W. J. PHELPS.

PROCESS OF DETINNING TIN SCRAP.

APPLICATION FILED JULY 27, 1909.

952,351.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

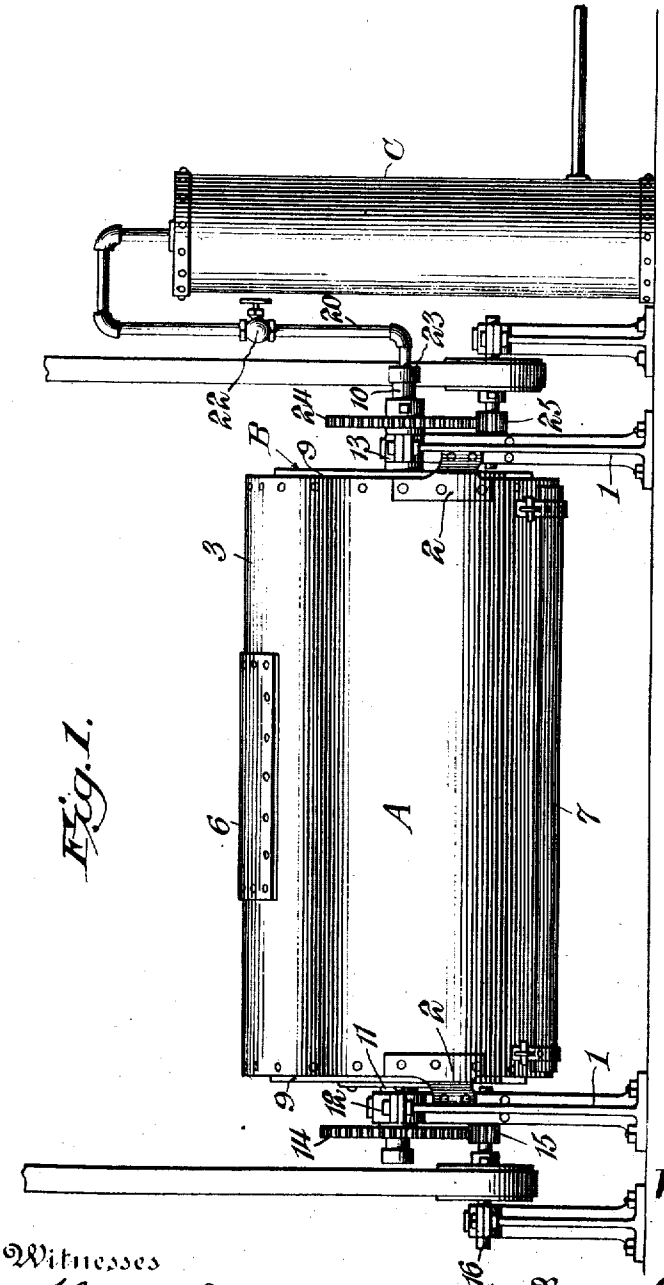

Fig. 1.

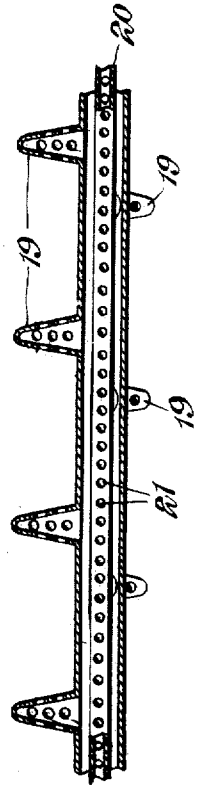

Fig. 5.

