Jan. 17, 1928.

J. W. MILLARD

1,656,528

PICKLING APPARATUS

Filed Dec. 9, 1926

3 Sheets-Sheet 1

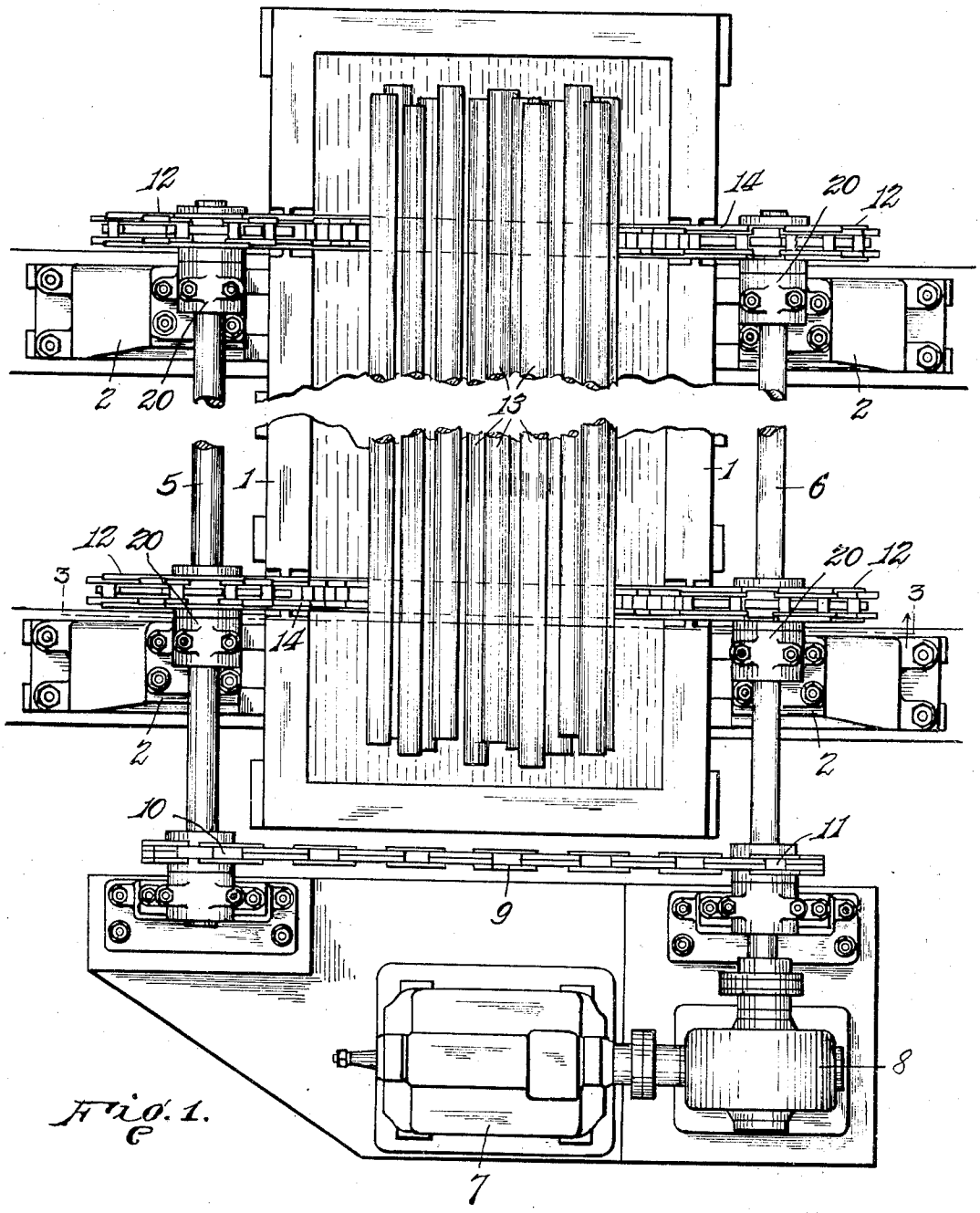


Fig. 1.

