

Jan. 9, 1945.

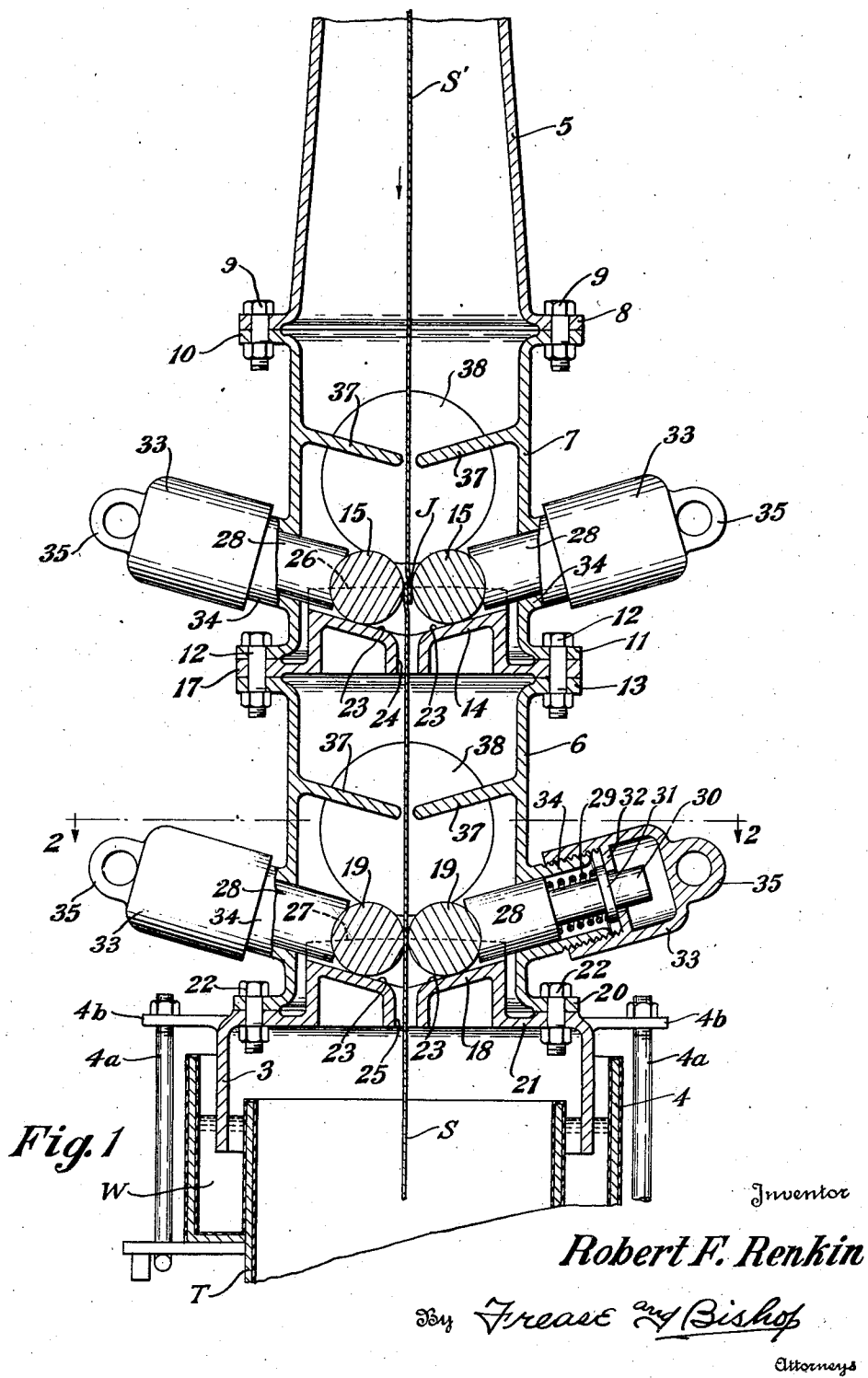
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SEAL FOR GAS PICKLING FURNACE MUFFLES

