

959,720.

2 SHEETS--SHEET 1.



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METHOD OF HANDLING SLAG.
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2 SHEETS—SHEET 2.

Fig. 2.

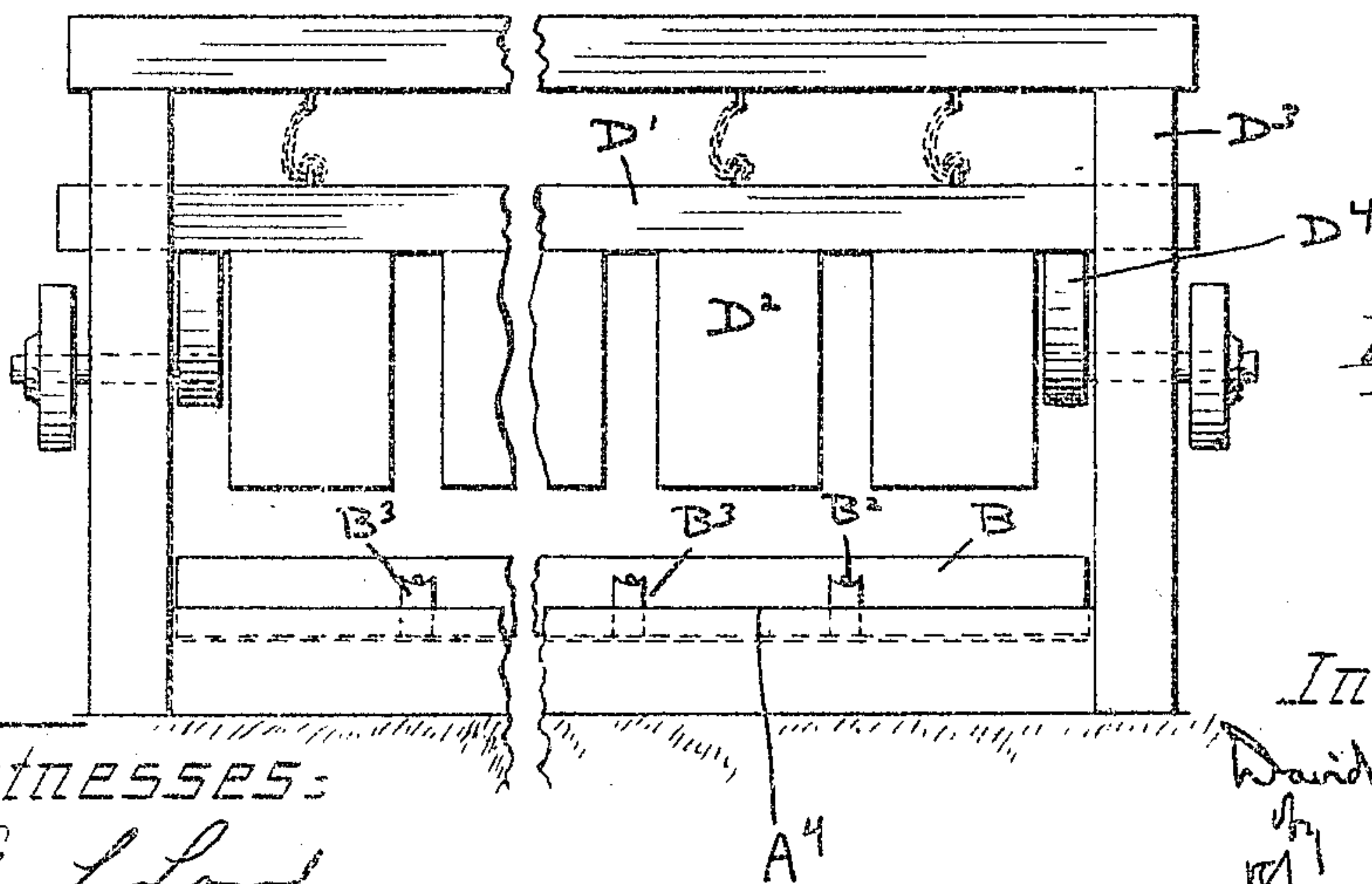
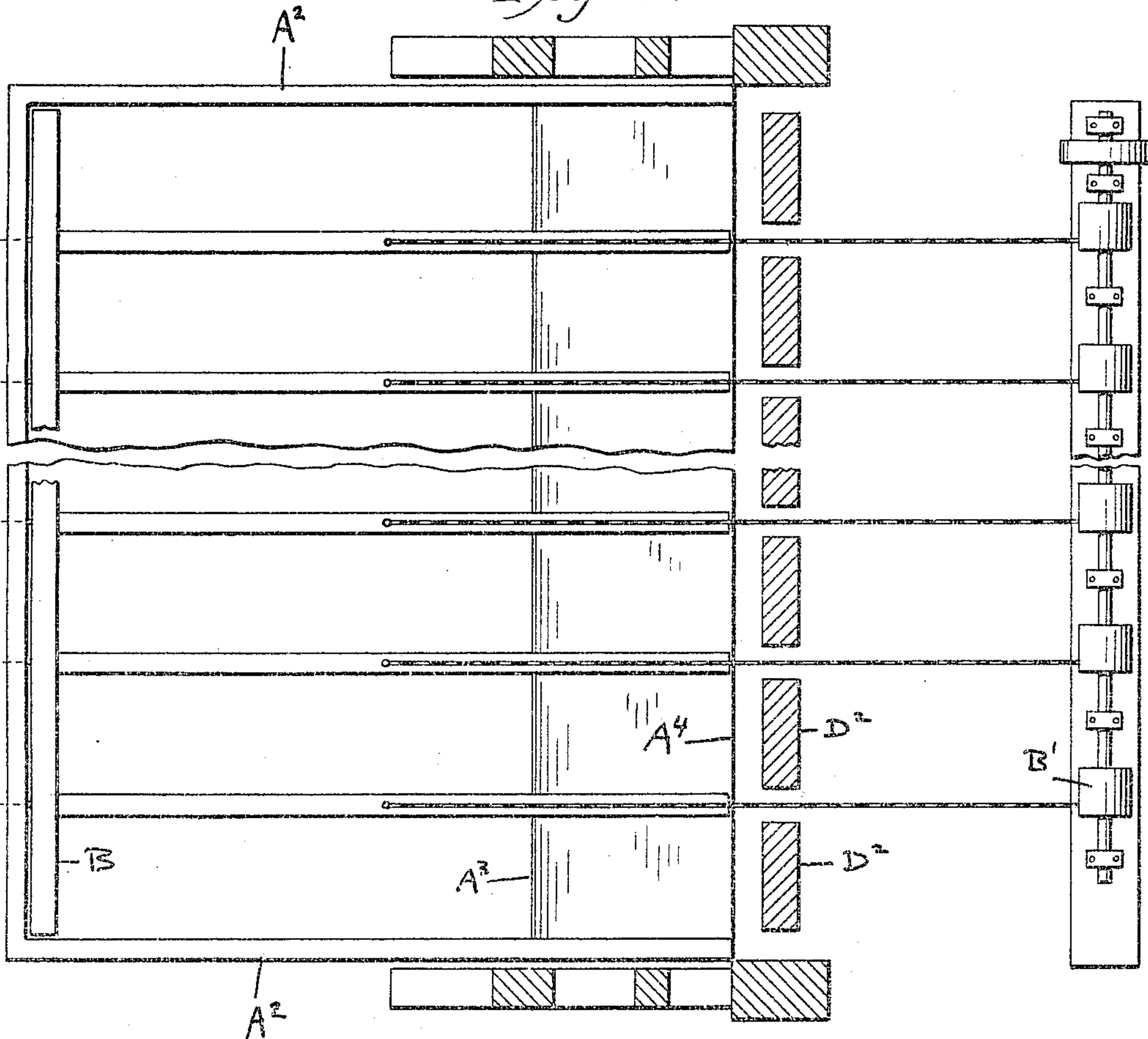