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3 Sheets-Sheet 2

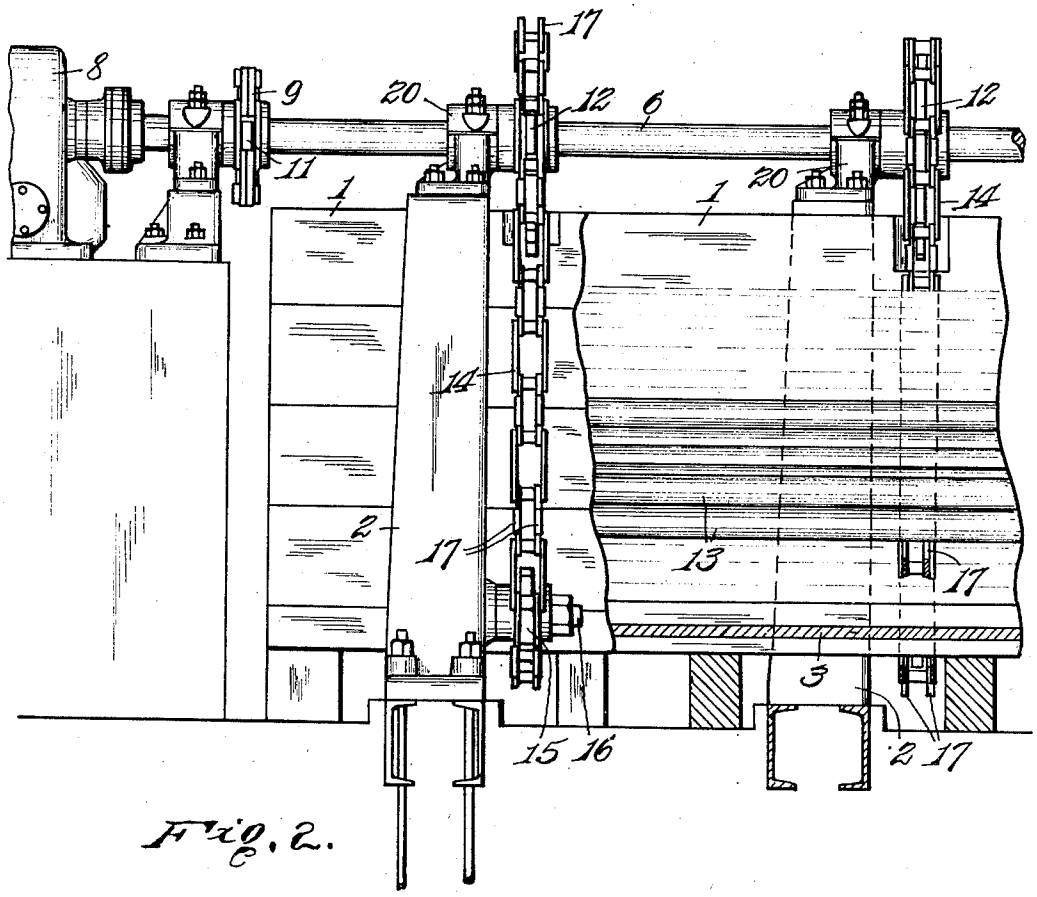


Fig. 2.

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3 Sheets-Sheet 3

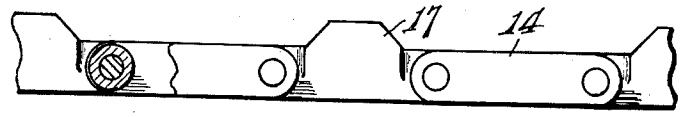


Fig. 5.

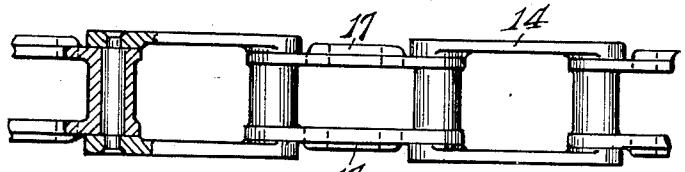


Fig. 4.

