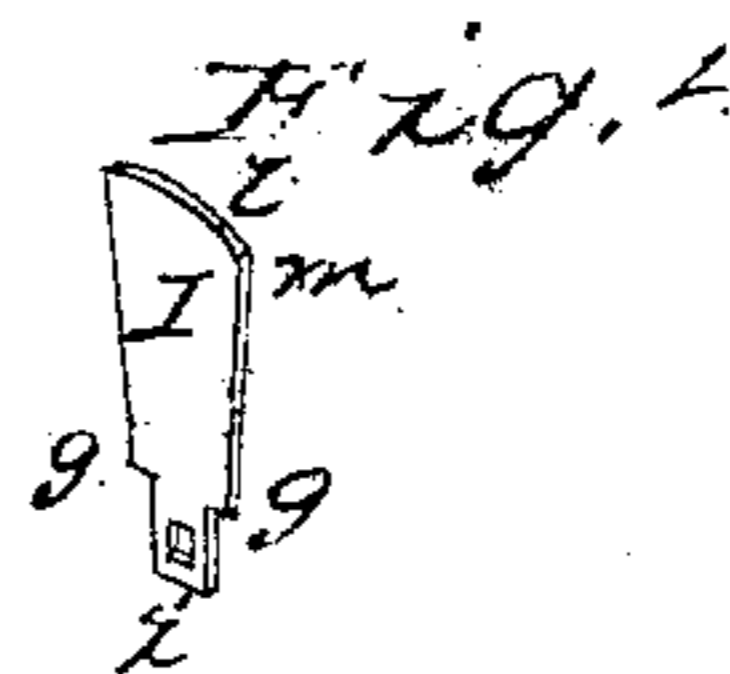
