May 8, 1956 O. R. OLSON 2,744,619

BATH FURNACE CONVEYING DEVICE

Filed April 22, 1953 2 Sheets-Sheet 1

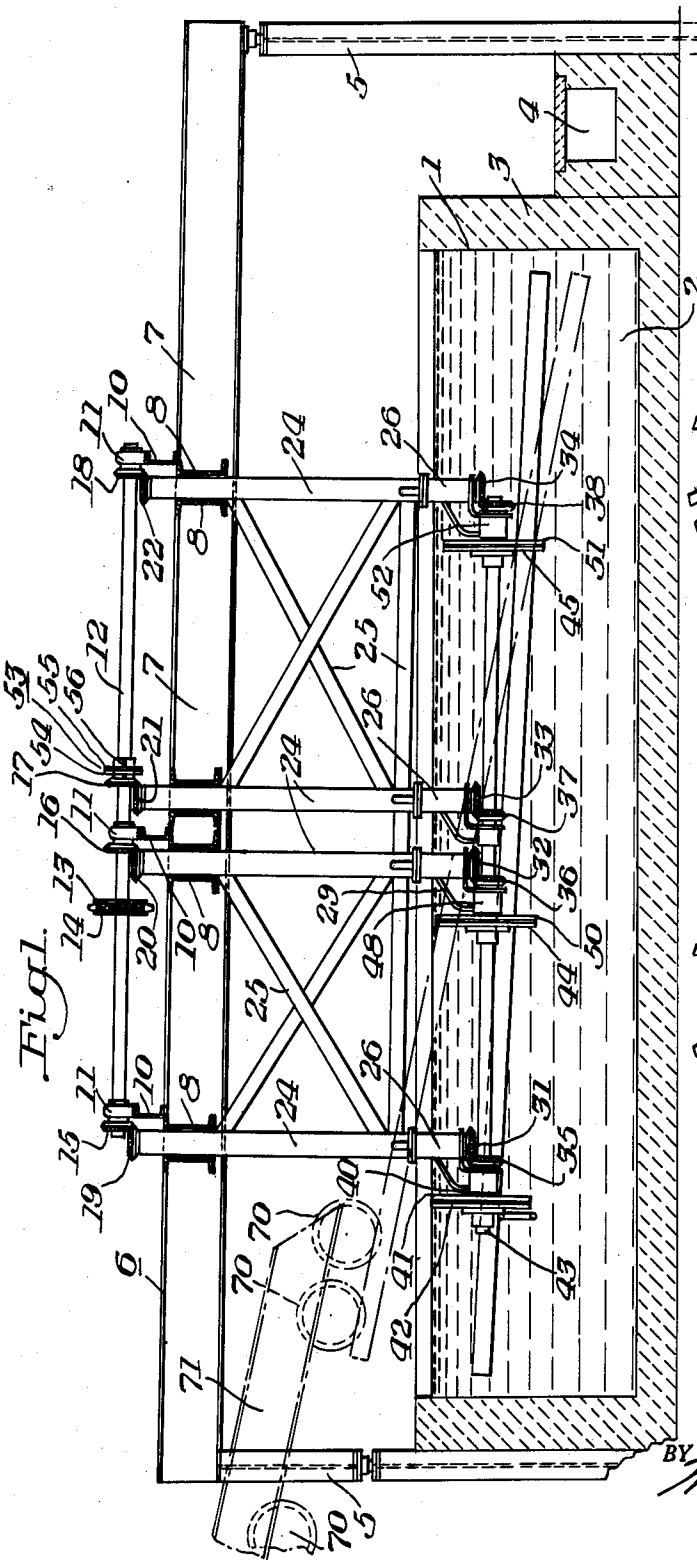

Fig. 1.

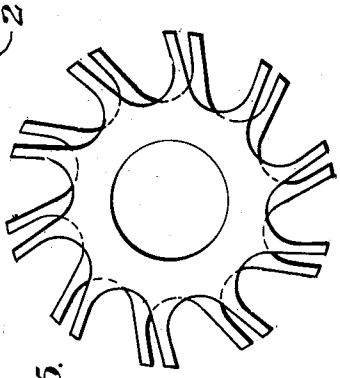

Fig. 5.

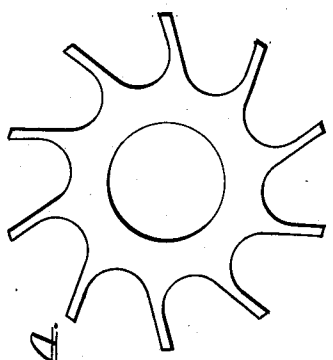

Fig. 4.