Filed Aug. 10, 1942

2 Sheets-Sheet 1



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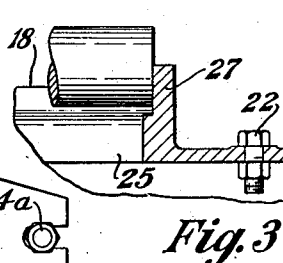
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UNITED STATES PATENT OFFICE

2,367,174

SEAL FOR GAS PICKLING FURNACE
MUFFLESRobert F. Renkin, Sharon, Pa., assignor of one-
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Application August 10, 1942, Serial No. 454,234

6 Claims. (Cl. 34—242)

The invention relates to an improved construction for providing a seal for a gas chamber, and more particularly to improved sealing means for the discharge end of a gas pickling furnace muffle in which continuous strip metal and the like is treated.

In coating steel products, as for example steel strips, wire and the like, with zinc, tin and other metals of low melting points, it is necessary to clean the surfaces of the steel product to prepare it for coating. The cleaning may be desirably effected by means of a "dry pickle" treatment instead of the ordinary wet pickle treatment in which an acid bath is utilized, and a method of coating steel strips or wire including such "dry pickle" treatment is set forth in my prior Patent No. 2,245,225, issued June 10, 1941 and entitled Method of coating metal.

In cleaning steel strip, for example, by means of this "dry pickle" treatment prior to coating, the strip is passed through a long closed muffle tube located within a heating furnace, and a heated controlled active atmosphere or "pickling gas" is passed through the muffle tube preferably in a direction counter to the travel of the strip. The pickling gas is adapted for reacting with the scale and other surface impurities on the strip to form gases or vapors which are carried off with the pickling gas passing through the muffle.

At its discharge end, the muffle tube extends downwardly into a hot water or fluxing bath, and it is very important to provide sealing means around the strip where it discharges from the muffle into the bath in order to prevent the escape of pickling gas and to prevent the vapors from the bath from entering into the muffle tube.

Moreover, continuous strip consists of coils having their ends welded together forming thickened and uneven joints, and accordingly the sealing means must be adapted to allow the joints to pass therethrough, and at the same time to provide a seal around the strip intermediate such joints.

It is therefore a general object of the present invention to provide a novel and improved sealing construction for a gas chamber in which a continuous strip or the like is being treated.

Another and more specific object is to provide improved sealing means for the discharge end of a gas pickling furnace muffle.

A further object is to provide an improved sealing construction at the discharge end of a gas pickling furnace muffle for sealing around a continuous strip having joints and passing vertically through the muffle.

A still further object is to provide a simple but extremely effective seal at the discharge end of a gas pickling furnace muffle, which seal prevents gases from entering or leaving the muffle as the strip discharges therefrom.

These and other objects are accomplished by the improvements comprising the present invention, which may be stated in general terms as including vertically spaced pairs of sealing rollers mounted in the depending vertical discharge portion of a muffle tube, said rollers being yieldingly held in engagement with opposite surfaces of a strip passing through the muffle tube, and being rollably supported on inclined supports sloping downwardly in opposite directions toward the strip.

While the invention is shown and described herein as applied to cleaning strip steel prior to coating, it will be understood that the invention includes the treatment of other products such as sheets, strip sheets, rods or wire, without departing from the scope of the appended claims.

Referring to the drawings forming part hereof, Figure 1 is a fragmentary vertical sectional view through discharge portion of a gas pickling furnace muffle, with certain parts in elevation; Fig. 2 is a transverse sectional view thereof as on line 2—2, Fig. 1; and

Fig. 3 is a fragmentary sectional view as on line 3—3, Fig. 2.

Similar numerals refer to similar parts throughout the several views of the drawings.