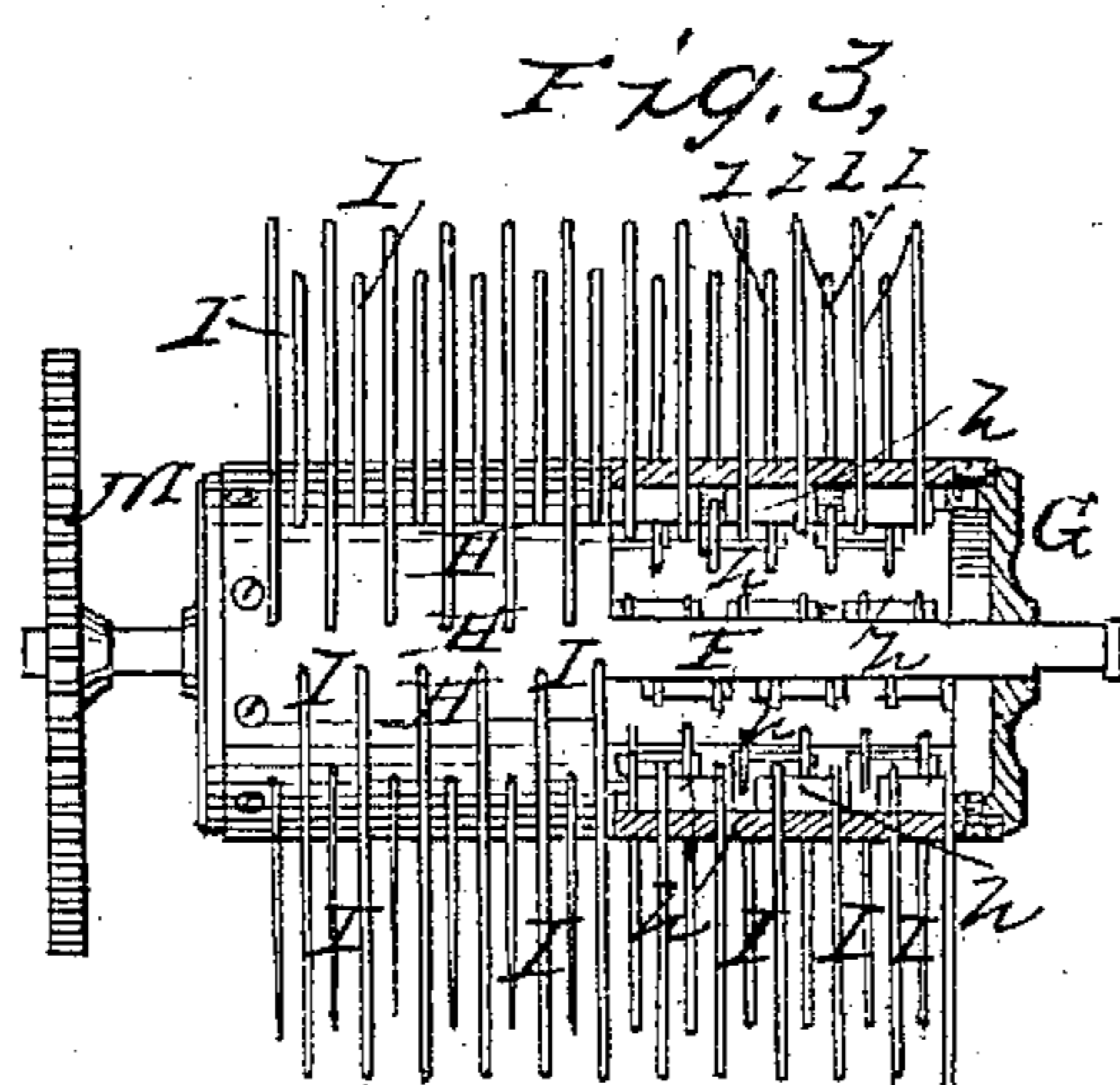
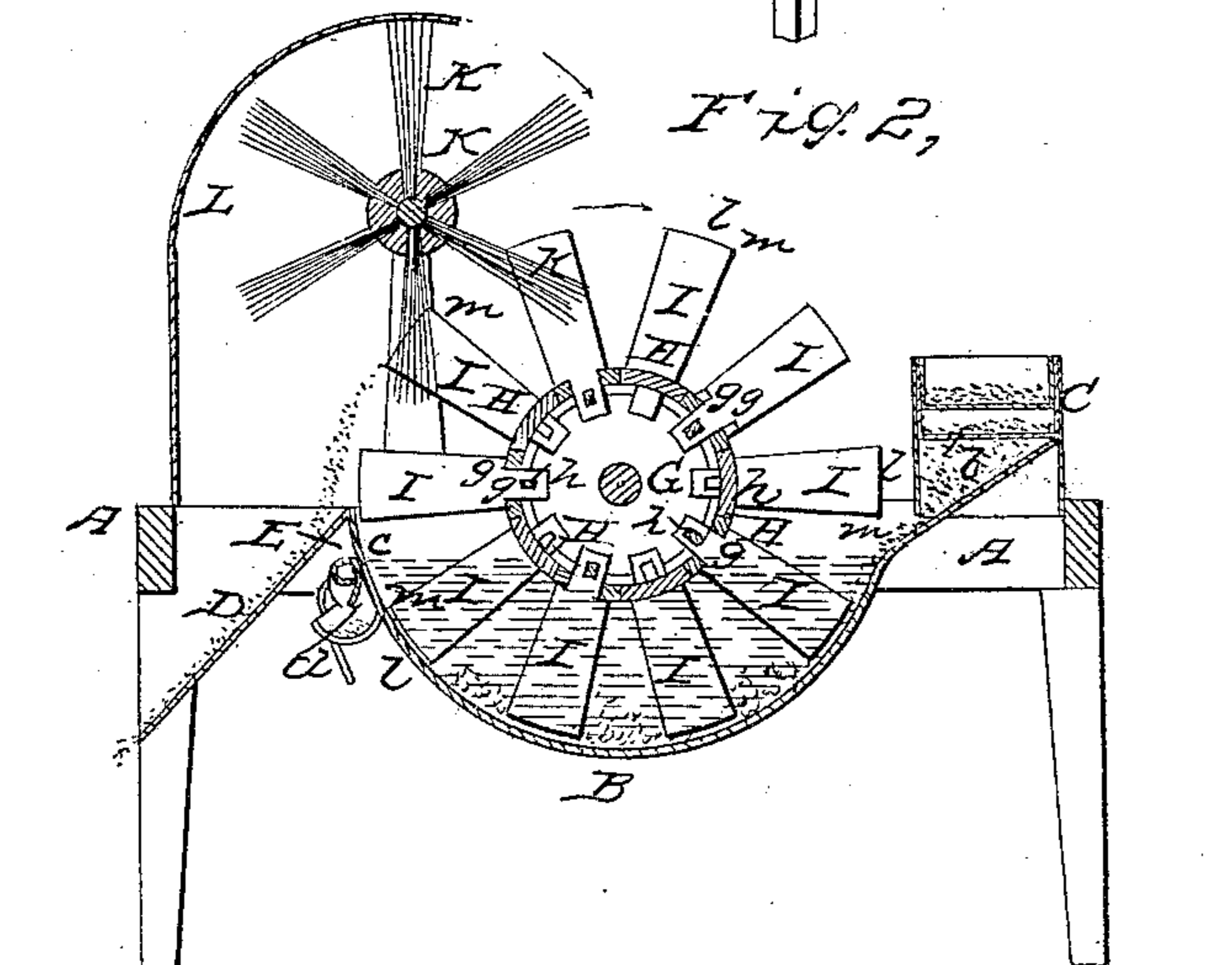
