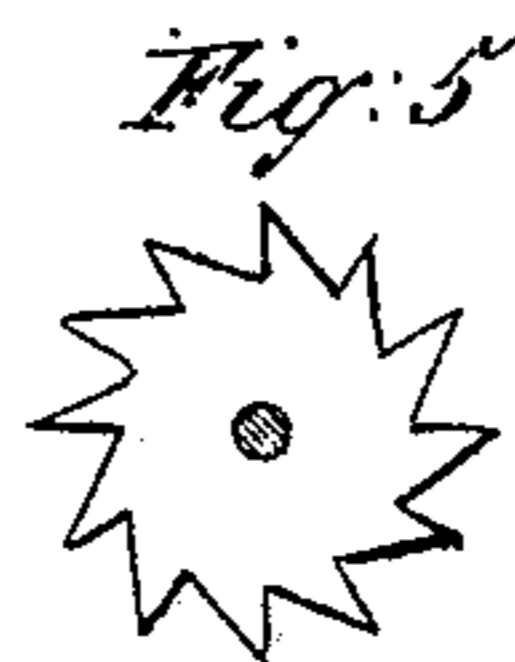
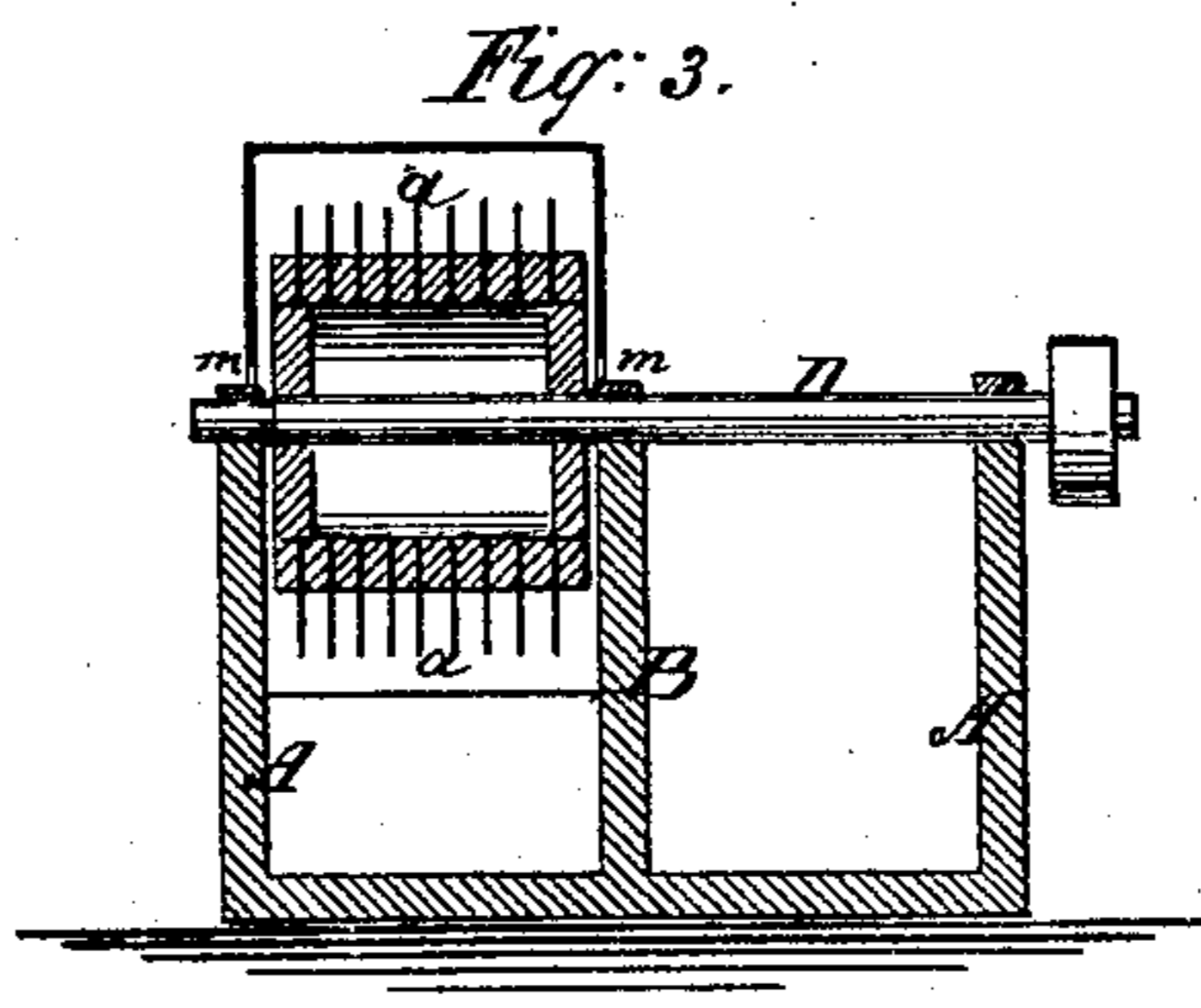
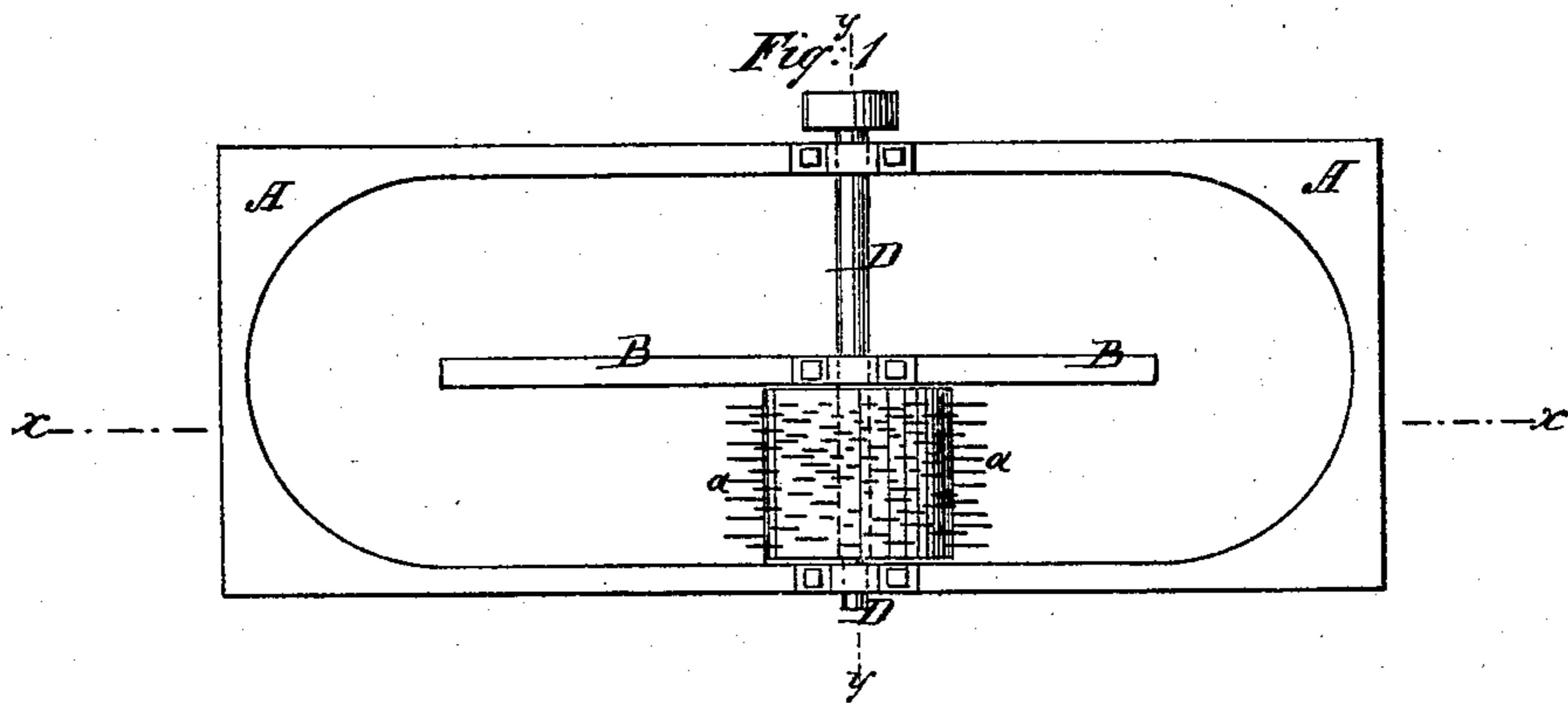
