H. PANTON.

Recovering Tin from Waste Tin Scraps.

No. 137,712. Patented April 8, 1873.

Fig. 1.

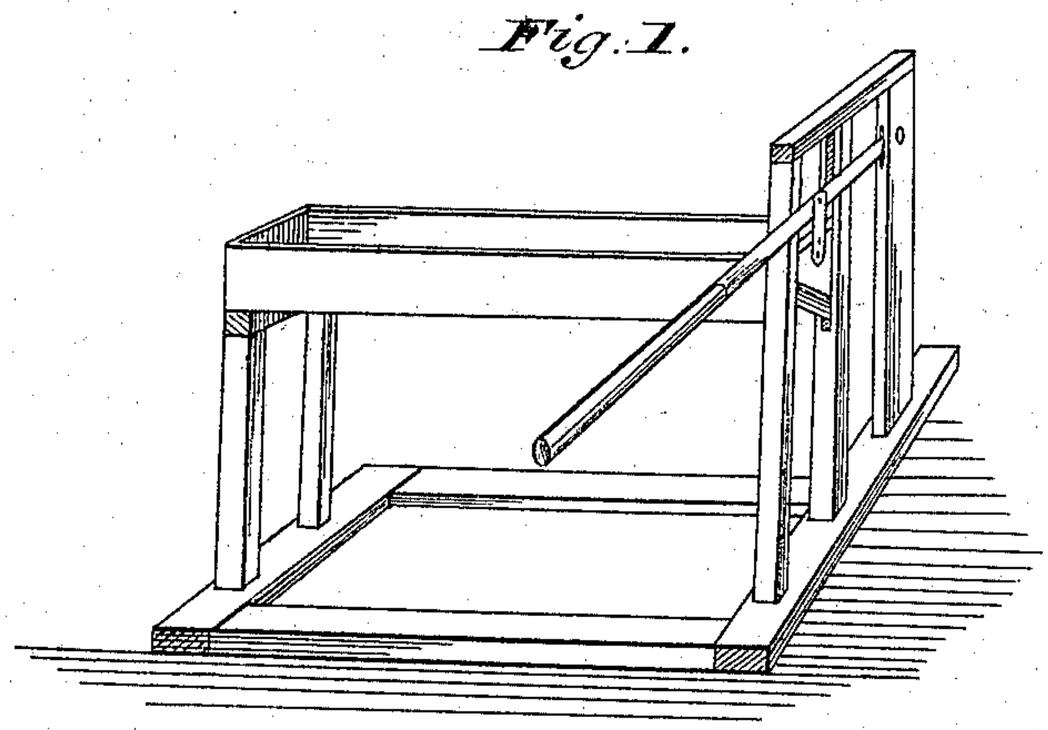


Fig. 2.

