Jan. 23, 1923.

H. S. MARSH ET AL.

CONVEYER APPARATUS.

FILED AUG. 16, 1921.

1,442,961.

2 SHEETS—SHEET 1.

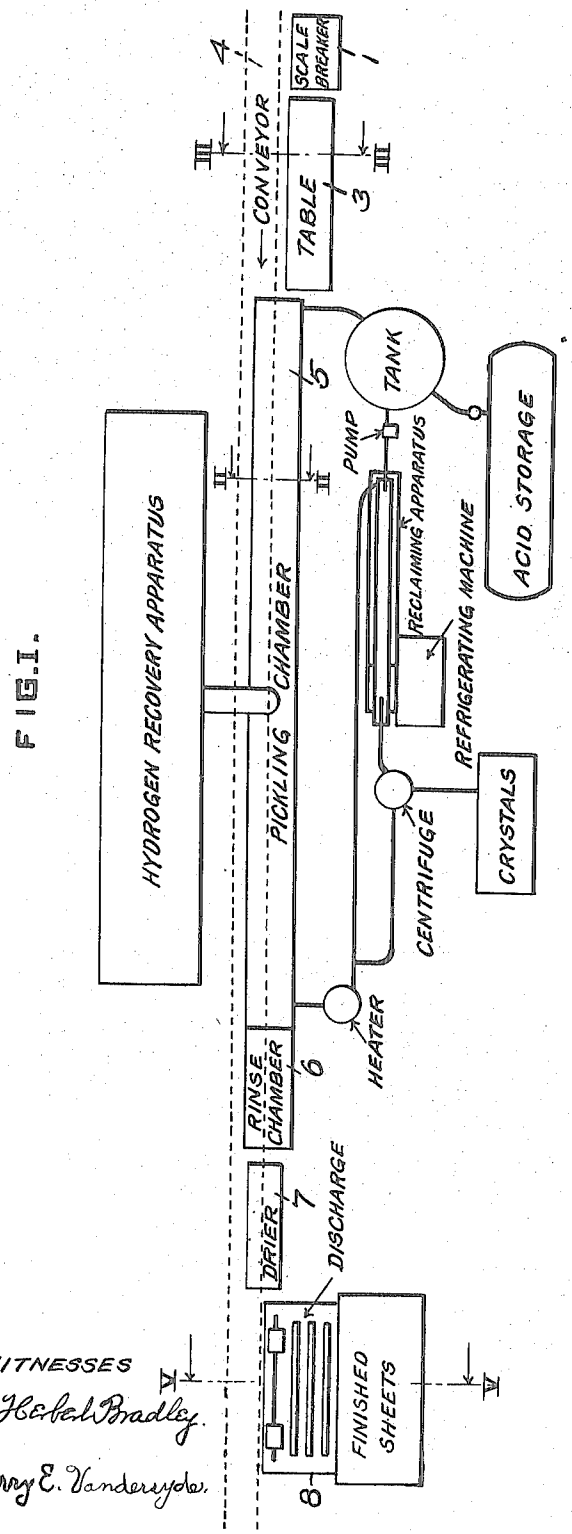


FIG. I.

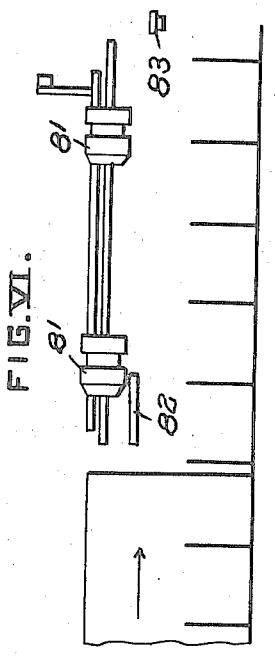


FIG. VI.

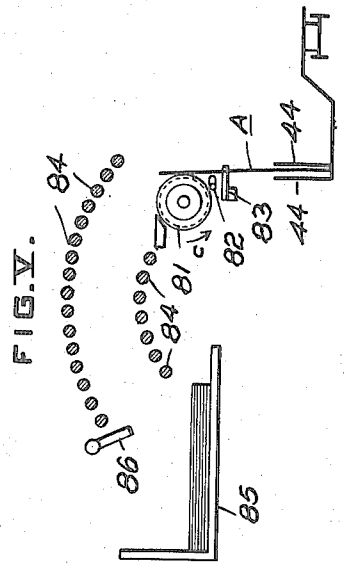


FIG. V.

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2 SHEETS—SHEET 2.