Witnesses

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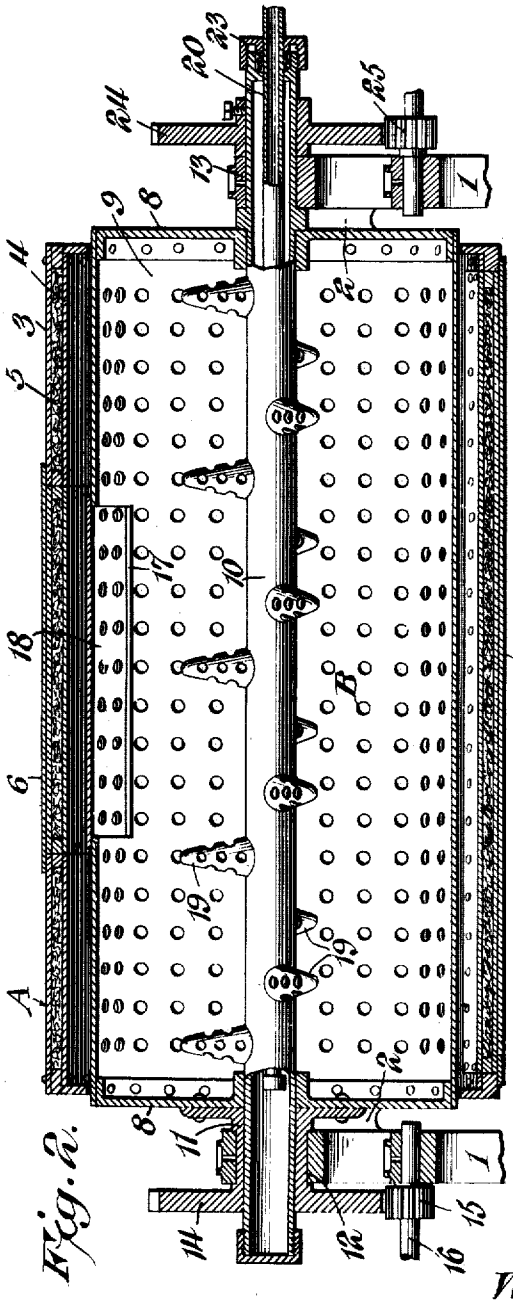

Fig. 2.

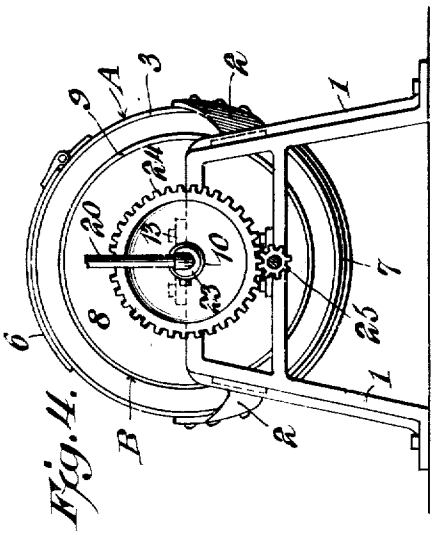

Fig. 4.

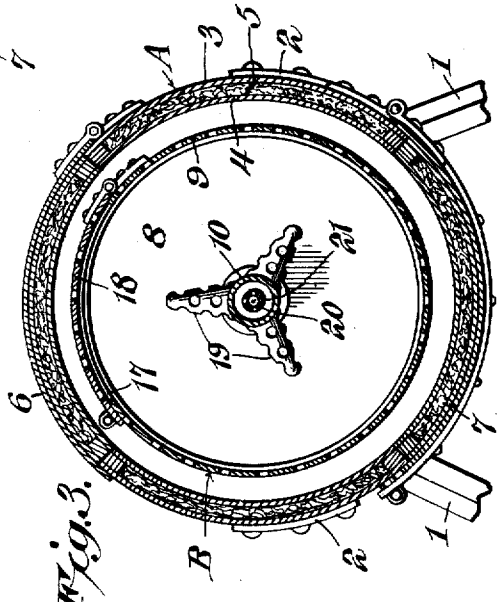

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

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PROCESS OF DETINNING TIN-SCRAP.

952,351. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed July 27, 1909. Serial No. 509,933.

To all whom it may concern:

Be it known that I, WALTER J. PHELPS, a citizen of the United States, residing at Baltimore city and State of Maryland, have invented a new and useful Process for Detinning Tin-Scrap, of which the following is a specification.

This invention relates to the process of recovering tin from tin-coated scraps.

It has been demonstrated that tin disintegrates when subjected to extremely low temperatures, as for instance, when brought in contact with liquid air.

Based upon this principle, the present process consists in subjecting the tin-coated scraps or tin bearing material to an extremely low temperature, while simultaneously agitating the scraps to cause the tin to separate from the steel or other metal coated by the tin.