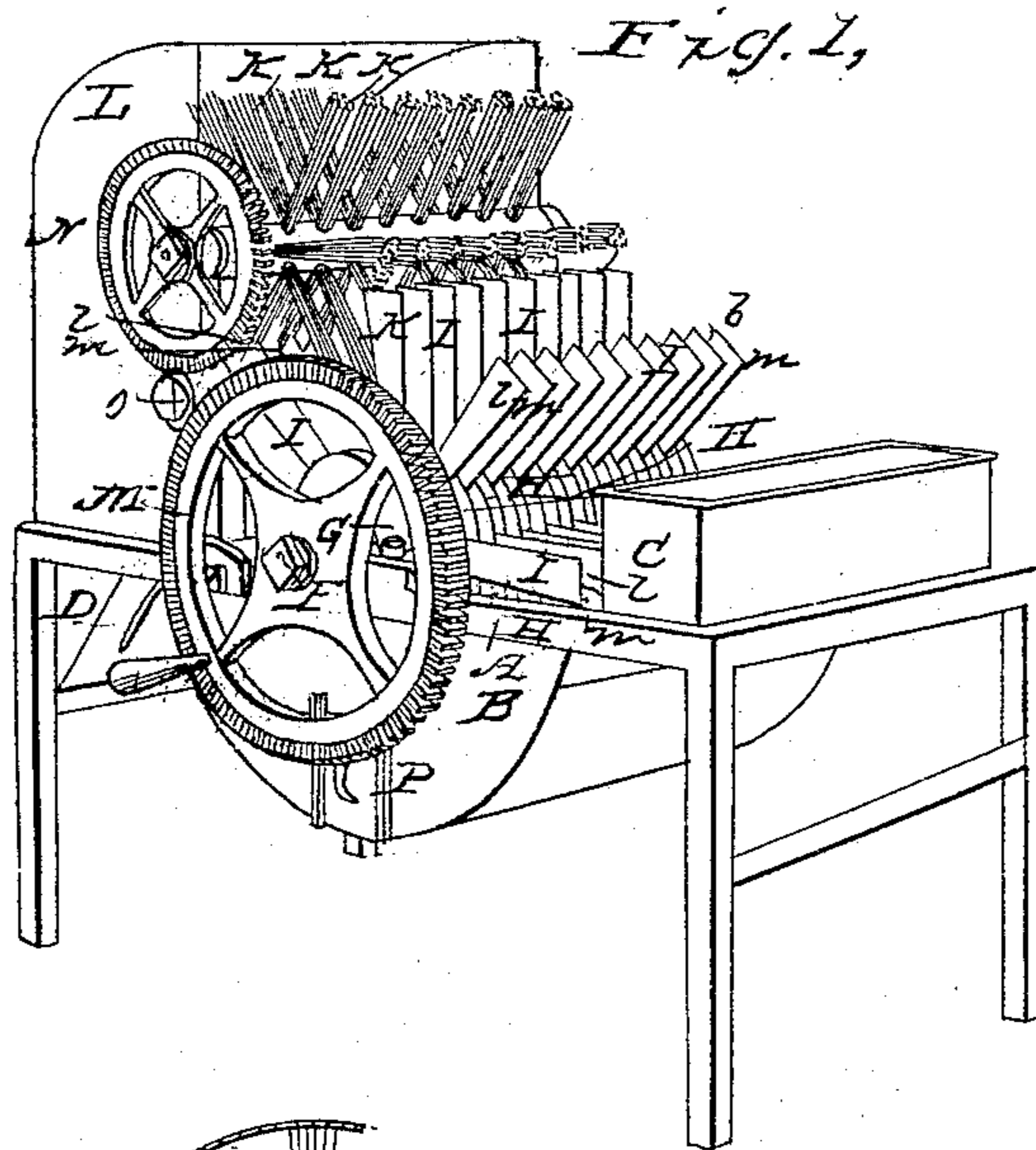


