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G. A. WILBERFORCE.

CENTRIFUGAL PUMP.

(Application filed Sept. 29, 1899.)

(No Model.)

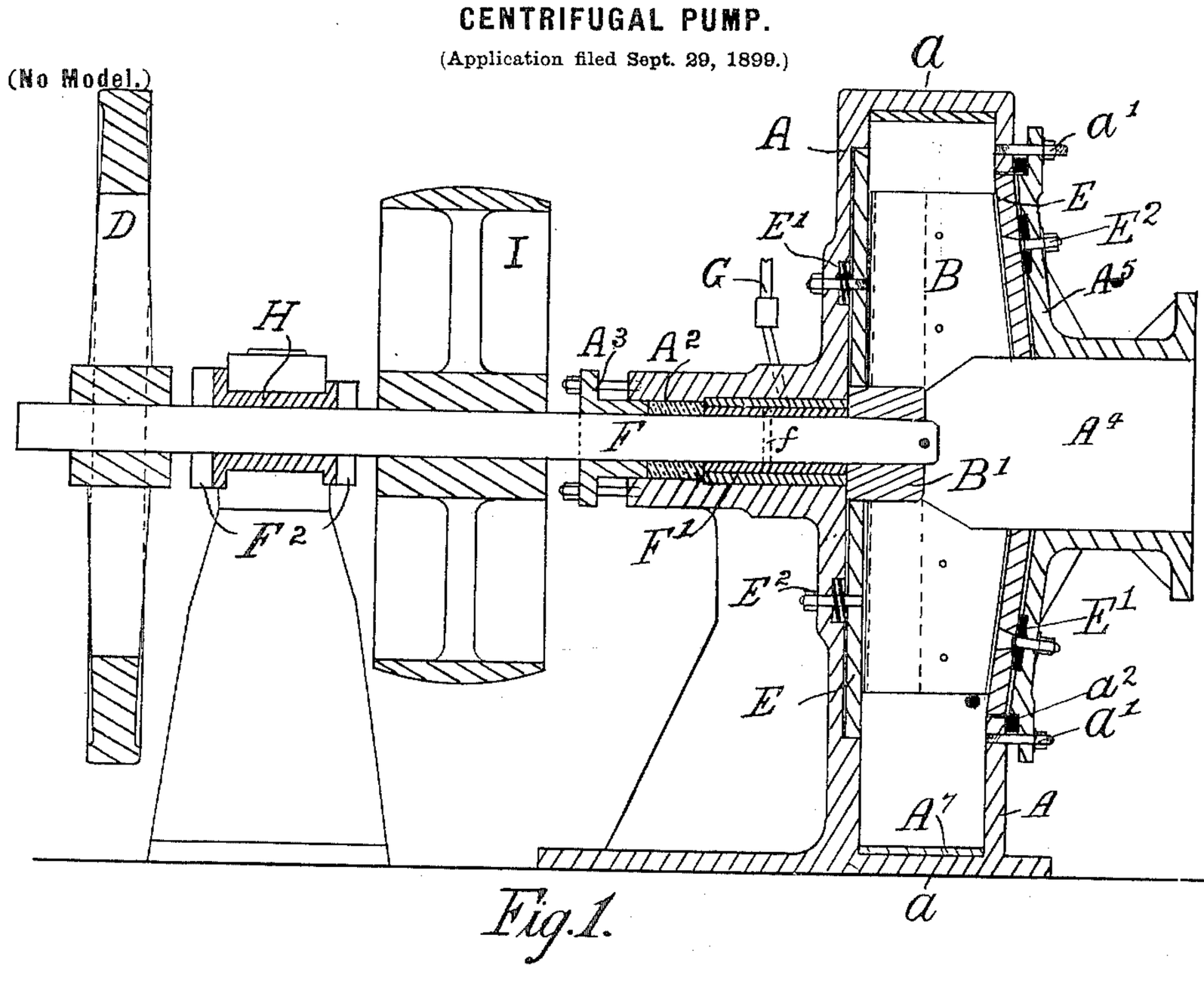

Fig. 1.