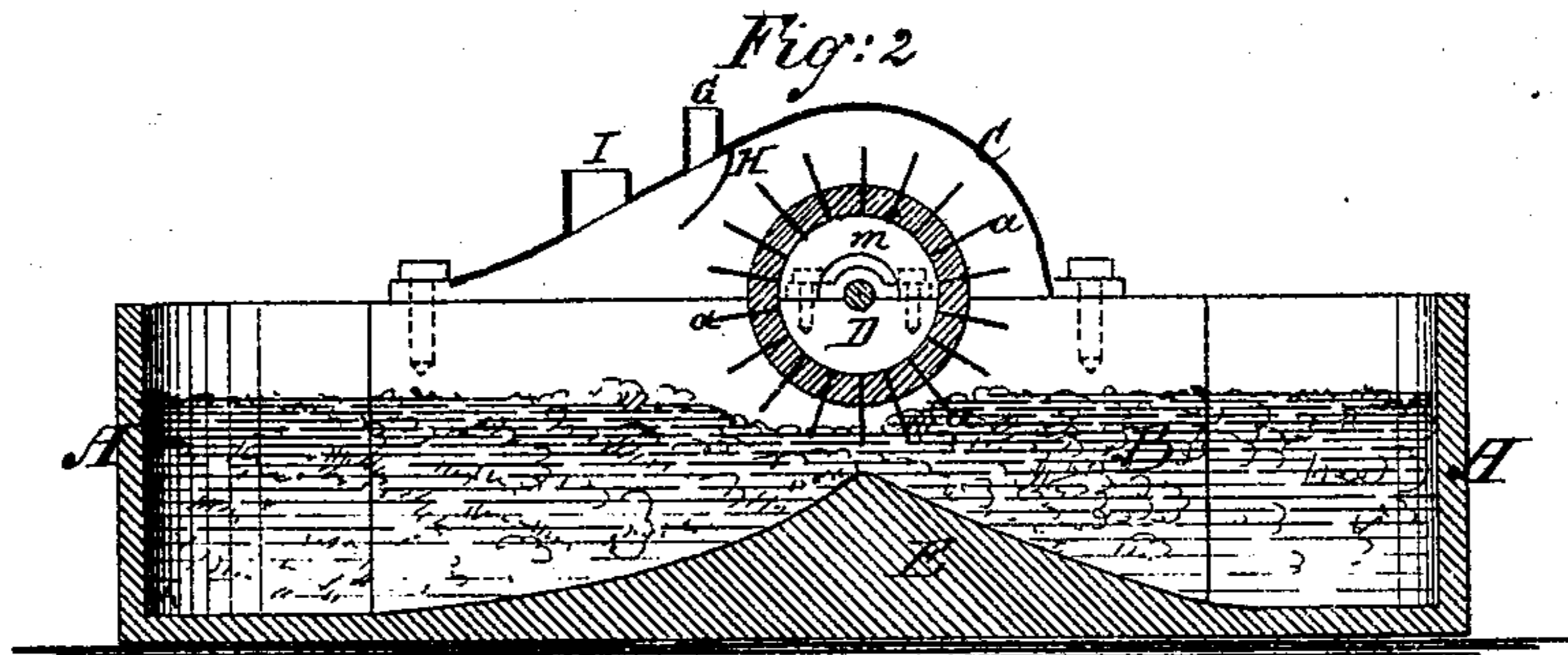