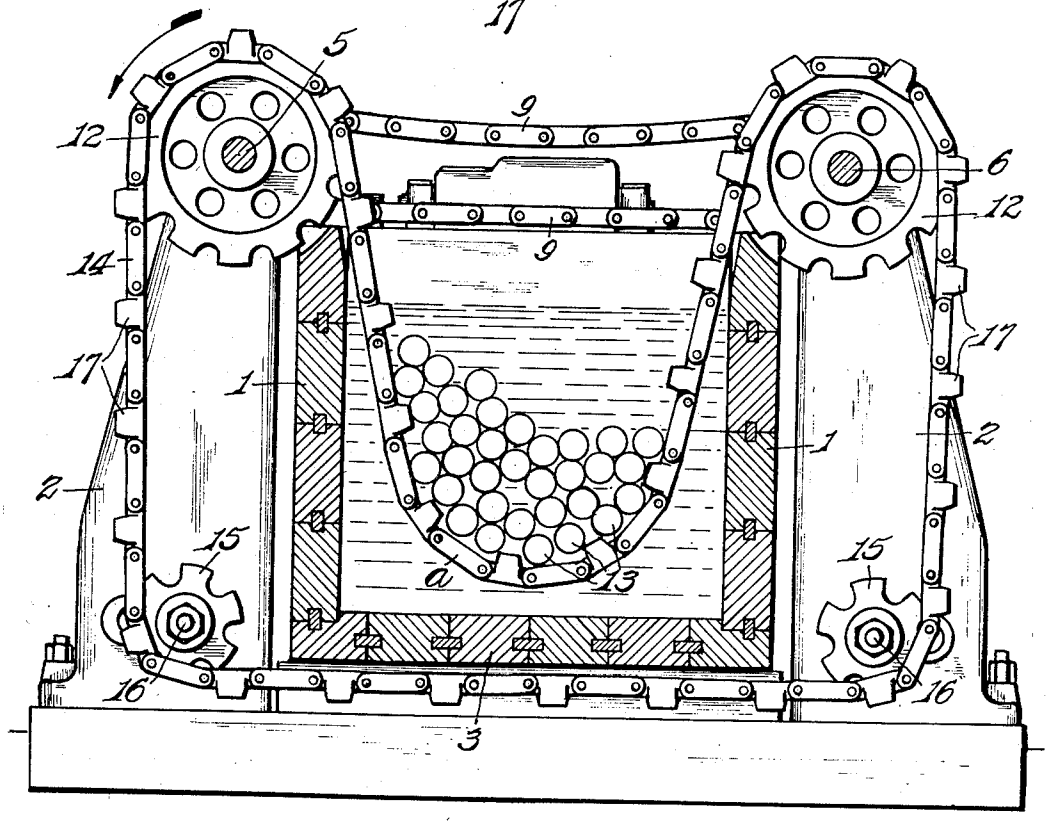


Fig. 3.

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Patented Jan. 17, 1928. 1,656,528

UNITED STATES PATENT OFFICE.

JOSEPH W. MILLARD, OF MARTINS FERRY, OHIO.

PICKLING APPARATUS.

Application filed December 9, 1926. Serial No. 153,521.

This invention relates broadly to apparatus for effecting pickling of metal rods, bars and tubing, and it has for its primary object to provide simple and effective means for removing the scale from lengths of metal rods, bars and tubing during the carrying out of the usual pickling operation or process.

It is well known to those skilled in the art that the manufacture of butt and lap weld tubes from skelp involves the heating, and, frequently, repeated reheatings, of the metal in the rolling and sizing operations in order to produce perfect joints; also that the hot rolling of rods and bars, especially of circular cross section, from blooms requires one or more heatings, and that such heatings and reheatings result in the production and the deposit on the surfaces of the product of a very considerable amount of scale.

It is the purpose of the present invention to provide, in association with a tank for containing a pickling solution, means whereby the metal rods, bars or tubes are supported within the tank and are continuously subjected to a rolling or tumbling thereof for effecting the prompt dislodgment of adhering scale with the result that the pickling is accomplished very much more rapidly than has been possible heretofore.

In describing the invention in detail, reference is herein had to the accompanying drawings, in which—

Figure 1 is a top plan view of the invention;

Figure 2 is a view of the same, partly in side elevation and partly in longitudinal section;

Figure 3 is a cross section on line 3—3, Fig. 1;

Figure 4 is an enlarged view of a length of the carrying chain, partly in plan and partly in section; and—

Figure 5 is a view of the same, partly in side elevation and partly in section.