In the accompanying drawings, which illustrate an improved apparatus for carrying out the process, Figure 1 is a front elevation of the apparatus. Fig. 2 is a central longitudinal section thereof. Fig. 3 is a transverse section. Fig. 4 is an end view drawn on a reduced scale. Fig. 5 is an enlarged sectional view of the combined means for discharging the refrigerating medium into the tin scraps and for agitating the same.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawing, A designates a cylinder mounted with its axis horizontal and supported on standards 1 by means of brackets 2. This cylinder or drum A is composed of inner and outer shells 3 and 4 having a non-conducting material 5 packed between them for retaining the cold. At the top of the cylinder is a door 6 for permitting the tin scraps to be deposited in the apparatus, and at the bottom is another door 7 by means of which the tin particles recovered from the scraps can be removed.

Rotatably mounted in the fixed cylinder A is an inner cylinder or drum B provided with solid heads 8 which carry a perforated cylindrical shell 9 for holding the tin scraps. This cylinder B is mounted to rotate on a horizontal tubular axle 10, and on one of its heads 8, is provided with a hub 11 through which the axle 10 extends. The hub is journaled in a bearing 12 on one of the standards, while the opposite end of the axle is journaled in a bearing 13 on the other standard. The hub 11 carries a large gear wheel 14 which meshes with a pinion 15 carried by a driving shaft 16, whereby the drum B is rotated. The drum has an opening 17 normally closed by a door 18 and so arranged as to register with the upper door opening of the outer drum A, so that the scraps can be placed in the inner drum.

The tin scraps are agitated during the freezing process, and for this purpose, the axle or shaft 10 is provided with a plurality of spaced outwardly-projecting arms 19 which are preferably conical so as to readily pass through the mass of scraps contained in the drum B. These arms or agitators also serve as discharging nozzles for the cooling or refrigerating medium, which may be liquid air or some equivalent material. The shaft 10 is hollow and extending longitudinally thereof is a liquid air supply pipe 20 which has numerous perforations 21, as shown in Fig. 5, through which the liquid air passes to the nozzles 19. The shaft 16 is connected with a reservoir C containing liquid air, the supply of which is regulated by a valve 22. On the end of the axle or shaft 12 is a stuffiing box 23 for preventing leakage of the cooling medium. The shaft 10 is rotated independently of the drum B by means of a gearing consisting of a large wheel 24 on the projecting end of the shaft 10 and with which meshes a driving pinion 25. It will thus be seen that liquid air can be discharged into the drum B while the shaft rotates to agitate the tin scraps.

In practice, the tin-bearing material is supplied to the inner drum through the openings at the top of the inner and outer drums, and after the doors of the openings are closed, the inner drum and agitator are rotated for effectively stirring the tin scraps to bring every portion of the tin-coated surfaces in contact with the liquid air which is supplied by the opening of the valve 22. This liquid air acts on the tin in such a way as to destroy the cohesion between the tin particles and the sheet metal coated thereby, and the particles of tin sift through the perforations of the inner drum and are collected in the space at the bottom of the outer drum. After the agitation has proceeded long enough to remove the tin, the door 7 is first opened to allow the tin to drop out into a suitable receptacle. After this is done, the inner drum is opened when the

door thereof is at the bottom, so that the sheet metal from which the tin has been removed can be emptied from the apparatus in preparation for the next charge. It will thus be seen that the detinning process can be readily carried out with an extremely simple apparatus and with substantially no loss of tin.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. The herein described process of recovering tin from tin scraps which consists in subjecting the tin scraps to a sufficiently low temperature to disintegrate the tin, and agitating the scraps for separating the disintegrated tin therefrom.

2. The herein described process of recovering tin from tin-bearing material, which consists in subjecting the material to a freezing medium at such temperature as to disintegrate the tin, simultaneously agitating the material during the action of the said medium, and separating the tin from the material.

3. The herein described process of detinning tin scraps which consists in delivering a cooling medium to the tin scraps while agitating the same to loosen the tin coating from the scraps, and separating the loosened tin from the mass of scraps.

4. The herein described process of detinning tin scraps which consists in subjecting the scraps to the action of liquid air for loosening the tin coating from the scraps, and separating the loosened tin from the mass of scraps.

5. The herein described process of detinning tin scraps which consists in discharging liquid air into a mass of tin scraps while contained in a rotatable drum, simultaneously agitating the scraps for separating the loose tin particles therefrom, and collecting the separated tin particles.

6. The herein described process of recovering tin from tin-bearing material which consists in bringing the material into contact with a freezing medium to such temperature as to disintegrate the tin, and finally separating the disintegrated tin from the material.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WALTER J. PHELPS.

Witnesses:

JOHN H. SIGGERS,

EDITH L. BROWN.