In Fig. 1 of the drawings the vertically extending discharge portion of a gas pickling furnace muffle is shown fragmentarily. The lower section 3 of said muffle portion extends into a water seal W provided by the channel 4 around the hot water or fluxing tank T into which the steel strip S passes preparatory to being coated. The tank T is detachably connected to the section 3 of the muffle portion by bolts 4a hung from ears 4b on section 3.

The upper section 5 of the muffle discharge portion is connected to the discharge end of a horizontal muffle tube extending through a gas pickling furnace, such as shown in my copending application Serial No. 444,502, filed May 26, 1942 and entitled Furnace muffle construction.

The steel strip S is cleaned or pickled in the horizontal muffle tube by the action of the pickling gas circulating therethrough, and as the strip passes downwardly through the vertical discharge portion of the muffle and then into the washing or fluxing tank T, the improved sealing means constituting the present invention prevents the

escape of the pickling gas and prevents the vapors from the washing or fluxing tank from entering the muffle tube.

As shown, the vertical discharge portion of the muffle tube is made up of a number of tubular sections including lower end section 3, top section 5, and intermediate sections 6 and 7. Additional sections may be used as required for making the connection with the horizontal portion of the muffle tube.

The top section 5 of the muffle tube discharge portion is provided with an angular flange 8, which is secured by bolts 9 to a flange 10 on the upper end of the intermediate section 7. Similarly the bottom end of intermediate section 7 is provided with an outturned flange 11 which is connected by bolts 12 to an outturned flange 13 on the upper end of section 6. Preferably the support member 14 for rollably supporting the upper sealing rollers 15 has an outturned flange 17 which is clamped between the flanges 11 and 13 for mounting the support 14 in the muffle tube discharge portion.

A similar support 18 for supporting the lower sealing rollers 19 is secured to or made integral with the lower end section 3, as shown, and the lower end of intermediate section 6 is provided with an outturned flange 20 which is bolted to the flange portion 21 of the bottom section 3 by means of bolts 22. The sealing roller supports 14 and 18 have upper surfaces 23, one on each side of the strip S, and said surfaces 23 are inclined downwardly in opposite directions toward the strip S. The rollers 15 and 19 are rollably supported at their peripheral or strip engaging surfaces on the inclined surfaces 23 and tend by gravity to rollably engage opposite surfaces of the strip A.

Between the oppositely inclined surfaces 23, the supports 14 and 18 are provided with slots 24 and 25 respectively, through which the strip passes.

The sealing roller supports 14 and 18 are provided at their ends with upwardly extending flange portions 26 and 27 respectively, and as shown in Figs. 2 and 3, said flange portions are adapted to slidably abut the ends of the sealing rollers 15 and 19 respectively, so as to substantially prevent any leakage of gas or vapor around the ends of the rollers and through the slots 24 and 25 in the supports 14 and 18.

The means for yieldingly urging each of the sealing rollers 15 and 19 toward the strip preferably comprises spring pressed plungers 28 having their longitudinal axes in planes parallel to the adjacent inclined surfaces 23 of the supports 14 and 18, and disposed at right angles to the longitudinal axes of the sealing rollers which they abut, as clearly indicated in Fig. 1. As shown in Fig. 1, each plunger 28 has a cylindrically curved end surface fitting a sealing roller, and is yieldingly urged against a sealing roller by means of a helical spring 29 engirdling a reduced portion 30 of the plunger and acting between the plunger 28 and a washer 31 on said reduced portion. The washer 31 abuts an internal annular flange 32 in a cap 33, which is preferably screwed on a projecting tubular portion 34. The tubular projections 34 are preferably integral with the muffle sections 6 and 7, and the plungers 28 are slidable therein. Preferably the caps 33 are provided with perforated ears 35 for facilitating attachment and detachment of the caps 33 from the projections 34.

A plurality of plungers 28 may be provided for

each of the rollers 15 and 19, and as shown in Fig. 2, two plungers are provided for each roller, although more may be provided, if desired.