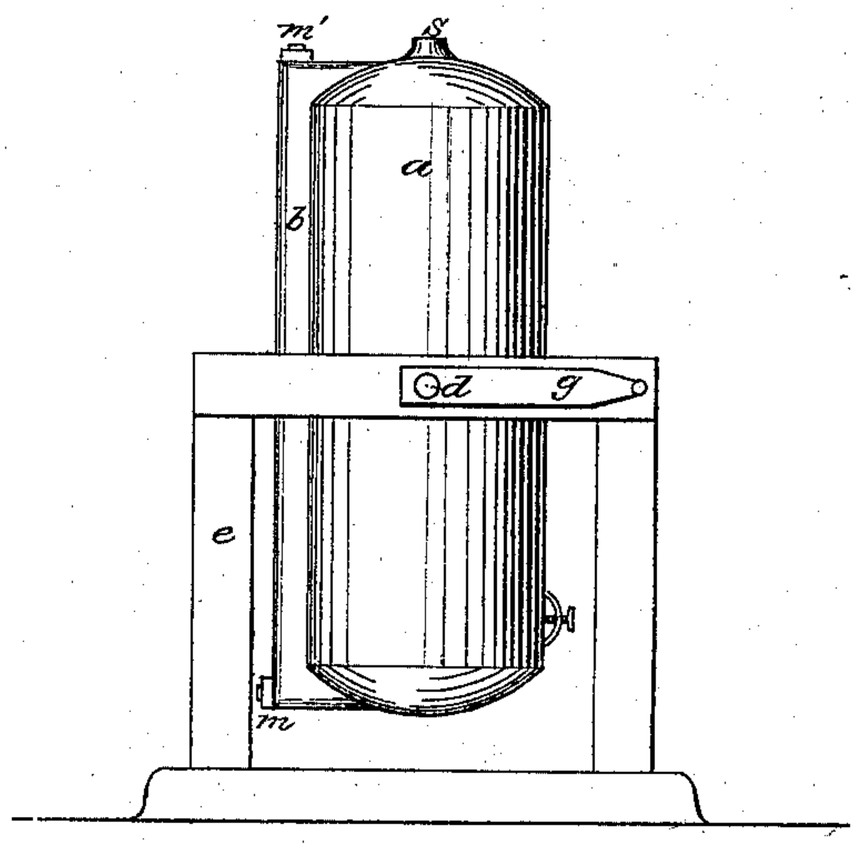
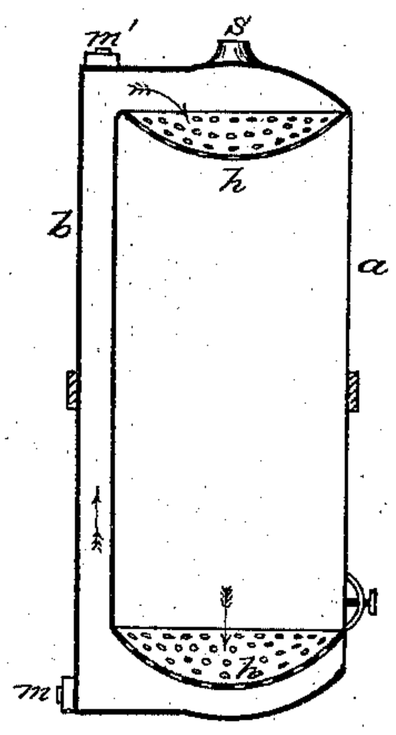


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY PANTON, OF NEW YORK, N. Y.

IMPROVEMENT IN RECOVERING TIN FROM WASTE TIN-SCRAP.

Specification forming part of Letters Patent No. **137,712**, dated April 8, 1873; application filed March 31, 1873.

To all whom it may concern:

Be it known that I, HENRY PANTON, of the city, county, and State of New York, have invented a new and useful Improvement in Processes for Recovering Tin from Waste Tin-Plate Scraps, and rendering the iron of them suitable for directly working into steel.

My process consists in first reducing the bulk of the scraps, which, in consequence of the irregularity of their shape and the disorder in which they are thrown together, occupy much room in proportion to their weight. This is accomplished by cutting them into small pieces or chips by means of such machines as are employed for cutting scraps of dry leather, rags, roots, &c., preparatory for a finer division. The only alteration of such machines required is that they be of heavier and more substantial construction.

A machine I have employed, on a small scale, and which answers the purpose well, is shown in Figure 1. This consists of a box five feet long, one foot wide, and one foot deep, mounted on a frame two and a half feet high, having a steel plate with a cutting-edge fastened to its bottom at one end, and another steel plate with a cutting-edge adjusted and fastened to a frame-work, which, by means of a lever, is lifted and forced downward. This steel plate is set so that it acts obliquely to the plate fastened to the box, forming a shear. The scraps, therefore, when placed in the box and crowded forward, are cut into any desirable dimensions. Secondly, in placing these chips at a summer temperature, or a little higher degree, in a receiver of peculiar construction, shown in Fig. 2, for further treatment with mercury.

Fig. 2 is an exterior view of the receiver; and Fig. 3 is a vertical section of the same, showing the interior arrangement.

