

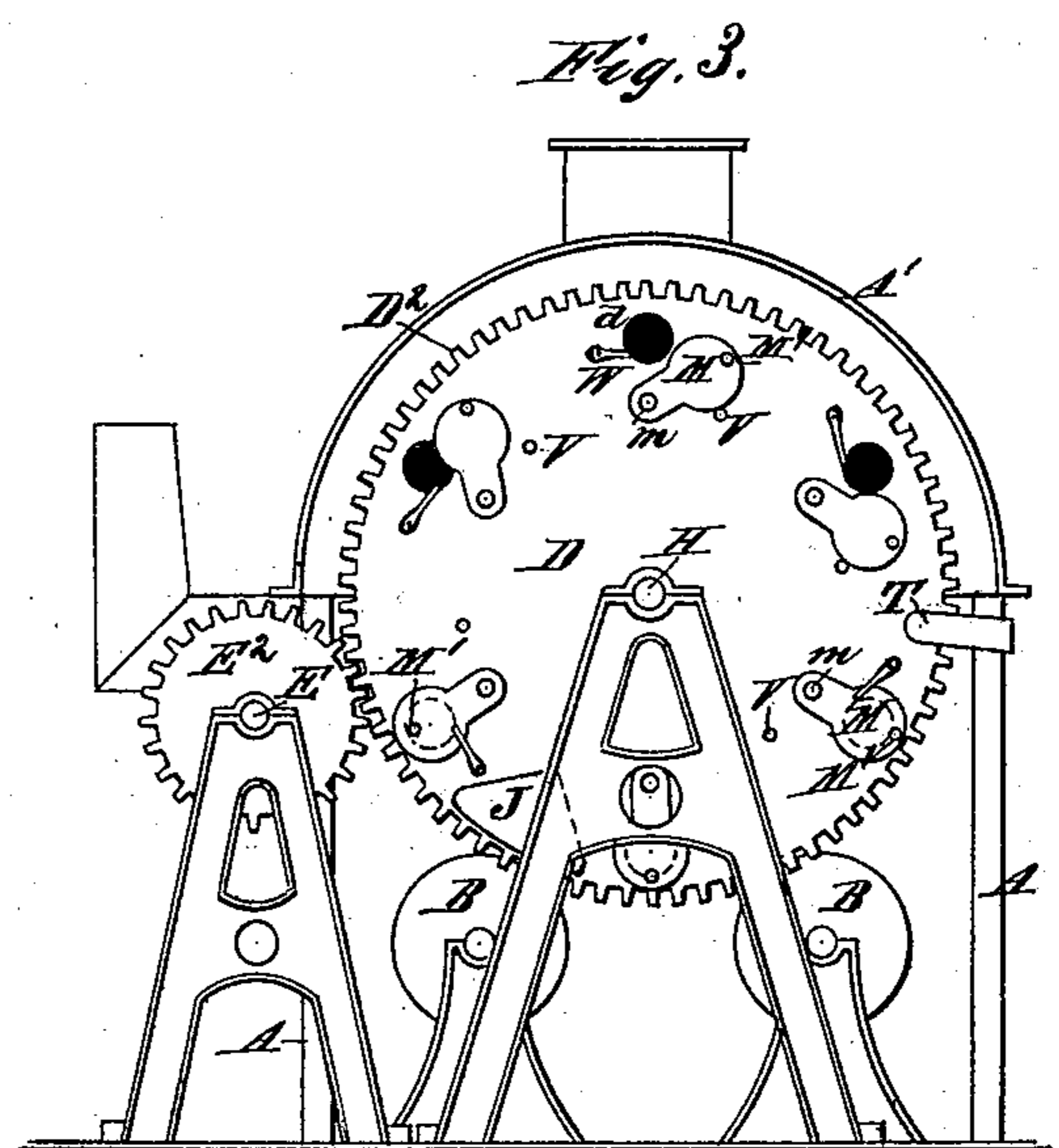