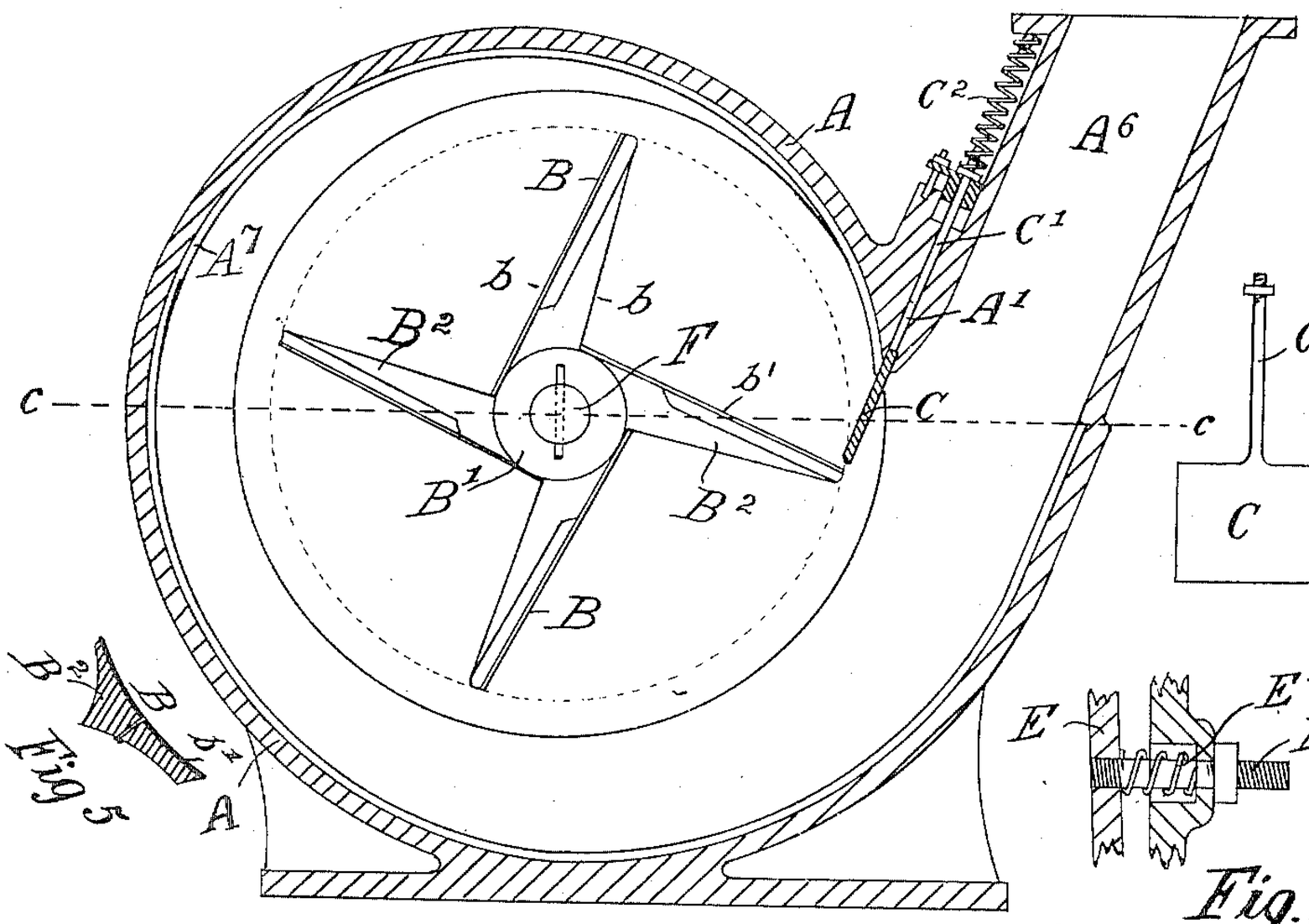

Fig 4

Fig 5

Fig. 3

Witnesses:
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Fig. 2

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UNITED STATES PATENT OFFICE.

GEORGE ALFRED WILBERFORCE, OF BEECHWORTH, VICTORIA.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 640,345, dated January 2, 1900.

Application filed September 29, 1899. Serial No. 732,110. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALFRED WILBERFORCE, a subject of the Queen of Great Britain, and a resident of Albert road, Beechworth, in the British Colony of Victoria, have made certain new and useful Improvements in Centrifugal Pumps for Tailings or Liquid Charged with Sand, Earth, or Stones, of which the following is a specification.