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Fig. 2.

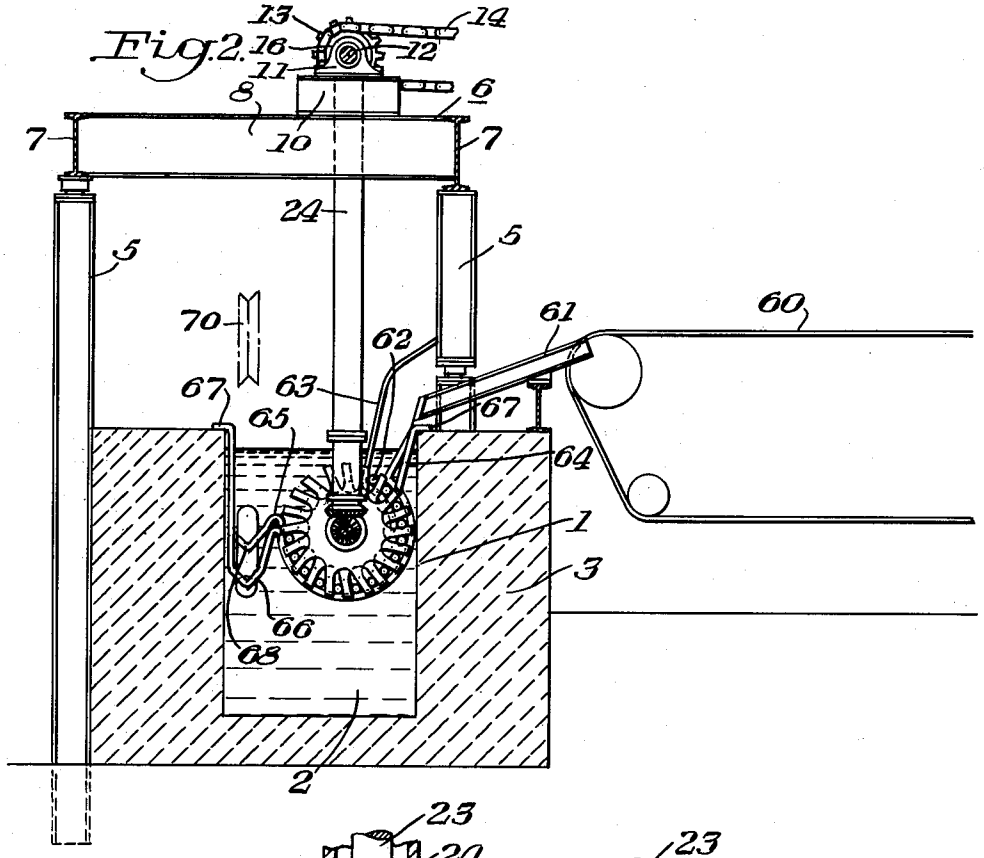
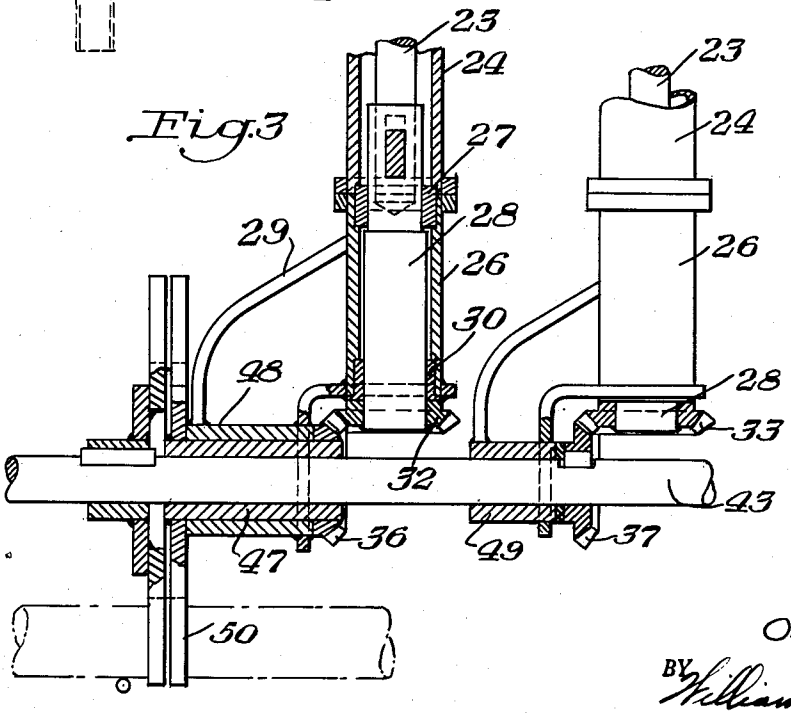