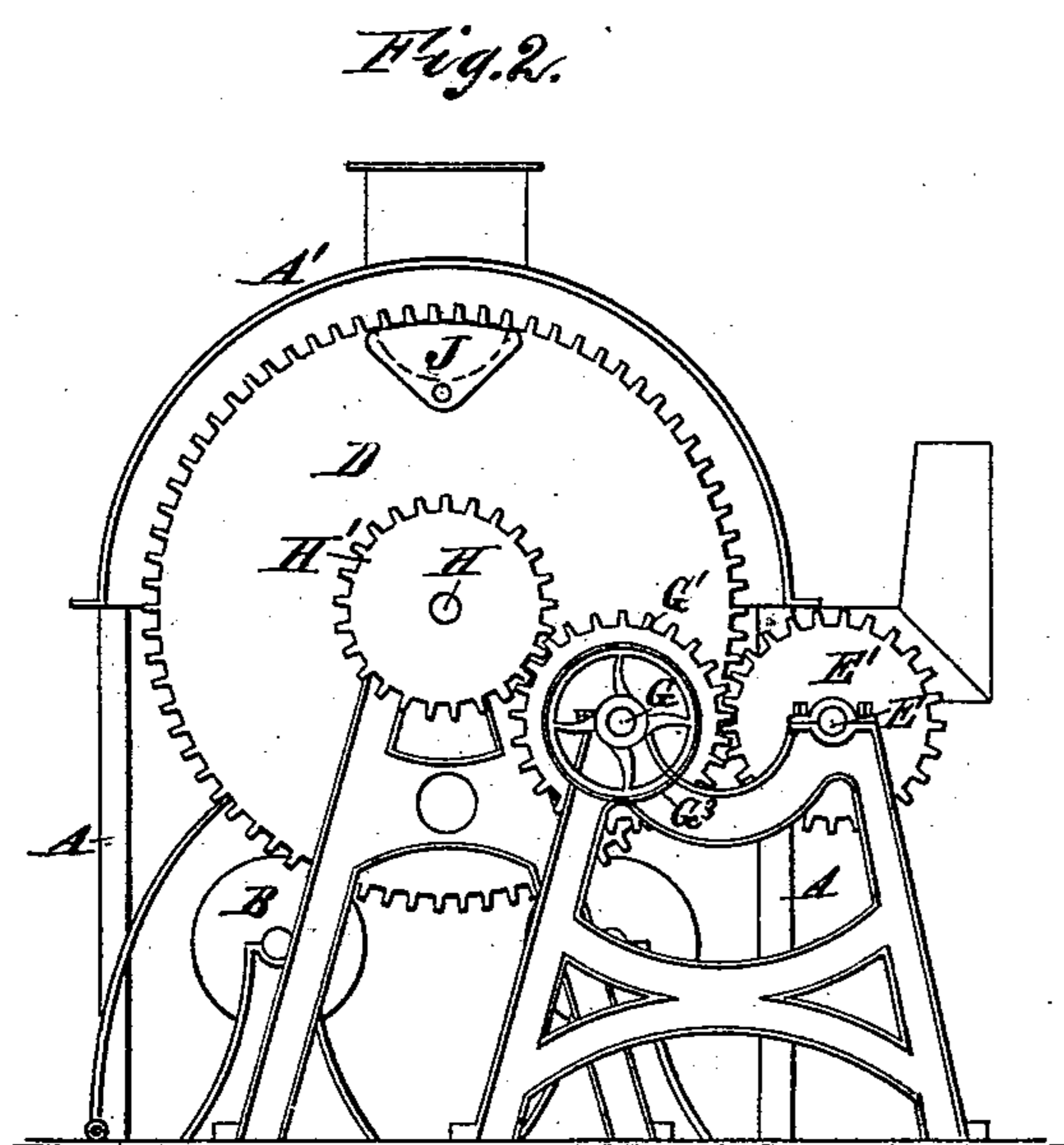