A. S. LYMAN.

Machines for Disintegrating Fibrous Substances.

No. 151,992.

Patented June 16, 1874.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN MACHINES FOR DISINTEGRATING FIBROUS SUBSTANCES.

Specification forming part of Letters Patent No. **151,992**, dated June 16, 1874; application filed April 16, 1874.

*To all whom it may concern:*

Be it known that I, AZEL STORRS LYMAN, of the city, county, and State of New York, have invented a new and useful Improvement in Engines for Disintegrating Fibrous Substances, of which the following is a specification:

This invention relates to engines for disintegrating straw, wood, hemp, flax, wool, cotton, rags, and other fibrous substances in the manufacture of paper and for other purposes.

In an application for Letters Patent of even date herewith there is described a certain new and useful process in the art of disintegrating fibrous substances, which consists substantially in subjecting the stock, while held in suspension in some liquid medium, to the percussive and tearing action of rapidly-moving pickers, the resistance to the blows of which is furnished by the inertia of the material itself and of the medium in which it is moving; and the present invention consists, in general, in the construction and arrangement of pickers adapted to the working of this process, and particularly in the modification of the ordinary rag-engine, whereby it is adapted to the reception and practical working of such pickers.

In the ordinary open engine provided with a "midfellow," around which the stock is made to travel, the stock in its approach to the beating roll or cylinder is caused to pass up an inclined way, at that portion of which that is directly underneath the roll is located the bed-plate. This bed-plate is generally composed of projecting ribs, or corrugations, or chisel-edged knives, which lie transversely of the path in which the stock is moving. The stock is caught between these ribs or knives and the fly bars or blades of the roll, which also are generally made with chisel-edges, and extend longitudinally along the face of the roll and by the frequent repetition of the abrading and cutting action thus produced the material is gradually reduced to fiber. The immense resistance that the fly-bars, which act like the blades of a paddle-wheel, encounter in going through the water, and more particularly from the masses of fiber that are constantly choking the space between them and

the bed-plate, renders a high velocity impracticable. Behind the bed-plate the inclined way, up which the stock has moved in its passage to the roll, rises to a still greater height, and forms the structure denominated a "back-fall," which is usually made concave on the side facing the roll, and falls away somewhat steeply on the opposite side. On account of the slowness of revolution of the roll in the ordinary pulp-engine this back-fall has been deemed a necessary appurtenance of the machine, both to facilitate the circulation of the pulp and to prevent its crowding back upon the roll and impeding its action.

In the improved construction which forms the subject of this application it is proposed to dispense with the continuous-edged fly-bars heretofore used upon the beating-roll, and to substitute therefor pickers or strikers composed of or armed with projecting points, teeth, or angles, which are so shaped as to pass through the stock and water with much greater facility than the fly-bars can.

It is also proposed to dispense with the bed-plate, which has heretofore been employed as an antagonizing surface to the fly-bars of the beating-roll, and which, by the resistance it afforded to the movement of the roll, has made a high rate of revolution impossible.

In the improved construction, the only proposed resistance to the blows of the pickers is that derived from the inertia of the stock itself and of the medium in which it is moving. This modification of structure, too, as well as that before mentioned, facilitates the running of the pickers at a very high velocity.

A still further modification of structure consists in dispensing with the back-fall of the ordinary engine. This is rendered possible by the high velocity consequent upon the change in the form of the pickers or beaters and the omission of the bed-plate. The effect of these changes is such that when the pickers are run at the rate of twenty-five hundred or three thousand feet per minute, the stock will be attacked so violently and thrown so far behind the pickers as to render a back-fall entirely unnecessary, whether as a means of producing circulation or of preventing the back-flooding of the picker-roll. By thus dispensing with

the back-fall a very large saving is effected in the power required to run the machine, as the consumption of power in lifting the stock over the back-fall of the ordinary engine constitutes one of the principal items in the expense of working it.

Referring to the drawings, Figure 1 is a plan view of a fiber-reducing engine embodying these improvements, the hood over the pickers being omitted. Fig. 2 is a longitudinal vertical section of the machine on the line *xx* of Fig. 1. Fig. 3 is a transverse vertical section on the line *yy* of Fig. 1. Figs. 4 and 5 are views, in plan and end elevations, respectively, of a modified form of pickers.