### Ore Washer.

Patented March 8, 1853.



# UNITED STATES PATENT OFFICE.

SAMUEL GARDINER, JR., OF NEW YORK, N. Y.

IMPROVED MAGNETIC MACHINE FOR WASHING AND SEPARATING GOLD.

Specification forming part of Letters Patent No. 9,610, dated March 8, 1853.

*To all whom it may concern:*

Be it known that I, SAMUEL GARDINER, JR., of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Washing and Separating Gold from Extraneous Matter, which apparatus may also be employed for separating other ores; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of the apparatus. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a plan of the cylinder of magnets, one-half of it being shown in section. Fig. 4 is a perspective view of one of the plates which form the magnets.

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

This invention is more particularly designed for the separation of gold from the black sand with which it is frequently found mixed in the beds of rivers. This sand contains magnetic oxide of iron, which it is difficult to separate by the operation of washing alone, owing to its great specific gravity.

The apparatus consists of a cylinder of permanent magnets revolving through a trough into which the auriferous sand or earth is introduced, while a suitable stream or quantity of water is allowed to run through it. The magnets in passing through the trough collect the magnetic particles and at the same time agitate the other contents in such a manner that the sand or earthy portion, which is lightest, is brought to the surface and washed from the trough by the overflow of the water, with which it is kept constantly supplied. In connection with the magnets there is a revolving brush or series of brushes, which, after the former leave the trough, brush the magnetic particles from them, so that they always enter it clean and in a fit state to make a new collection.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a frame, which may be of wood or metal, of suitable strength to carry the working parts of the apparatus.

B is a semi-cylindrical trough, of wood or metal, supported by the frame A.

C is a box placed above the front end of the trough B and containing two screens, *a b*, of different mesh. The bottom of the box is inclined downward to the trough. At the back of the trough there is an incline, D, inclining downward from the upper edge, and a short distance below the upper edge there is a slotted opening, *c*, extending nearly across the back of the trough. Outside the opening *c* is placed a cylinder-valve, E, which turns in suitable journal-boxes, and which has a slot, *d*, of corresponding size with *c*. This cylinder-valve is furnished with a handle, by which it is turned to regulate the width of opening of *c*, the width of said opening depending on the position of *d* in relation to it. Below the opening is an incline, *e*, and a small trough, *f*.

