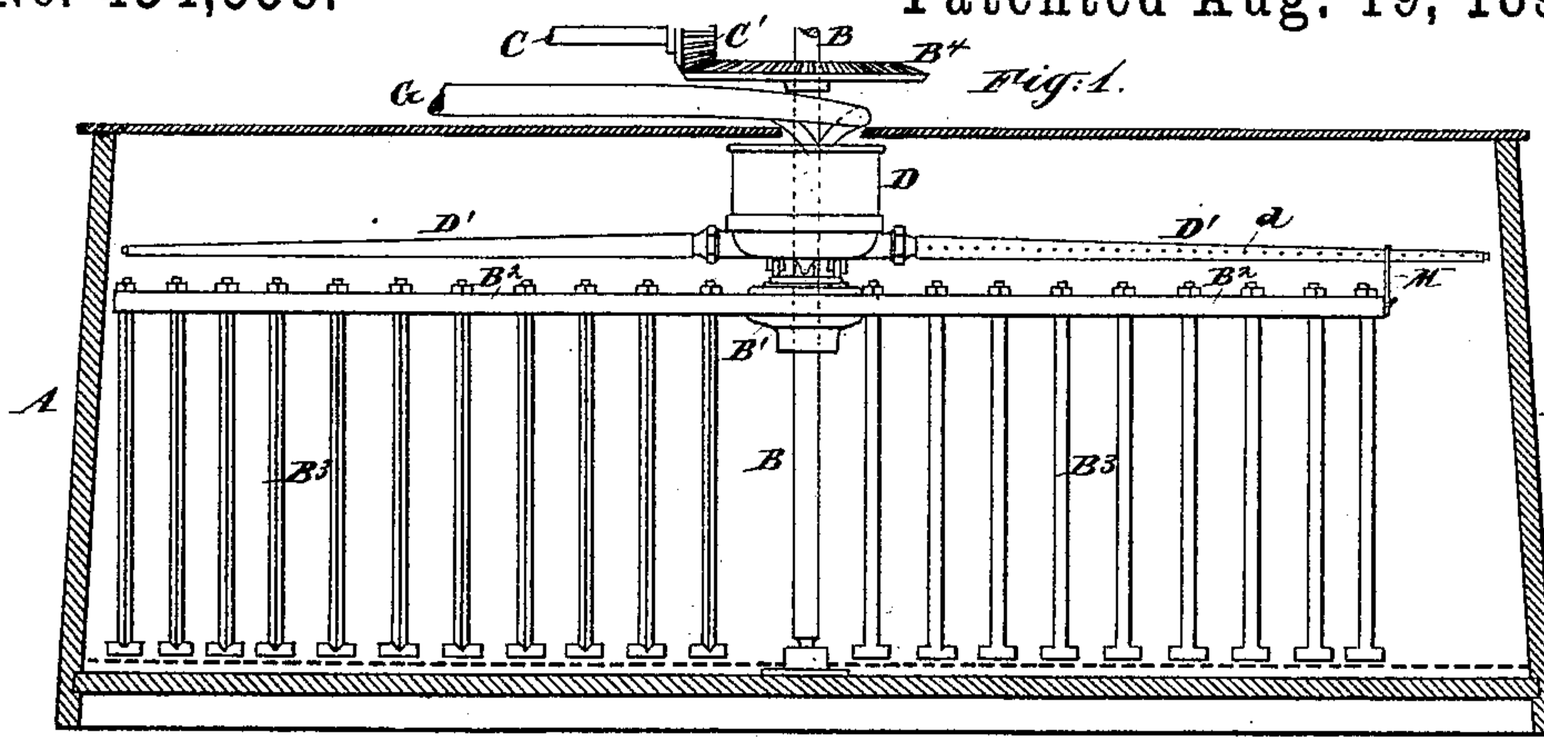

Fig: 2.

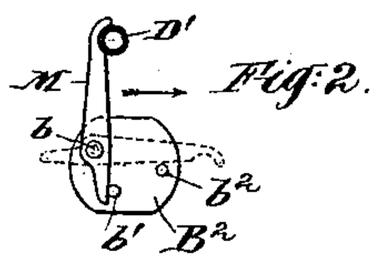

Fig: 3.