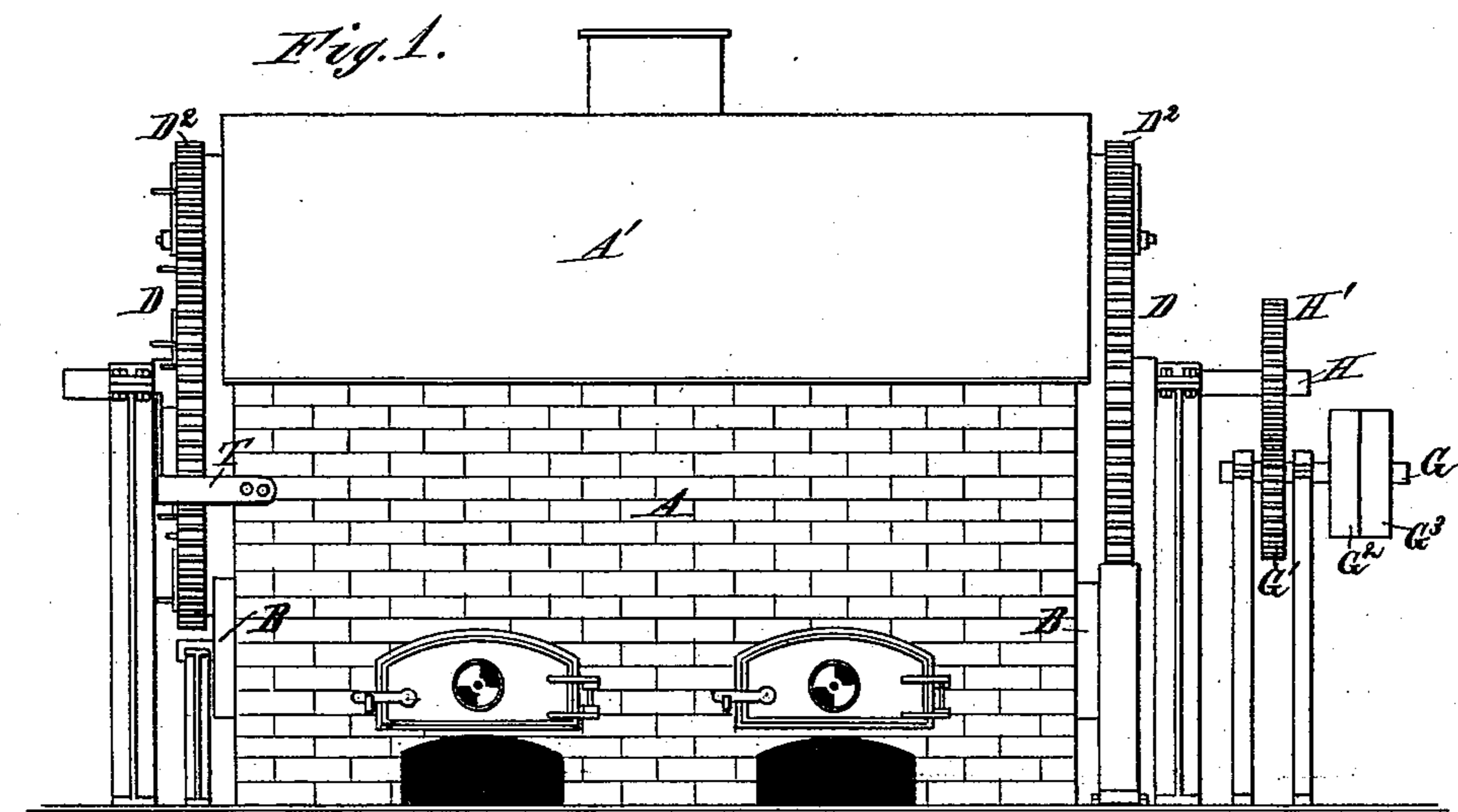
(No Model.)

