(No Model.)

C. H. ATKINS.

APPARATUS FOR REMOVING METALLIC PARTICLES FROM PAPER PULP.

No. 393,348. Patented Nov. 27, 1888.

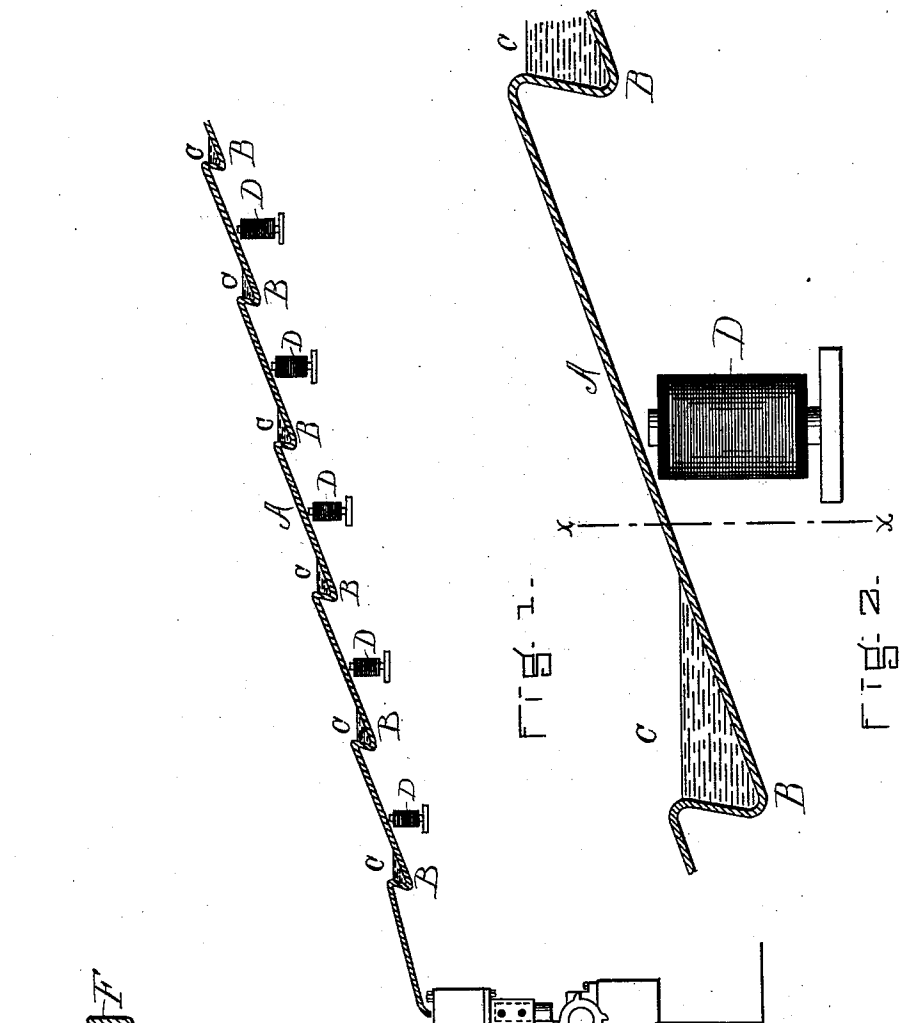
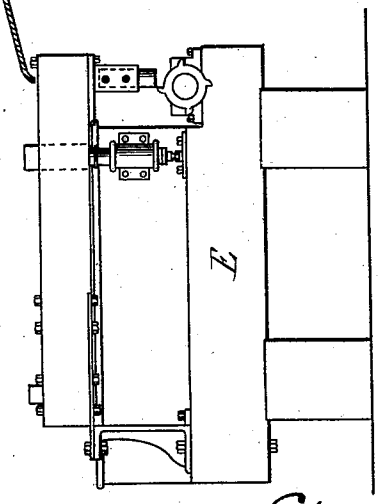


FIG. 1.

FIG. 2.

FIG. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

CHARLES H. ATKINS, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR REMOVING METALLIC PARTICLES FROM PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 393,348, dated November 27, 1888.