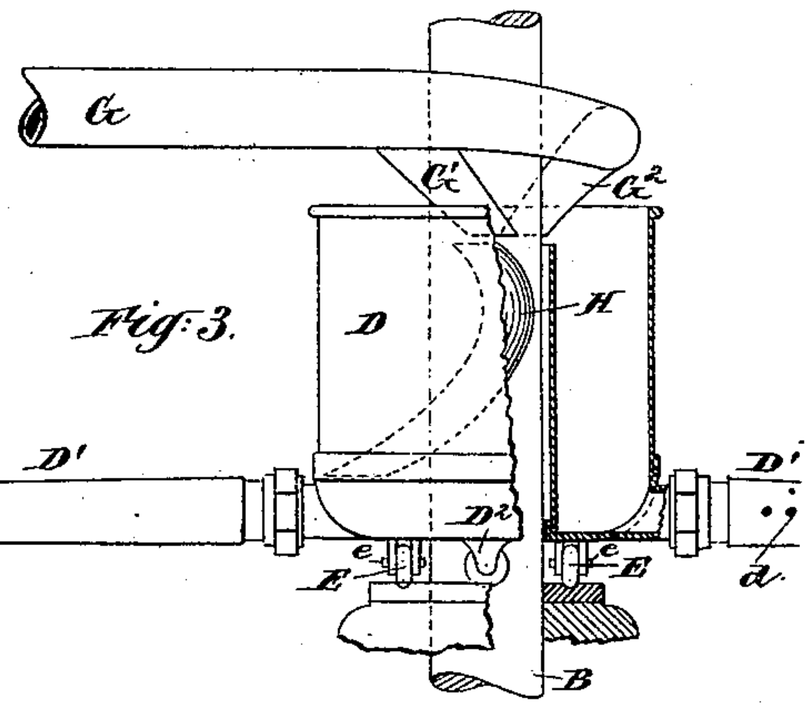

Fig: 4.

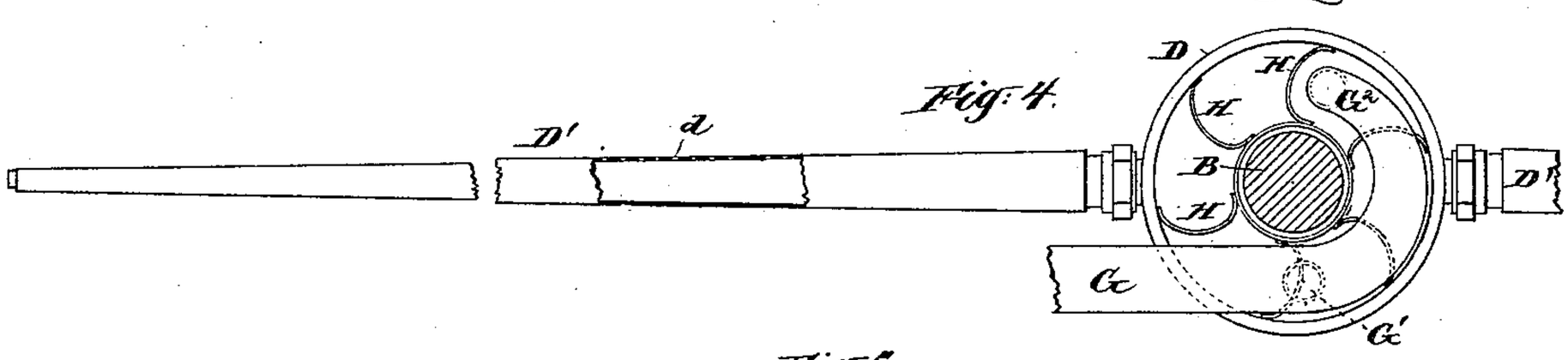

Fig: 6.

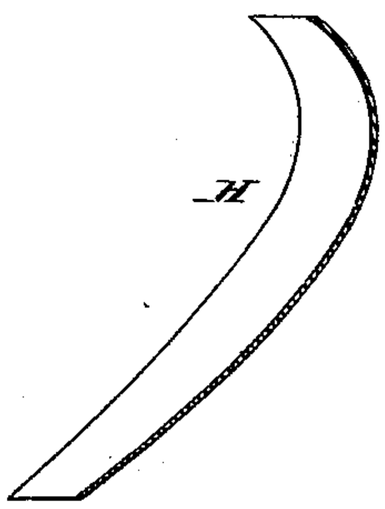

Fig: 5.