2 Sheets—Sheet 1.

A. EDWARDS.
Drying Machine.

No. 234,860.

Patented Nov. 30, 1880.



WITNESSES=

W. Calborne Brookes

Charles C. Stetson

INVENTOR=

Alfred Edwards
by his attorney

Thomas S. Nelson

(No Model.)

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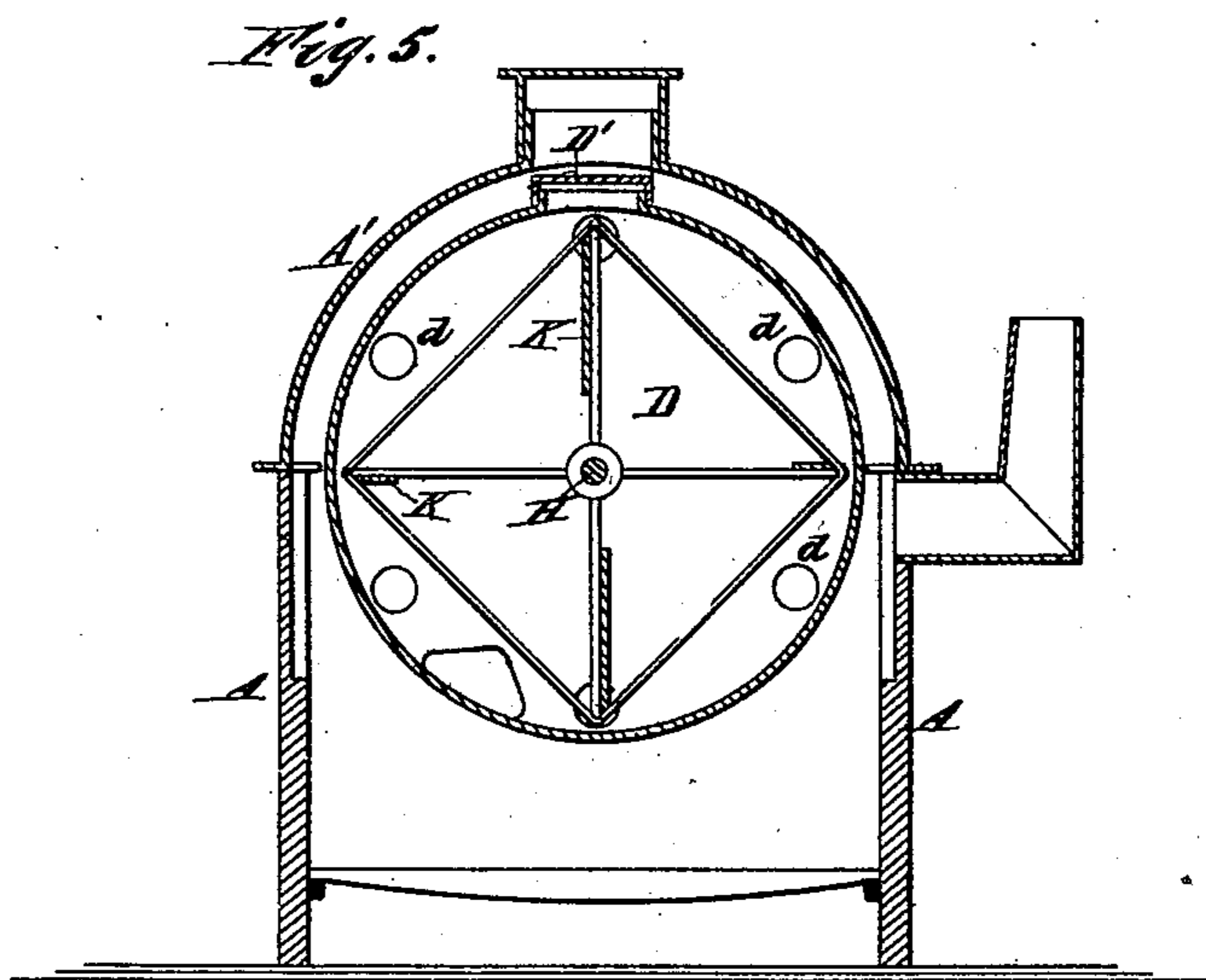
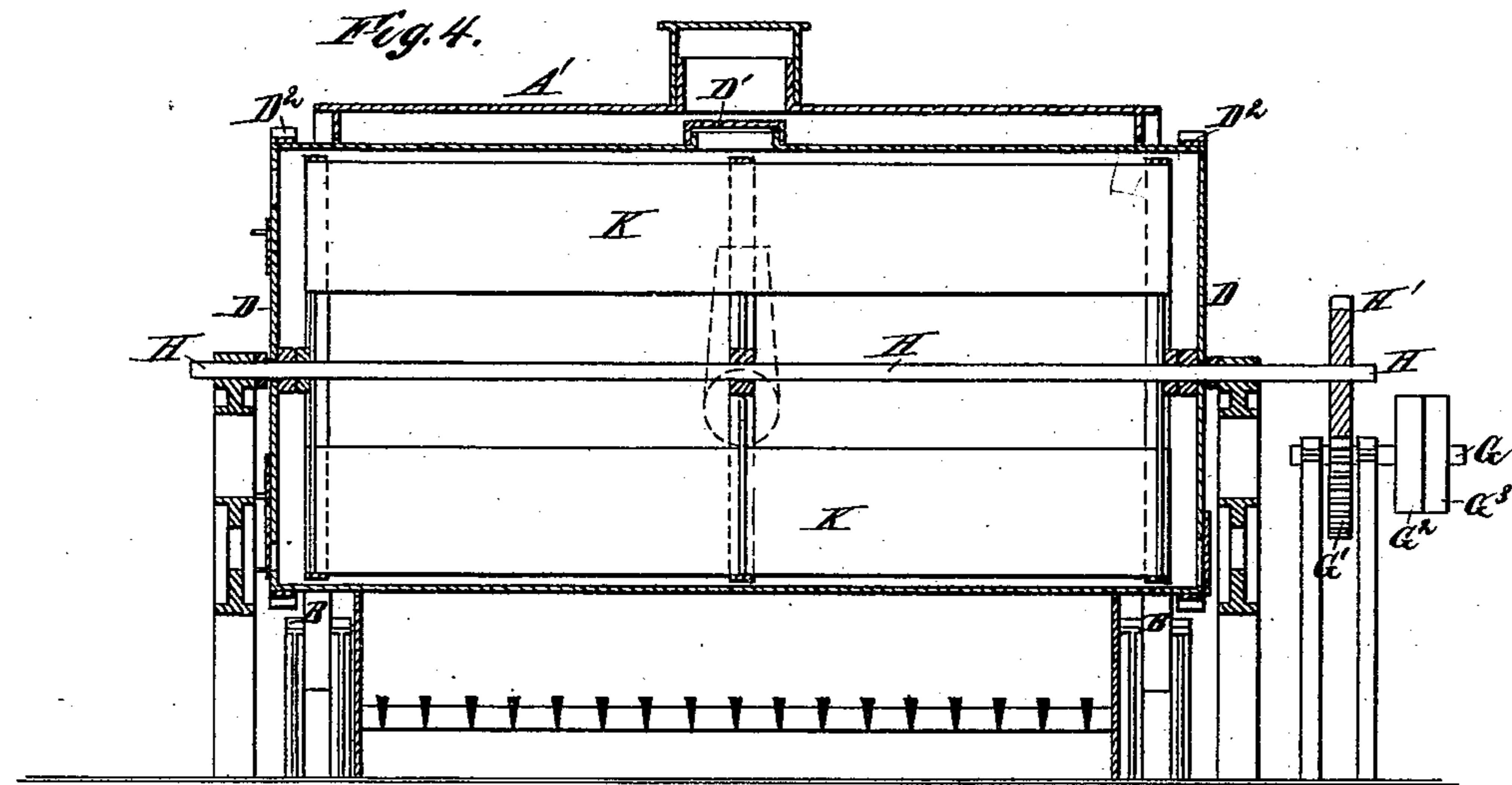
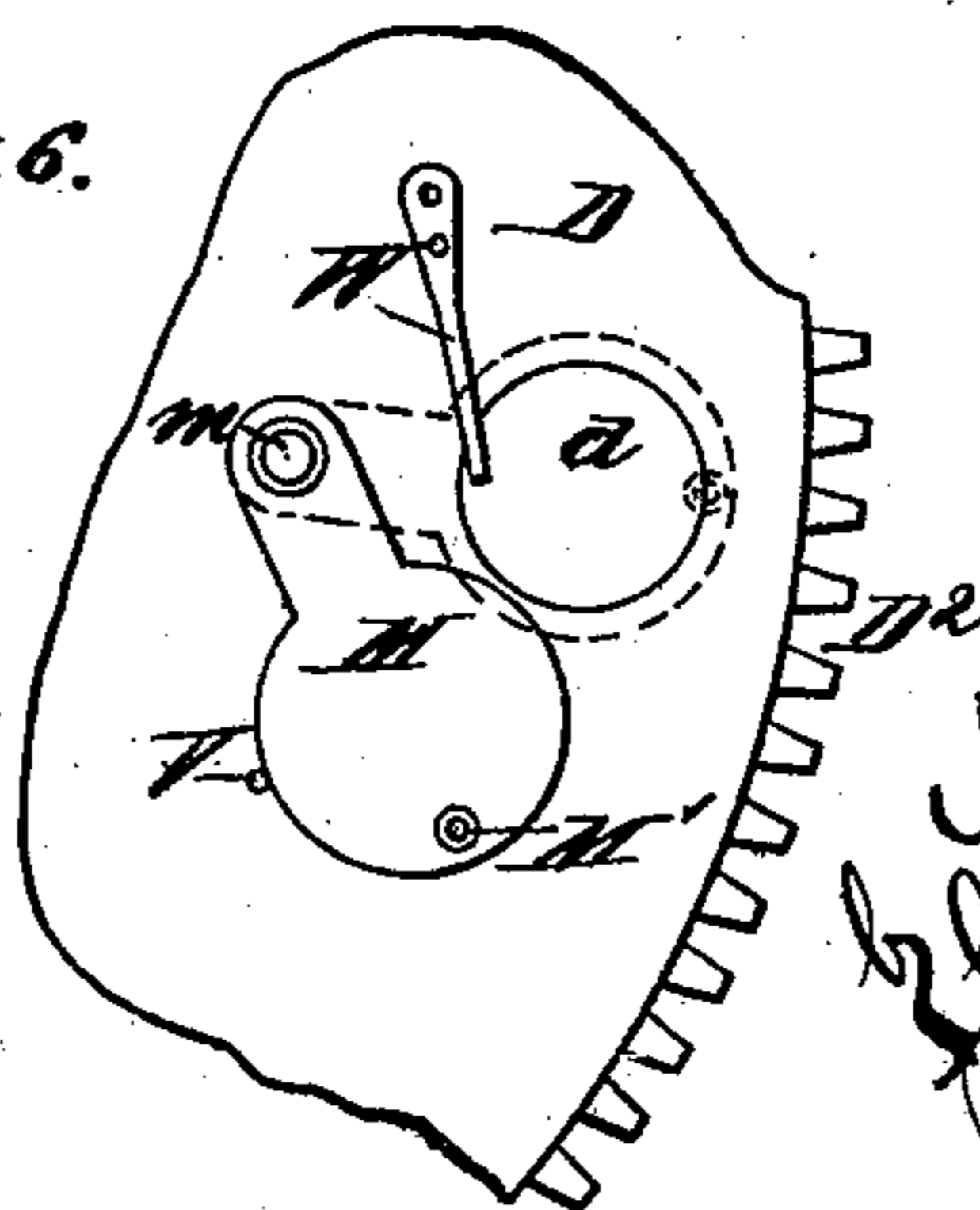