Fig. 3.

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UNITED STATES PATENT OFFICE.

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METHOD OF HANDLING SLAG.

959,720.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID T. CROXTON, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Methods of Handling Slag, of which the following is a full, clear, and exact description.

The present invention relates to a method of handling slag as it comes from the blast furnace with a view to delivering it in proper condition and form to be shipped away from the furnace.

The object of the invention has been to provide a method by which the entire furnace run may be disposed of economically and with a minimum of expense in the matter of handling, and with a view to improving the condition of the slag so that it shall acquire a commercial value of considerable amount.

Heretofore it has been the practice in many places to either dump the slag into piles where it is utterly wasted, or, in other localities, where the topography of the plant is such as to prohibit the use of slag dumps, the molten material is cast into pits of water and granulated and loaded by buckets into conveyers. It has further been proposed to dispose of slag by running the molten material onto revolving tables where it is granulated, the granules being scraped off into traveling receivers and having no value except as a refuse. It has also been attempted to utilize the slag by pouring it into pans wherein it is molded into bricks, the pan being inverted for the purpose of delivering the brick in molded form.

I have devised a method of handling slag distinct from the above practices, by means of which method I am able to care for slag in any amount in which it may be delivered from the furnaces, and I can deliver it in such an improved condition as to cause it to bring a high price in the market where it is utilized for such purposes as railroad ballast, aggregate for concrete and as roofing gravel. Furthermore, my procedure dispenses with the large quantity of hand labor commonly employed in slag casting pits, and the rapidity of disposal is far in excess of any method heretofore devised for making this material into a commercial product.