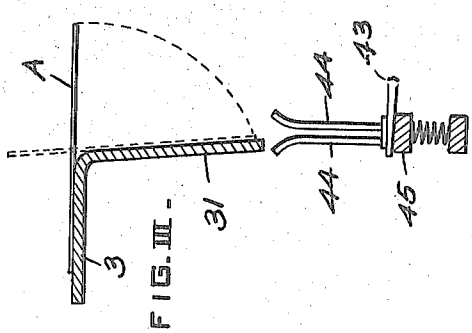


FIG. III.

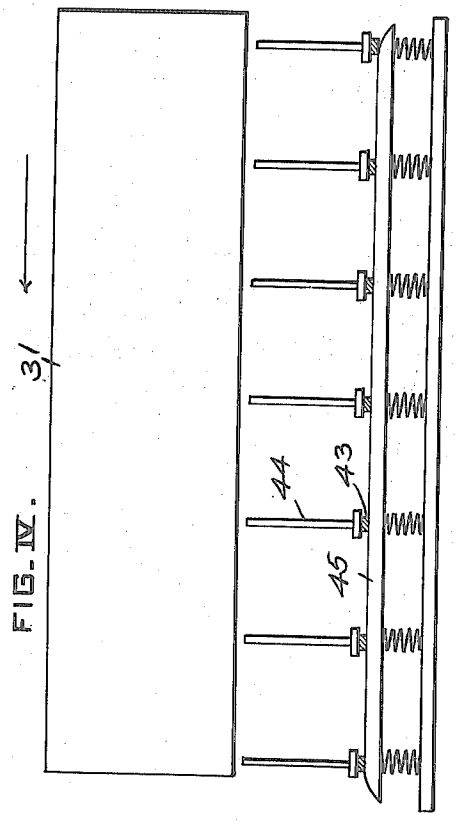


FIG. IV.

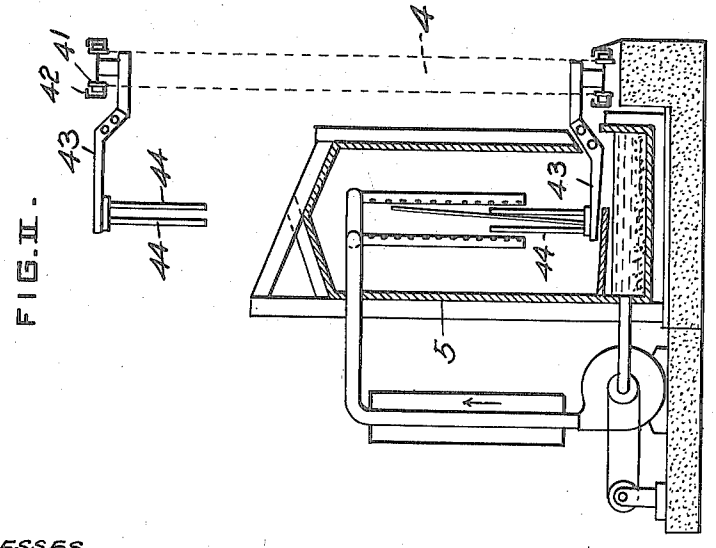


FIG. II.

WITNESSES

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UNITED STATES PATENT OFFICE.

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CONVEYER APPARATUS.

Original application filed October 12, 1920, Serial No. 416,547. Divided and this application filed August 16, 1921. Serial No. 492,665.

To all whom it may concern:

Be it known that we, HENRY S. MARSH and RALF S. COCHRAN, residing at Youngstown, in the county of Mahoning and State of Ohio, citizens of the United States, have invented or discovered certain new and useful Improvements in Conveyer Apparatus, of which improvements the following is a specification.

This application is a divisional application, derived from our application for United States Letters Patent Serial No. 416,547, filed October 12, 1920, for improvements in pickling metal articles. The subject-matter here is found in means for introducing sheet material to and in due course removing it from a travelling conveyer. The relation to pickling apparatus is casual and incidental, and the present invention is applicable generally to conveyers, regardless of the purpose for which the sheet material may be conveyed. However, we shall in exemplary manner describe the apparatus in which the invention resides, in the very environ where it was conceived, namely in pickling apparatus.

In the accompanying drawings which form part of this specification, Fig. I is a diagrammatic view in plan of apparatus for pickling metal articles, in this case steel sheets, in continuous operation. Fig. II is a view to larger scale, in vertical section, on the plane indicated by the line II—II, Fig. I; Fig. III is a similar illustration, on the plane indicated at III—III, Fig. I; Fig. IV is a view in side elevation, and to equal scale with Fig. III of that portion of the apparatus shown in section in Fig. III; Figs. V and VI are views (to somewhat smaller scale than Figs. III and IV) but, similarly to Figs. III and IV, showing in cross section and in side elevation the ultimate unit of the apparatus—the unit at the extreme left, Fig. I. The plane of section of Fig. V is indicated at V—V, Fig. I. Fig. VI is a view from the side opposite that of Fig. IV,—the upper side, referring to the diagrammatic Fig. I.