Application filed July 16, 1887. Serial No. 244,468. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. ATKINS, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement for Removing Metallic Particles from Paper-Pulp, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification in explaining its nature.

In the manufacture of paper it frequently happens that fine metallic particles are carried along in the pulp to the wire cylinder of the paper-machine, and form, eventually, an integral part of the paper, in which the presence of the metallic particles is a commercial defect. These metallic particles are mostly either of brass or copper, or of iron, the iron particles being derived from the abrasion of the iron parts of what are technically known as the "engines," and the bronze or copper particles being derived from some other parts of the machinery—such as bearings—or from the vats and valves of water or steam pipes. One class of these particles—namely, those which are copper, bronze, lead, tin, and the like—are readily entangled and held by mercury; but mercury does not very readily attack, or at least very readily eat, hammer-hardened or rolled copper, particularly if such rolled copper has the suboxide face which is usual on hot-worked copper.

My invention, therefore, consists in introducing between the pulp-engines and the vat from which the pulp is dipped by hand-sieve, or into which it runs to be taken up by the cylinder of the ordinary paper-machine, a trough in which the pulp in its passage from the engine to the vat shall be exposed to magnetic and mercurial influences, and also in the details of the construction of such trough and of its surroundings and accessories.

The trough is made of sheet-copper, preferably in a single piece, and slopes downward from the engine to the pulp-vat. It may be of any convenient length. The slope of this copper trough is not a uniform slope; but it is provided with what are known in mining engineering as "riffles," or small dams which extend from side to side. These riffles furnish pans of the width of the trough for the reception of mercury, and between the riffles are placed magnets close up to the copper on the trough. As the pulp flows down from the pulp-engine to the vat, its flow will be alternately accelerated and retarded, and consequently in a traverse over a considerable number of riffles almost every particle of the pulp (probably every particle of the pulp) will have come within the magnetic field of the magnets, and will have traversed the surface of the mercury in one of the mercurial receptacles.

In the drawings, Figure 1 shows, in elevation, at E, the pulp-vat. At A is represented the bottom of the trough, of which B are the depressions, which I have called "riffles." C is the mercury contained in these riffles. D represents the electro-magnets, placed between the riffles and close to the bottom surface of the trough. A portion of the trough with its riffles and mercury and an adjacent magnet is shown in Fig. 2.

Fig. 3 is a transverse section at the line *x x* of Fig. 2, and shows the trough with its sides F F. Only two magnets, placed at the center of the trough, are represented in Fig. 3; but it is my intention to place a series of magnets side by side across the whole width of the trough, so that in the space between the riffles there shall be no part of the trough which is not under magnetic influence or within the magnetic field of some magnet.

The magnets which I employ are electro-magnets, because with them great magnetic power can be obtained.

When the mercury becomes too much saturated with the particles which it will absorb and amalgamate, it is to be drawn off and distilled in the usual way, and when the delivery of pulp to the pulp-vat ceases for any reason the surface of the trough is to be cleaned from particles held to it by the influence of the magnets.

I prefer to make a trough in a single piece without riveting, and I prefer to mount the magnets on a movable slide, so that they can be withdrawn during the process of cleaning the trough; but these things are not absolutely essential to the working of my invention. Any other metal than copper, which is equally insusceptible to the influence of mercury, will serve to make the trough; but I do not think that a trough made of iron would be as good

as a trough made of copper, because the water of the pulp would be apt to rust the iron, and the iron would be apt to have residual magnetism which would render it difficult to clean. It is for this reason that I recommend non-magnetic sheet metal for the material of the trough.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

The improvement in apparatus for the manufacture of paper, comprising the pulp-vat of the pulping-engine and the pulp-vat from which the sieves remove the pulp in sheets or layers, and a pulp-trough interposed between the said pulp-vats having a sheet-copper bottom along which the pulp is caused to flow, which copper bottom is wrought with riffles containing mercury in their cavities, and a series of electro-magnets below said copper bottom, the magnetic fields whereof extend across said trough from side to side, whereby the particles of magnetic metal and of metal capable of amalgamation in the pulp are detained on or near the bottom of the pulp-trough, substantially as and for the purposes described.

CHARLES H. ATKINS.

Witnesses:
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