The vertically spaced pairs of sealing rollers 15 and 17 are partially self-aligning because of being rollably supported on a slope or incline such as the inclined surfaces 23. For best results, it has been found that the angle of these surfaces 23 and the corresponding angle of the axes of plungers 28 with the horizontal should be approximately 15°, although considerable variation may be permitted while still obtaining satisfactory results.

By vertically spacing the sealing rollers 15 from the sealing rollers 19, the seal around the strip S at rollers 19 is maintained when the welded joint J between the end of that strip and the adjoining end of the next strip S' is passing through the other set of sealing rollers 15. As indicated in Fig. 1 the seal is being made between the strip S and the rollers 19 as the joint J passes through the rollers 15. Conversely, as the joint J passes through the rollers 19 the seal is maintained between the strip S' and the rollers 15, so that at all times one pair of sealing rollers is tightly engaging the strip surface to provide an effective seal.

As shown in Fig. 1, a pair of baffle ribs or plates 37 may be provided above each pair of sealing rolls 15 and 19, with a narrow opening between the baffles for passage of the strip. These baffles function to catch any foreign material carried along with the strip into the discharge portion of the muffle, and prevent any substantial amount of it from being carried into the sealing rollers.

A circular plug 38 is screwed in one end of each tubular muffle section 6 and 7 to provide access to the interior of said section for removing accumulated foreign material or replacing rollers. Each plug 38 has an annular flange 39 abutting a sealing ring 40, and is preferably provided with handling lugs 41.

The present invention constitutes a simple and effective seal at the discharge end of a gas pickling furnace muffle, so as to prevent the pickling gas from escaping into the washing or fluxing tank T, and also to prevent vapors rising from the tank from entering the muffle.

I claim:

1. Sealing construction for a chamber containing a fluid medium for treating a continuous metal strip, including spaced pairs of sealing rollers in said chamber for engaging opposite sides of said strip, means yieldingly urging each of said rollers toward and maintaining the same in sealing engagement with the strip, and a support for each pair of rollers having supporting surfaces rollably engaging the strip engaging surfaces of the rollers and oppositely inclined toward the strip.

2. Sealing construction for a chamber containing a fluid medium for treating a continuous metal strip, including a pair of sealing rollers in said chamber for engaging opposite sides of said strip, means yieldingly urging each of said rollers toward and maintaining the same in sealing engagement with the strip, and a roller support having surfaces rollably engaging the strip engaging surfaces of said rollers on opposite sides of said strip.

3. Sealing construction for a chamber containing a fluid medium for treating a continuous metal strip, including a roller support in said chamber having roller supporting surfaces on opposite sides of the strip inclined oppositely

toward the strip, sealing rollers rollably supported on said surfaces for engaging opposite sides of the strip, means yieldingly urging each of said rollers into engagement with the strip, and a flange on each end of the roller support slidably abutting the ends of the rollers supported thereby.

4. Sealing construction for a chamber containing a fluid medium for treating a continuous metal strip, including a roller support in said chamber having roller supporting surfaces on opposite sides of the strip, sealing rollers rollably supported on said surfaces for engaging opposite sides of the strip, means yieldingly urging each of said rollers into engagement with the strip, and a flange on each end of the roller support slidably abutting the ends of the rollers supported thereby.

5. Sealing construction for a chamber containing a fluid medium for treating a continuous

metal strip, including a pair of sealing rollers in said chamber for engaging opposite sides of said strip, means yieldingly urging each of said rollers into engagement with said strip, and a roller support having surfaces rollably engaging said rollers and a slot between said surfaces for passage of said strip.

6. Sealing construction for a chamber containing a fluid medium for treating a continuous metal strip, including a pair of sealing rollers in said chamber for engaging opposite sides of said strip, means yieldingly urging each of said rollers into engagement with said strip, and a roller support having surfaces oppositely inclined toward said strip and rollably engaging said rollers, said roller support having a slot between said surfaces for passage of said strip.

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