The necessity for pickling steel sheets in the course of fabrication is universally known, and need not be dwelt on.

Beginning with the scale-covered sheet, and before subjecting it to the pickling operation, we, in the practice of our invention, preferably put it through a scale breaker. The scale breaker is indicated at 1, in the diagrammatic showing which Fig. I affords, and, since it forms no essential part of our present invention, it will suffice to allude to our earlier application, mentioned above, and say that it contains fuller description of this unit of the apparatus.

From the scale breaker the sheets under treatment are delivered, one by one, to a table 3, Fig. I. This table is more fully illustrated in Figs. III and IV. The table 3 is so arranged that the sheet (A) delivered by the scale breaker will initially rest upon its horizontal surface, in the full-line position indicated in Fig. III. The relative positions of scale breaker and table are, however, such that the center of gravity of the sheet as delivered lies beyond the edge of the horizontal portion of the table. Accordingly, the sheet will advance from the scale breaker, and will rest upon table 3 in its advance, maintaining the position indicated in full lines in Fig. III, until its rear edge passes from engagement by the scale breaker. Thereupon the sheet will of its own weight swing from the full-line position of Fig. III to the dotted-line position, and will then slip down the apron 31, with which table 3 is provided, and come to position in conveyer 4.

Conveyer 4 will be understood best by comparing the showing of Fig. I with that of Fig. II. It consists of an endless flexible body member, in the form of a belt or chain, equipped with rollers 41 which travel in guide channels 42. It is so disposed that, throughout its work-performing reach, it extends through a succession of chambers, the nature of which is presently to be indicated, and it carries the sheets with which it then is laden through these chambers, one after another; while throughout its idle return reach it is out of the way. Conveniently, and as shown, the idle return reach of the conveyer is above the work-performing reach, and the work-carrying parts there assume inverted position.

The conveyer 4 is provided with laterally extending arms 43, and from these arms fingers 44 extend. Throughout the work-performing reach of the conveyer these fingers stand vertically. They are arranged in pairs, and their tips may flare divergently, to insure the automatic reception of the sheets descending from table 3. The sheets come to rest in the notch defined by the successive pairs of fingers; the fingers engage the sheets at intervals on opposite sides, and support

them in edgewise standing position as they are borne forward through the chambers.

Throughout that portion of its path where it receives the sheets from table 3, the conveyer may rest upon a spring-backed buffer plate 45.

The pickling chamber is indicated at 5. For particular description of its construction and of the operation which is performed within it, we refer again to the parent application, mentioned above. Suffice it here to say that the sheets borne by conveyer 4 are within chamber 5 sprayed upon by pickling solution, and thus as they advance pickling is effected.

Beyond the pickling chamber the advancing sheet passes successively through a rinse chamber 6 and a drier 7, whose offices are sufficiently indicated by their names. And again reference is made to our earlier application named above for more particular description.

The sheet advancing beyond the drier is now pickled and is ready for further treatment. Our invention lies further in the mechanism by which the pickled sheets are removed from the conveyer of the pickling apparatus and delivered in suitable place and manner, for further treatment. This discharge mechanism bears in Fig. I the reference numeral 8, and is illustrated in detail in Figs. V and VI.

Adjacent the path of advance of the sheets borne in conveyer 4, beyond drier 7, and extending parallel with that path, is a pair of magnetic rollers 81. The particular construction of these rollers need not be dwelt upon; such rollers are on the market; their characteristic features are that, attracting to their surfaces bodies formed of magnetic material, by turning they convey such bodies from one point to another. The position of the rollers 81 relatively to the path of sheet advance is sufficiently indicated in the drawings, and the direction of rotation is indicated by the arrow *c*. Conveniently two rollers are employed, mounted on a common axle, and adjustable in their distance apart, to accommodate the mechanism to sheets of different size.