A is a tub or vat, which is to be built in any convenient mode and of any desired size, and may be provided in the usual manner with pumps, discharge-valves, traps, and the various appliances in use upon pulp-engines, other than those which are specially mentioned herein, as being omitted; B, the mid-fellow; C, the hood that shuts in the pickers; D, the picker-shaft; E, the inclined way, up which the stock passes into contact with the pickers; and *aa*, the pickers or strikers, which in Figs. 1, 2, and 3 are shown as of needle-form, projecting from the periphery of a hollow drum or cylinder, mounted on the picker-shaft, while in Figs. 4 and 5 they appear as saw-teeth on the circumferences of a gang of disks. As already indicated, the inclined way E is for the sole purpose of lifting the material up so as to bring all parts of it into engagement with the pickers, and thus prevent its forming different strata of uneven degrees of comminution. As the pickers do not come into close contact with the crown of this inclined way, and as the pickers themselves consist of points or projecting angles, it is plain that the inclined way can in no degree operate in connection with the pickers, as a bed or antagonizing surface on which a grinding or abrading action upon the stock can take place. The pickers may be made in any form suited to pick, snap, whip, or tear the stock into fiber without the aid of an opposed resisting-surface, and they may be secured to the drum or to the shaft in any convenient way. Whether made in the form of needles, as shown in Figs. 1, 2, and 3, or of teeth, as shown in Figs. 4 and 5, they ought, for the best results, to be arranged so as not to follow each other in the same line of travel. The arrangement of the picker mechanism, again, should be such that only a small segment of it shall dip into the water, as this will favor a high velocity. Naturally the ends of the picker drum or cylinder will be made to run pretty close to the vertical walls of the hood. In consequence of this there is a liability that the stock may work in between the ends of the drum and the sides of the hood, and thus impede the free action of the machine. This may be prevented by leaving openings around the picker-shaft in the walls of the hood, as shown in the drawing at *m*.

When the pickers are driven rapidly the air rushes in through these openings, and, striking against the closed ends of the drum, spreads laterally, and thus tends to keep the space cleared of all obstructing matter. In order to soften the stock, and thus aid the pickers, steam may be injected into the vat, either live or exhaust steam, though more generally the latter, being used for this purpose. This will best be introduced immediately behind the pickers, since at that point the water is to a large extent broken up into fine particles, and thus, by reason of the large surface exposed, will the more readily extract the caloric from the steam. By giving to the steam-induction pipe an inclination rearward from the pickers, or providing the injection orifice with a deflecting shield, as shown in the drawings, the jet of steam may be made to aid the circulation of the stock in the vat. In the drawings, G represents a steam-pipe, here shown as entering the vat through the hood, and provided with a deflector, H. I is a larger pipe for permitting the ready escape from underneath the hood of the steam that remains uncondensed.

From the foregoing statement of the object and the construction of this improved engine, its mode of operation will be readily understood.

What is claimed as new is—

1. A fiber-reducing engine in which the picker or beater roll is provided with teeth, points, angles, or equivalent prominences, substantially as described, and is arranged, in connection with the other parts of the mechanism, to operate upon the stock while it is floating, or is suspended in water, or other supporting liquid, as set forth.

2. In combination with the picker or beater roll of a fiber-reducing engine, an inclined way, constructed and arranged substantially as shown and described, so as to induce a circulation of the entire body of the stock into contact with the pickers, but without affording an opposing surface between which and the pickers the stock may be caught and cut, ground, or abraded.

3. In combination with the picker or beater roll of a fiber-reducing engine, an inclined way, constructed and arranged to operate substantially as shown and described, so that the stock after coming in contact with the pickers may be carried directly rearward, without being lifted up over a back-fall, as in the ordinary pulp-engine.

4. The picker-hood provided with ventilating-apertures in its walls, substantially as and for the purpose set forth.

5. The steam-pipe entering the picker-hood behind the pickers, substantially in the manner shown and described, for the purpose of heating the water and aiding the circulation.

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