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALFRED EDWARDS, OF NEW HAVEN, CONNECTICUT.

DRYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 234,860, dated November 30, 1880.

Application filed March 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, ALFRED EDWARDS, a citizen of the United States, residing in the city and county of New Haven, in the State of Connecticut, have invented certain new and useful Improvements relating to Drying-Machines, of which the following is a specification.

My machine is adapted for use in drying offal, blood, and analogous products of the slaughter-house, as also for drying scrap from fish-oil factories, grain, and loose material generally. I employ a revolving cylinder with provisions for applying heat, either directly from a fire or by other means, to the exterior. I provide for introducing and removing the material without necessitating any internal projections. In the most complete form of the apparatus I mount a revolving device in the interior having a motion in the opposite direction to that of the exterior cylinder. I provide a liberal aperture at the periphery at each end, through which the material may be discharged rapidly during its rotation, or may be drawn out by any suitable tool or appliance when the apparatus is not in motion. I provide each end with liberal apertures arranged around near the periphery, and so controlled that each is open in the upper part of its path, while the space immediately adjacent on the interior is unfilled except with vapor and gases, and is closed during the lower part of its path, while the space against it on the interior is filled with the solid or semi-fluid material. The devices by which I attain these conditions will be fully set forth below.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a front elevation of my improved apparatus. Fig. 2 is an elevation of the right-hand end of Fig. 1. Fig. 3 is a similar view of the opposite end. Fig. 4 is a longitudinal vertical section. Fig. 5 is a central transverse section of my device, and Fig. 6 is a detailed view of a portion of the end of the cylinder shown in Fig. 3.

Similar letters of reference indicate like parts in all the figures.

A A are the stationary walls of a furnace. They may be of brick or other suitable masonry.

B B are stout rolls, mounted in suitable bearings and adapted to support a large revolving cylinder, D, which serves as the main body or shell of my drying apparatus.

The shell D is provided with a receiving aperture covered by a cap, D', the masonry A being correspondingly formed to allow this cap to project a little. The interior of the cylinder D is smooth.

Each end of the cylinder D is provided with gearing D², which engages with corresponding gear-wheels E², fixed on a counter-shaft, E, mounted in fixed bearings, and receiving motion, through a gear-wheel, E', from a gear-wheel, G', on the driving-shaft G. The latter is mounted in fixed bearings and driven by a belt from a steam-engine or other power (not shown) running on fast and loose pulleys G² G³.

A shaft, H, extends along the axial line of the cylinder D, but free to turn independently thereof. This shaft H is mounted in fixed bearings and equipped with a gear-wheel, H', which also engages with the driving-wheel G', but so as to induce a turning motion in the opposite direction to that of the cylinder D. The shaft H is provided, within the cylinder D, with a series of arms and scrapers, grinders, &c., of any required form adapted to perform the several functions of scraping the interior, grinding any bone or large solid masses within, and especially of effectively lifting and agitating all the material in the interior and exposing it to give off its moisture. The form of these parts K, and particularly the width of the scrapers, may be varied according to the character of the material for which the machine is to be used.

The gases and moisture escape freely through liberal apertures, d, arranged in the ends. The holes and their covering means are alike. A description of one will suffice for all.

Each hole d is equipped with a cover, M, turning on a center, m, mounted on the head. These covers are of considerable weight and tend to turn, by gravity, so as to always hang in a perpendicular position below the suspending point or pivot m; but this motion is not permitted.

T is a stop mounted on the fixed portion of the apparatus, and projecting partially across the end of the main cylinder on the side where the apertures d and their covering means rise from the lower to the higher part of their revolution. Each cover M is provided with a pin, M', which, if the aperture remains closed in passing the arm T, is struck by the latter and compelled to open.