A guide 82 may be provided, to bring the advancing sheet to position adjacent the rollers. As an advancing sheet A comes to position to be removed from conveyer 4, it automatically trips a make-and-break device 83, and in so doing effects the energizing of the electro-magnets of the rollers 81, which up to that time had remained unenergized. Immediately, the rollers attract the sheet, and, as they continue to turn, they raise the sheet from the conveyer 4 and carry it over their upper surfaces. The rising sheet advances relatively to the roller, so that its forward edge projects farther and farther from the roller, and, being initially inclined somewhat (to the left, Fig. V), it swings toward a horizontal position as the line of tangency passes below the midline of the sheet and as the lower edge of the sheet passes from the fingers 44 of conveyer 4. The sheet as it advances under the propulsion of rollers 81 enters a suitable guideway, conveniently formed in this instance by opposite lines of idle rollers 84. The limitations imposed by the guideway cause the sheet ultimately to break contact with rollers 81, and the momentum of the sheet (aided it may be by gravity) carries it forward, until it is delivered from the guideway to a suitable receptacle. Fig. V shows a crate 85, in which has already been stacked a number of sheets which will be understood to have come through the discharge mechanism. At a point in its course where the magnetism of rollers 81 is no longer needed the advancing sheet engages a trip 86, and, swinging this trip, automatically breaks the circuit and effects the de-energizing of the magnets of rollers 81. This leaves the rollers in condition, permitting the next advancing sheet to come to position opposite the discharge mechanism and then a new shifting of trip 83 (which meanwhile has come to initial position—either in consequence of the swinging of trip 86 or otherwise) begins the operation anew. Of course the proportions and arrangement may be such that trip 86 will be shifted before the sheet is ready to break contact with rollers 81, and in that case it will not, of course, be momentum which releases the sheet from the rollers. It will be understood that, after each operation, trip 86 in turn resumes its initial position, either in consequence of the shifting of trip 83 by a newly entering sheet or otherwise.

Fig. I of the drawings shows also a plant for reclaiming spent pickling solution, and apparatus for hydrogen recovery too. These parts are appropriately labeled; they form no part of our present invention; concerning them, we refer again to our application, Serial No. 416,547, already mentioned, and to reissued Letters Patent No. 15,119, reissued to us June 7, 1921 (original No. 1,369,451, granted us February 22, 1921).

The apparatus of our present invention in its operation requires but little comment, in view of what has gone before. It is apparatus adapted to be used in connection with a travelling conveyer and manifestly it is unimportant to the invention, for what purpose conveyer 4 bears the sheets. That is to say, our invention is not limited to service in pickling apparatus, but is applicable theoretically, wherever sheets are to be conveyed one by one along an extended course. The means for removing the sheet from the conveyer are magnetic and, accordingly, so far as concerns these particular

means, they are limited in applicability to the handling of magnetic material, but otherwise, and particularly so far as concerns the means for introducing the sheets successively to the conveyer, there is no such limitation upon the invention. With these general observations, we proceed to indicate the features of operation.

The sheets advancing one by one from the scale breaker rest upon the horizontal portion of table 3. As soon as the posterior edge of a sheet passes out from and is free of the scale breaker, the sheet will swing under gravity and slide down the inclined portion of table 3 and enter the supports formed by the fingers 44 of conveyer 4. The conveyer is at this point supported from beneath on spring-backed blocks 45, and these blocks absorb the stress of the falling sheet.

The sheet, so loaded upon the continuously advancing conveyer, is carried by the conveyer, to undergo such treatment or to serve such ends as may be desired. In this case, as has been made plain, the sheet borne by the conveyer is pickled as it advances, and, in due course cleaned and dried. It then is ready for removal. Coming in the progress of the conveyer opposite the discharge apparatus 8, the sheet is automatically picked up, raised from the conveyer, swung over and delivered to crate 85 or other suitable receptacle. The drawing shows a succession of sheets automatically piled in the crate.

We claim as our invention:

1. In sheet-handling apparatus the combination of a conveyer, a feed table arranged adjacent said conveyer, a shock-sustaining member for the conveyer opposite the feed table, and means for delivering sheets to said table with their center of gravity beyond the area of support afforded by the table, substantially as described.

2. In sheet-handling apparatus the combination, with a travelling conveyer adapted to sustain and carry sheet material resting upon edge upon it, of a feed table including a horizontal surface and a surface downwardly inclined from said horizontal surface, the said table arranged with its inclined surface extending toward said conveyer, and a cushion block arranged opposite said table and beneath said conveyer upon which said conveyer rests in its advance, substantially as described.

3. In sheet-handling apparatus the combination, with a travelling conveyer adapted to sustain and carry sheet material resting upon edge upon it, of a feed table including a horizontal surface arranged at a higher level than said conveyer and an inclined surface extending from said horizontal surface toward said conveyer, and a cushioned support for said conveyer arranged opposite said table, together with means arranged at an interval from the means already defined, for removing from the conveyer a sheet borne by it, substantially as described.

In testimony whereof we have hereunto set our hands.

HENRY S. MARSH.
RALF S. COCHRAN.

Witnesses:
ED. J. RUSSERT,
ETHEL JONES.