The cylinder of magnets is constructed in the following manner:

F is its shaft, whose journals rest in suitable boxes on the frame.

G G are two circular heads or disks secured to F.

H H are a series consisting of any number of plates of metal secured to the disks G G, parallel with the axis F, and forming together the periphery of the cylinder.

I I are the magnetized plates which form the magnets, being shouldered down at *g g* and fitted into slots in the plates H H. Every connected pair of these plates constitute one magnet, the plates being connected by keys *h h*, each of which secures one pair of plates, I I, or one magnet, to one of the plates H by passing through a slot, *i*, in each close within the said plate. The form of the plates I I is best shown in Figs. 2 and 4. They are flaring or widened toward the outer extremities, *l*, so as to increase the surface, and are thinned off to a sharp point, *m*, at the front, as shown in Fig. 4, as it is well known that sharp points, edges, or corners attract with greater force.

K is the brush-cylinder, which is hung in suitable bearings parallel with the cylinder of magnets, and at such a distance from the latter cylinder that the brushes *k k* will sweep the magnets from the poles or ends nearly down to their termination in the cylinder. The brushes are arranged in rows, each row

having the same number of brushes as there are plates I I in a row of magnets.

L is a hood or covering for the brush to prevent the scattering of the particles swept from the magnets.

The cylinder of magnets and the brush-cylinder are geared together, so as to revolve in the same direction, (see arrows in Fig. 2,) by spur-wheels M N upon their shafts (see Fig. 1) and an intermediate pinion, O, rotary motion being communicated to either shaft by hand or by any prime mover.

The operation of the apparatus is conducted in the following manner: The auriferous sand or earth is placed in the box C, upon the upper and coarser screen, *a*, and a stream of water is let in upon it, which washes all but the very coarsest parts through *a* to the screen *b*, where another separation takes place, so that all which enters the trough B is quite fine. Gold found in the portions collected by *a* and *b* may be afterward separated.

The opening *c* should be so regulated according to the supply of water as to keep the trough B filled by the water to above the level of *c*, and the agitation produced by the revolution of the magnets through the mixture of water and earth will so agitate it as to cause the gold, which is the heaviest portion, to fall to the bottom. The magnetic oxide of iron, which, next to the gold, forms the heaviest portion, will also have a tendency to sink, but will be collected and taken from the trough by the magnets, to which it will adhere until the brushes *k k* come into operation upon it and sweep it off and throw it over the incline D, whence it falls to the ground or to a suitable receptacle. The sand and earthy portion of the mixture is washed up and continues escaping with the water until it is all washed out and the water runs off clear. The gold is drawn

off from the trough, after washing and separating, by a door, P, near the bottom of the trough.

The magnetic oxide of iron has always been the most difficult of all foreign matters to separate from gold, in consequence of its specific gravity being too great to admit of its being separated by washing alone. The sand and earthy particles, being incapable of separation by other means than washing, have rendered two operations necessary where the gold is found mixed in this way—videlicet, first, washing to separate the earth, and then submitting it to the operation of the magnet to separate the iron. By combining the two operations it will be evident that much labor will be saved. The washing away of earthy matter can be performed as well in this as in any other apparatus in use, and thus by its employment the separation of the iron is effected without any expenditure of time or labor.

I do not claim to have invented a rotary cylinder of magnets for the purpose of separating magnetic particles from ores or metals; but

What I claim as my invention, and desire to secure by Letters Patent, is—

Separating gold or other metal from earthy and magnetic particles by means of a rotary cylinder of magnets, F G H I, which magnets, at the same time as they collect the magnetic particles, serve as agitators for agitating the water and the metal and earthy and other foreign matter with which it is mixed for the purpose of washing away the said earthy and other foreign matter, the said cylinder of magnets being constructed and arranged in relation to the trough B, containing aforesaid mixture, in any way, substantially as herein set forth.

SAML. GARDINER, JR.

Witnesses:

O. D. MUNN,  
S. H. WALES.