This apparatus is made wholly of either cast or wrought iron; and consists of a cylinder, *a*, five feet long and two feet diameter, having convex ends, and a pipe, *b*, three inches diameter, parallel with and close to its outer side, leading, by means of two elbows, from the interior of one of its ends to the interior of the other end. Around the center of the whole is an iron band, having two journals, *d*, projecting, which rest in appropriate boxes on a frame, *c*. To the ends of the journals are attached cranks *g*, by which the cylinder is turned. Within the cylinder *a* are two partitions, *h h*, one at each end, perforated with small holes, forming a kind of strainer. Both of these are concave to the upper or top end of the cylinder. At the lower end is a round man-hole, *j*, one foot across; and at each end of the pipe are screw stoppers *m' m*. At the top of the cylinder, firmly attached to it, is a small anvil, S, of solid iron.

About three hundred pounds of the small chips of scraps are placed in the cylinder through the man-hole, the cover of which is adjusted, packed with leather, and firmly fastened by a screw. The upper screw stopper *m'* is then unscrewed, and forty or more pounds of mercury are poured into the pipe, when the stopper, packed with leather, is again screwed fast. The cylinder is then slowly revolved in the direction opposite to that indicated by the arrows in Fig. 3. The mercury circulates in the direction of the arrows—that is, as the lower end of the cylinder rises the mercury falls into the pipe; and when it has become reversed in position the mercury has, by its weight, entered the then lower chamber, where the larger portion of it remains until it has been turned to the top, when it falls through the perforations to the scraps, where it scatters and percolates through them, amalgamating with and carrying the tin to the bottom, when it passes through the perforations of the lower partition to the chamber beneath it. By the next revolution it traverses the circuit again, and thus the circuit is repeated until the tin has been wholly separated. The lower stopper *m* is then taken out, and the mercury, with the tin, removed.

The cylinder, at the commencement of the process, is revolved slowly to allow time for the mercury to fall from the upper chamber and saturate the tin on the surface of the scraps, which requires about ten minutes. It is then turned more rapidly for an equal duration of time, so as to thoroughly agitate the scraps. Then during a half hour it is revolved after intervals of about five minutes. It is next allowed to stand, with only an occasional blow with a hammer on the anvil S at the top of the cylinder, which removes and settles any ad-

hering mercury. The mercury is not removed until it begins to lose its fluidity. This is determined by occasional examinations. It may be removed at any stage of the treatment of a batch of the scraps, and fresh mercury substituted.

The scraps are removed by opening the manhole and turning the cylinder so that they will fall into a box placed to receive them. The tin is separated from the mercury in the manner usually practiced for separating it from other metals, as by distillation, or by oxidation of the tin. In a few cases—where the waste scraps are found to be oily or greasy—it is better to first wash them by a solution of soda, which may be done in the same apparatus before treating them with mercury.

The advantages of this process over others consist in its simplicity, metallic tin being obtained by mechanical means almost wholly, with the exception of that of a simple distillation for ultimately separating the tin from the mercury; the compactness of the apparatus required, and the comparative little cost of its structure. These are considerations of great importance, as it is desirable to work the scraps in towns removed at a distance from the market, where relatively small quantities are made, and which would otherwise not be utilized, as their great bulk, compared with their weight, prohibits their being carried to distant centers. By this process they may be reduced in bulk, treated at the locality, and compactly packed in barrels or boxes, and removed to the nearest steel works, placed in crucibles with the usual ingredients employed for forming steel batches, and converted and melted into steel.

Having thus described my improvement, what I desire to secure by Letters Patent of the United States is—

1. The process herein described of utilizing waste tin-plate scraps by first reducing them to small chips by the means described; secondly, treating them with mercury in the manner explained; and, thirdly, converting the chips of iron, after such treatment, into steel, in the manner set forth.

2. The apparatus described for treating tin-scrap, consisting of the revolving vessel *a*, provided with the perforated diaphragms *h* and *h'* and side pipe *b*, so as to return the mercury and distribute it over the scraps, as described.

HENRY PANTON.

Witnesses:

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