This invention relates to improvements in centrifugal pumps of the type which are employed for pumping tailings or liquid charged with sand or other earthy substances or stones. In the best known of this type of centrifugal pumps the blades are curved radially and the outer ends thereof fit closely within the casing from the nose of the delivery branch for about one-quarter of its circumference, and then the casing enlarges eccentrically until it reaches the outer side of the delivery-pipe, there being no provision made for releasing stones or gravel from the ends and edges of the blades. Such pumps, with the ends and edges of the blades working close to the casing, are found in practice when employed to pump liquid charged with stones or the like to be very liable to be injured by the stones or other material being thrown against the nose-piece and thence jammed either between the ends or the edges of the blades and the casing and crushed thereby unless the blades or casing or the shaft be broken or destroyed. The improvements devised for overcoming these objections consist in furnishing the pump with an automatically-movable nose-piece and with side liners, which are seated on compressible supports, and arranging the pump blades or runners to lie straight and tangentially from their boss and at such an angle as to give an efficient delivery. Also there are other features which, together with the foregoing, will be hereinafter fully described and explained by a reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section through center of the pump and its driving-shaft; and Fig. 2, a vertical section on line *a a*, Fig. 1; Fig. 3, an enlarged section showing one means of arranging the side liner on a compressible seating; Fig. 4, a flat view of the sliding nose-piece; and Fig. 5 a section of the blade on line *b b*, Fig. 2.

A is the centrifugal pump-casing as usually made, for the most part eccentric with the circle traversed by the blades B, the ends of the latter being clear of the casing at all points of its travel except at the nose-piece C. Also each blade is straight and lies tangentially from the boss B′.

C is the movable nose-piece, which normally stands just clear of the ends of blades B, in order that it may recede when struck by such as a stone and allow it to pass without injuring the pump. The point of nose-piece must in all cases lie below the horizontal center line *c c* of the blade-shaft. Said nose-piece C slides in a groove A′, provided in the casing, and it is guided therein by a stem C′, which is acted on by an adjustable spring C^2 or other suitable device designed to keep it at its working position. By having said nose-piece the pump-shaft may be provided with a fly-wheel D, the use of which lessens the power requisite to drive the pump.

The pump-blades B are preferably four in number, and they are cast integral with the arms B^2 and boss B′, the arms being of the tapering section shown in Fig. 5, while the working surface of each blade is shod with a thin wrought-iron or steel plate *b′*. Further, each blade in cross-section is hollowed out or dished, as shown in Fig. 5; also, instead of the blades being of a uniform width they taper from the boss to a reduced width at their outer ends. The cheeks or sides of pump-casing are recessed to receive liners E, which fit closely against the edges of blades, but with a space between them and the sides of casing, such liners being seated on springs E′ or upon other suitable compressible material, such as india-rubber or the like, which will allow the liner to give to free a stone or the like from between it and the edge of blades. In the drawings, E^2 are screw-studs or countersunk bolts holding the liners and springs E′ in position. The boss of pump-blades is secured on the shaft by its being driven on the tapered end thereof and further secured either by a screw-stud and washer or by a pin and key in place of a box-

nut, as ordinarily. The part of shaft F passing through the stuffing-box bearing A^2 of the pump-casing has a sleeve F′ on it, secured in position by a countersunk pin *f*, and hence when such part becomes worn it is easily renewed.

A^3 is the stuffing-box gland.

G is a water-pipe provided to lubricate or flush the bearing, and, further, when so desired an ejector is combined with the pump to assist in creating a vacuum when starting.

The casing A has its suction branch A^4 formed on a movable cheek plate or cover A^5, secured in position upon a rubber insertion a^2 by bolts a', and A^6 is the delivery branch, arranged at about the angle shown in Fig. 2, while A^7 is the peripheral lining of the casing.

H is an outer bearing for shaft F, which has fixed collars F^2 on it at each side of bearing, and I the driving-pulley.

Having now described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination, the radial blades B, the casing and the nose extending and movable in a plane substantially tangential to the path of the outer ends of the blades, substantially as described.

2. In a centrifugal pump a movable nose-piece as C arranged in a groove A′ in the pump-casing combined with a spring or other suitable device for retaining the nose-piece at its working position substantially as described and shown.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GEORGE ALFRED WILBERFORCE.

Witnesses:

WM. J. LANGFORD,

BEDLINGTON BODYCOURT.