Referring to the accompanying drawings which illustrate an arrangement by which

my invention may be carried into practice; Figure 1 is a cross-section showing the general relation of the parts. Fig. 2 is a plan of a casting table showing a breaker partly in section together with the connections for a discharging device. Fig. 3 is an end view illustrating the structure of the breaker.

It is my purpose to deliver the slag either by ladles, bogies, or runways in any manner suitable to the plant, to a casting table A. The table is of considerable extent and is mounted upon a stationary support A'. The back and ends of the table are provided with upwardly extending sides A², while the forward or discharge side of the table floor is inclined upwardly and gradually, as at A³, so as to give the forward edge A⁴ approximately the same level as the three sides A² just mentioned. By this means a retaining inclosure of proper depth is obtained, that depth being sufficient to give the slag the thickness required for the uses to which it is adapted to be put, as for railway ballast, concrete aggregate, etc. I run the slag onto this table until the proper depth has been reached, whereupon it is permitted to cool so that it will solidify and be in condition for removal therefrom. For the purpose of effecting this removal, I have here shown a follower or scraper bar B which, during the operation of casting slag, is located at the rear of the table and extends transversely across the same. This bar is connected with any suitable power device, such as a drum B' and a cable B², or equivalent structure, by which it may be drawn forward after the slag has solidified and cooled to the proper degree.

In the embodiment of the invention shown in the drawings, it will be seen that instead of connecting the cable directly to the scraper bar I have attached to the latter a series of partitions B³ extending from the bar across the table to the discharge edge thereof, and it is to these partitions that I have secured the drawing cables by which the discharge bar is dragged forward. These partition plates may be grooved in the top, as shown in Fig. 3, to receive the drawing cables and protect them from the slag if the proportions of the various parts are such as to render this advisable. These partition plates are provided for the purpose principally of separating the large mass of slag into divisions which may more easily and readily be broken into fragments of the

proper size and thickness as the slag sheet is drawn from the table.

Immediately below the forward edge of the table and in position to receive the slag drawn therefrom, I provide a receiving car C, and above the edge of the table I mount a breaking mechanism D, such as that shown in the drawings.

In the breaker illustrated a reciprocating beam D' having drop hammers or breakers D² thereon is mounted in a frame D³ and a cam D⁴ is located underneath the ends thereof in such manner as to lift the beam and permit it to drop at properly timed intervals during the withdrawal of the slag sheet. The descent of the breaking beam upon the sheet of slag as it projects over the end of the table will, obviously, result in the crushing off or breaking of that portion of the sheet overhanging the edge, the resulting fragments falling into the car below. As the slag sheet is continually drawn forward sliding over the inclined portion of the floor of the casting table, the breaker will intermittently descend upon the overhanging portion of the same and reduce the entire slag sheet to the desired condition for shipment. When the entire mass of slag has thus been brought to the proper form for delivery to the market, the discharge bar is dragged back to the rear side of the table by any means such, for example, as a cable D⁵ properly reeved around pulleys to the same winding drum which is used to drag it forward. The detail connection of the operating parts, however, is not of any consequence so long as the general principles of the invention are preserved.

It will be seen that with the method of handling the slag which I have here disclosed, any quantity of slag may be taken care of and handled without the aid of a crew of hand laborers, and consequently may be disposed of with minimum cost. The method further enables the furnaceman to deliver his slag in that condition in which it has the greatest market value.

The slag produced by my method will be

characterized for its greater density and the absence of porosity and cellular structure, as contrasted with slags now produced in the direct methods from the molten material. The former methods of granulating slag in pits give it no commercial value and the former method of running slag in runners and soaking it with water and pouring it in the cars produces a light cellular structure from the moisture in the sand beds and the quenching water used thereon and also from the gases in the slag. Such a product is also dirty because it is mixed with material from the runners as it cools. In distinction, my method of casting on a clean bed and allowing it to cool to hardness before any water is used and then removing the hardened sheet, will produce a harder, more dense and a less cellular slag.

Having thus described my invention, I claim:

1. The method of handling slag which comprises casting it on a table into sheets, cooling and solidifying the same in sheet form, moving the sheet over the edge of its support and breaking the unsupported portion into fragments.

2. The method of handling slag which comprises casting it into sheets of suitable thickness upon a suitable support, cooling and solidifying the same, separating the slag from its support by lateral sliding movement and breaking the sheet slag into fragments as it is moved.

3. The method of handling slag which comprises casting it into sheets of suitable thickness, maintaining it in sheet form until the solidification has been effected, separating the sheets from the support by a sliding movement, breaking the separated slag into fragments and delivering the same into a suitable carrier.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

DAVID T. CROXTON.

Witnesses:

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