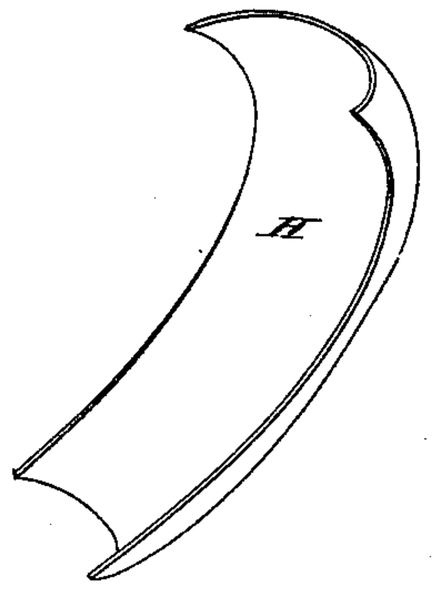

Fig: 7.

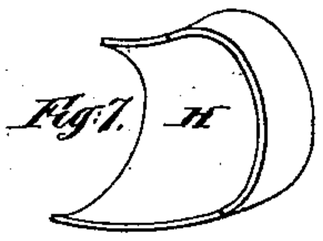

Fig: 8.

Witnesses:
Charles R. Searle.
Chas. S. Barber.

Inventor:
Michael Byrne
by his attorney
Thomas Drew Stetson

UNITED STATES PATENT OFFICE.

MICHAEL BYRNE, OF NEW YORK, N. Y.

SPARGER.

SPECIFICATION forming part of Letters Patent No. 434,538, dated August 19, 1890.

Application filed February 12, 1890. Serial No. 340,117. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BYRNE, brewer, residing in the city and county of New York, in the State of New York, have invented a new and useful Improvement in Spargers, of which the following is a specification.

My sparger turns on an axis concentric with the shaft of the rake, and is capable of being revolved independently of the rake.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation of the mechanism, with a central vertical section of the mash-tub in which it is operated. The remaining figures are on a larger scale. Fig. 2 is an end elevation of one of the arms of the rake and its attached finger. Fig. 3 is a side elevation, certain portions being broken away to show the interior. Fig. 4 is a plan view. The remaining figures show details detached. Fig. 5 is a perspective view of one of the buckets or curved floats. Fig. 6 is a vertical section. Fig. 7 is a view from above, and Fig. 8 a horizontal section of such float.

The shaft of the mashing mechanism is inclosed loosely within an annular vessel, which constitutes the center of the sparger. This annular vessel is equipped in its interior with concave floats. Two nozzles branched from a single pipe, controlled by a single valve, deliver the water into this annular vessel tangentially, and are arranged to deliver at opposite or nearly-opposite points, and thus in practically-opposite directions, upon the floats there presented. This insures that any lateral strain due to the jet from one nozzle which tends to displace the sparger or to derange the delicate anti-friction devices on which it is mounted is balanced by an equal tendency due to the jet from the other nozzle to displace or derange it in the opposite direction. The floats, being concave or curved both in their horizontal and vertical directions, act like the corresponding parts of a turbine water-wheel to utilize the force of the jets and cause such force to revolve the sparger.

Similar letters of reference relate to corresponding parts in all the figures.

A is the mash-tub, which may be of the ordinary form and dimensions.

B is an upright shaft, having a large hub or boss B′, carrying the arms B^2, which are provided with teeth B^3, performing the ordinary functions of a rake. The motion is received through a bevel gear-wheel B^4 through a bevel gear-wheel C′, keyed to a shaft C, turned by a steam-engine or other suitable power. The upper surface of the boss B′ is of cast-iron or other suitable material finished to constitute a circular track, on which properly-formed rollers or wheels may easily revolve.

D is an annular vessel, open at the top, and containing curved floats H, the central orifice being sufficiently large to loosely inclose the shaft B without contact therewith. Hollow arms D′ D′ extend outward from its base and are provided with holes *d*, through which water received in the annular vessel D may be properly distributed upon the mash. The annular vessel D with its perforated arms D′, having free communication with its interior, constitute the sparger.