Referring to said drawings, 1 indicates the sides and 3 the bottom of a pickling tank adapted for containing any appropriate pickling solution. Suitably located at each of the opposite sides of the tank are supports 2. Journaled above the level of the top of the tank and at opposite sides of the latter, as in bearings 20 borne by said supports, are shafts 5 and 6, one thereof, as the shaft 6, being driven by suitable means, as by an electric motor 7 connected thereto by suitable drive gearing enclosed within a gear case 8. The other shaft 5 is driven by an endless sprocket chain 9 which connects sprocket wheels 10 and 11 fixed on said shafts 5 and 6, respectively.

Sprocket wheels 12 mounted on said shafts in opposed pairs carry endless traveling chains 14 which constitute carriers for the lengths of rods, bars or tubes 13 which are being pickled, said chains having those portions thereof between the oppositely disposed sprockets 12 depending within the pickling solution in the tank in the form of catenary loops, as is clearly shown at *a* in Fig. 3. Idler sprockets 15 located in a common vertical plane with each of the opposed pairs of sprockets 12 cooperates with the latter for carrying the chains 14. Said idler sprockets, herein shown as mounted on stub shafts 16 carried by the supports 2, are so located relative to the level of the bottom 3 of the tank that the chains 14 in passing horizontally from one to the other thereof travel beneath said bottom, as shown.

The catenary loops *a* of the chains 14 constitute supports upon which rods, bars or tubes 13 to be treated are carried in submerged relation to the pickling fluid.

The chains 14 carry, or have formed on links thereof, preferably at spaced intervals, outwardly projecting lugs or dogs 17 which, in the advanced travel of said chains through the pickling solution, tend to carry forward therewith the thereby-engaged rods, bars or tubes, thus producing a continuous rolling and tumbling of the latter relative to each other. Such rolling and tumbling manifestly subjects the material or articles under treatment to frictional rubbing and battering to the extent that scale carried thereby is effectively dislodged in a small fraction of the time which has hitherto been required in effecting the pickling of such articles. Experiments have shown that pickling of rods, bars and tubes may be accomplished by means of the hereinbefore described apparatus in approximately one-sixth the time required to produce equally effective results by the most approved of heretofore prevailing methods of pickling. Thus, the capacity of the tank for effecting pickling is greatly increased, and, consequently, the cost of the pickling, or scale-removing treatment is materially reduced.

The carrying chains 14 are herein shown as two in number, but it will be understood that a greater number of such chains may be employed, depending upon the length of the material to be pickled, it being desirable that the width of space between chains shall be such that little if any sagging of the material may occur.

What is claimed is—

1. In apparatus for pickling metal rods, bars, tubes and similar articles, the combination with a tank container for a pickling solution of endless traveling chains supported outside and in independent relation to said tank and having portions of the lengths thereof depending within the tank in the form of catenary loops and constituting supports for a plurality of such articles, and means borne by said chains for engaging and advancing said articles for producing rolling and tumbling thereof relative to each other.

2. In apparatus for pickling metal rods, bars, tubes and similar articles, the combination with a tank container for a pickling solution of shafts journaled at opposite sides of and independently of the tank, sprockets carried by said shafts, endless traveling chains borne by said sprockets and having portions of the lengths thereof depending within the tank in the form of catenary loops and constituting supports for a plurality of such articles, said chains carrying projecting devices whereon the supported articles are advanced and elevated for subjecting the latter to continuous rolling and tumbling.

3. In apparatus for pickling metal rods, bars, tubes and similar articles, the combination with a tank container for a pickling solution, of upright supports located outwardly and independently of the tank, shafts journaled on said supports, sprockets carried by said shafts, endless traveling chains borne by said sprockets having portions of the lengths thereof depending within the tank in the form of catenary loops and constituting supports for a plurality of such articles, said chains embodying links having formed thereon projecting dogs by which, in the travel of the chains, articles adjacent thereto are engaged and advanced for inducing relative rolling and tumbling of the articles.

In testimony whereof, I affix my signature.

JOSEPH W. MILLARD.