V is a stop fixed in the head of the cylinder D in the proper position to restrain the opening motion. It compels the cover M to remain in a position ready to cover the aperture d again with a moderate amount of motion.

W is a spring, preferably made with a slightly-hooked form. When the pin m has passed its highest point and is moving in the descending portion of its path, the cover M is thrown into such position that its gravity tends to partially revolve it and effect the closing of the aperture d . There being little friction or other force to restrain the motion, the cover is certain to yield to this force and to move rapidly into the closed position. In doing so it engages strongly with the spring-stop W. In other words, it comes to rest by wedging itself between the spring-stop W and the head of the cylinder in such a manner as to not only insure the tight closing of the aperture d , but also to strongly hold the cover M in the closed position when it commences to rise again in the other portion of its path. In some cases gravity alone will suffice to overcome the force of this spring or strong hook, and the cover will swing open at about the time the stop M' is ready to strike the fixed stop T. In other cases the force of the spring will be more than sufficient, and considerable force will be required from the arm T to effect the opening. My apparatus will work successfully under any of these conditions.

Man-holes are provided at each end at the extreme periphery. These are covered by plates J. They may be made to turn on a center and equipped with mechanism for opening them by a turning motion, or they may be provided with ordinary arch-clamps.

I can empty the cylinder either by holding the cylinder stationary with its man-hole in the lowest position and raking out the greater portion of the material with any suitable implement, or by simply revolving the internal part liberally after uncovering the man-hole.

The material to be dried may be supplied through the man-holes by the aid of any suitable spout introduced when the man-holes are in their highest position; but I propose, usually, to supply the material through the aperture exposed by removing the cover D'.

It will be understood that any ordinary or suitable provisions may be made for controlling the heat of the fire, regulating the application of the hot gases, &c., and conducting

away the products of combustion. I have shown a casing, A', covering the upper portion of the cylinder D, with a liberal aperture through which to remove the cover D'.

I can apply the heat by a furnace of any ordinary or suitable construction, burning coal, wood, and scrap, or other fuel. I propose in some cases to use oil—either the oil from the manufactory or any grade of petroleum, naphtha, or the like—with suitable provisions for supplying air and controlling combustion, as the means of inducing and properly applying the heat.

Modifications may be made in many of the details within wide limits. I can drive the internal parts by an independent train of mechanism instead of the gearing represented. Some of the benefits of the invention may be realized by the use of a portion of the apparatus without using the whole. I can work successfully with the internal shaft, H, and its connections stationary. I can make the shaft H hollow, and thus introduce steam or hot air into the interior.

By employing moderate heat with a liberal agitating means on the interior my apparatus may be used with good effect in drying grain and analogous farinaceous material. I propose especially to use it for drying the waste from breweries and distilleries. In case sufficient alcohol or other volatile product of value is given off I propose to incase the whole and lead the discharge-vapors through a proper condenser to utilize such products.

Among other advantages of my arrangement, I obtain an unusually efficient scraping and grinding action by the motion of the main cylinder D and internal parts, K, in opposite directions, each at a moderate velocity, so that no difficulty is generated by the high centrifugal force due to a too-rapid rotation.

I claim as my invention—

1. The revolving cylinder D, having a head at each end, with a series of apertures, d , in combination with covers M, provided with means, as set forth, for operating them, so that the apertures are in a closed condition in the lower portion and are open in the upper portion, as herein specified.

2. In a drying-machine having a revolving case, D, with provisions for applying heat thereto, the catch W, in combination with the movable cover M, and with an arm, T, arranged to compel the opening at each revolution, as herein specified.

In testimony whereof I have hereunto set my hand, at New Haven, State of Connecticut, this 2d day of March, 1880, in the presence of two subscribing witnesses.

ALFRED EDWARDS.

Witnesses:

JAMES P. GALLIVAN,
JNO. C. NORTH.