E E are a set of wheels of uniform size and rounded peripheries mounted on short shafts *e*, carried in the housings D^2, fixed to the vessel D. The wheels E, traversing on the smooth circular track below, allow the sparger to revolve easily when the rake is at rest, or to remain at rest when the rake is revolving, when such conditions become necessary or desirable.

G is the induction-pipe admitting the water from an elevated reservoir. (Not shown.) It leads to a point over the vessel D, where it connects with two branches G′ G^2, which discharge the water tangentially into the annular vessel D. In the latter vessel are fixed at the proper angle a series of curved floats H, which receive the impact of the streams entering through the branches G′ G^2. The force thus communicated to the sparger induces a moderate revolution. The number and aggregate area of the holes *d* should be sufficient to discharge all the water ever likely to be admitted and prevent its accumulating in the annular vessel D so as to overflow or to prevent the proper action due to the impinging of the entering streams upon the floats. The

floats H are concave or curved both in their horizontal and vertical directions, and are set in the annular vessel D in such position that the entering streams impinge against the upper edge of each, describing a curve in traversing across the path of the float, and impel the revolution of the sparger both by the direct momentum of the jet and also by the reaction due to its discharge rearward from the lower edge of the float. The action is similar to that in the well-known form of water-wheel known as the "turbine."

The invention allows the water to be distributed gently with the required uniformity into all parts of the mash-tub, and allows the sparger to revolve at the required moderate rate, whether the rake be revolving or standing still. In case the rake is revolving actively and the sparger is not in use the latter may turn slowly through the slight force due to the friction of the wheels E. When water is admitted, the sparger will be revolved by the force due to the impact of the entering streams of water against the floats H, and also by the force due to the reaction of the escaping streams issuing from the apertures *d*. The revolutions of the sparger will be nearly the same whether the rake is revolving or is standing still.

M is a finger of metal partially turning on a pivot *b* on the extremity of one of the arms of the rake. Stops b' b^2 are arranged to limit its turning motion. When it is turned down and rests on the stop b^2, it is of no effect. When it is turned up and rests against the stop b', it engages with one of the arms D′ of the sparger and compels the latter to turn with the rake. This enables me to turn the sparger at the same rate as the rake when desired. It is especially useful whenever it becomes desirable to introduce so small quantities of water through the sparger that it would not be turned reliably at a sufficient rate by the force of the water itself. This gives a capacity for introducing indefinitely-small quantities while the rake is revolving. When the rake is at rest, the water must be admitted in sufficient quantities to insure the revolution of the sparger. The finger M is thrown out of action under these conditions by being thrown down by the passage of the sparger-arm. It must be so light and so easily turn on its center *b* that the gentle force received from the sparger will throw it from its nearly vertical position resting against the stop b' and cause it to drop into its horizontal position resting on the stop b^2.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. I can dispense with one of the branches G′ or G^2, and admit all the water through a single branch; but I prefer the two arranged as shown, so that the force due to the stream of water on one side tending to displace the sparger bodily in one direction shall be approximately balanced by the force due to the stream from the other branch striking on the opposite side of the center and exerting an equal force to displace the sparger bodily in the opposite direction. Thus conditioned, the sparger will work successfully as represented without ever becoming displaced so as to bring it into contact with the shaft. It revolves gently and with sufficient accuracy of position without any central guide.

I claim as my invention—

1. In combination with a mash-tub and revolving rake, a sparger having an annular vessel D, and concave floats H set therein adapted to be actuated by both the momentum and the reaction of jets of water tangentially received, as herein specified.

2. A mash-tub and rake, in combination with each other and with a sparger composed of the annular vessel D, perforated arms D′, and curved floats H, and with anti-friction wheels E, and the induction-pipe G, having branches G′ G^2, arranged to deliver the water tangentially against such floats on opposite sides, so as to balance the disturbing forces, as herein specified.

3. A rake and sparger capable of being revolved independently on the same axis and means for revolving each independently at will, in combination with each other and with the finger M, pivot *b*, and stops b' b^2, to allow the motion to be communicated at will from the rake to the sparger and to automatically assume the independent condition when required, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 11th day of February, 1890, in the presence of two subscribing witnesses.

MICHAEL BYRNE.

Witnesses:
CHARLES R. SEARLE,
M. F. BOYLE.