Fig. 3



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BATH FURNACE CONVEYING DEVICE

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5 Claims. (Cl. 198—211)

This invention relates generally to the art of conveying while heating articles such as pipe sections in a bath furnace during the process of coating or working on the same and more particularly to the conveying of different quantities of pipe sections through the furnace bath with the constant speed of the conveyor member.

A bath type furnace requires some mode of feeding the articles therethrough. Present day practice is to employ manual labor who roll the articles, such as pipe sections, into the bath allowing them to remain a given length of time and then fish for them in the bath when it is time to remove them. The bath is in a kettle type furnace which may contain many different solutions. A bath may consist of spelter for the purpose of galvanizing the articles or it may be a hot salt solution for the purpose of heating articles that are to be further treated as by pickling or for heating articles such as uranium metal prior to rolling the same. Baths of this character are contained in a large steel kettle which is supported on a base and laterally, from the sides and end walls, by ceramic furnace walls. Portions of the side and end walls of the kettle may be exposed directly to the products of combustion of the furnace employed to heat the same and maintain the same at the proper temperature.

One of the principal objects of this invention is the provision of a kettle furnace that is provided with a series of rails or skids for the purpose of guiding and supporting sections of longitudinal members, such as pipe sections, as they are fed into and through the bath so that they remain in the bath a specific period of time which would be sufficient to properly coat the same if it is a spelter furnace or to properly heat the same if it is a salt bath. These articles may be supported by skids and moved by wheels that are provided with perimetral pockets for the purpose of carrying the pipe sections through the bath and discharge the same after a predetermined period of time. The whole of these wheels may be submerged and the pipe section carried by the wheels themselves, or as previously stated, the pipe sections may be rolled or shoved along parallel track or skids while the perimetral pockets in the wheels merely maintain the pipe sections in spaced relation and roll them through the bath at a predetermined period of time. After the pipe sections have remained in the bath a given time, another means is employed to lift and convey the pipe section from the bath. This discharge mechanism, however, comprises a subject matter of copending application.

Another object of this invention is supervision of a pair of wheels, each having equal sized pockets and equal number of pockets around their perimeter, which when rotated, may be mounted adjacent each other to form a single wheel with a given maximum number of pockets which represents the maximum number of pockets in each individual wheel. When one wheel is disposed at an angle relative to the other wheel to offset their pockets relative to each other, they present an annular series of pockets which are equivalent to twice the number of

pockets of each individual wheel but substantially half the size. Thus large pipe sections may be fed through the bath by the pocketed conveyor wheels in phase with each other. Since the speed of operation of the wheels is substantially constant and they will convey the large pipe sections through the bath at a given period of time, they will thus convey a specific number of pipe sections for a specific period of time.

When the conveyor wheels are disposed at an angle equal to half the pitch of their pockets, thus presenting twice the number of pockets for conveying smaller pipe sections through the bath, the wheels are operated at substantially the same speed. They will convey twice the number of pipe sections through the bath. Due to the fact that these pipe sections are smaller diameter they do not require the length of time in the bath as the larger pipe sections because they do not contain the amount of steel the larger sections contain. It is unnecessary to allow a smaller section of pipe to remain in the bath as long as the larger section of pipe, however, both sizes of pipe sections remain in the bath a proportionate amount of time and in accordance with their weight.

The conveyor wheels may be disposed of at less than one half the pitch of the pockets on the conveyor wheels and thereby present smaller pockets for smaller sections of pipe but the total number of pockets is the same as that in each wheel. This may be employed to convey solid rods or other members of greater weight having smaller cross section through the bath. These require a longer period of time in the bath as do the larger pipe sections which may be of the same weight as the solid member.

Again the conveyor wheels when locked together may be rotated at the different speeds so as to change the timing that they convey the pipe sections through the bath. In some instances, wherein the pipe sections are preheated before they are fed into the bath, it may be desirable to feed them through the bath at a faster rate of speed as it is not necessary to allow the pipe sections to dwell too long for the purpose of coating the same as spelter.

It is preferable to have two wheels mounted relatively close together and it is also desirable to have one or more sets of these pairs of wheels, particularly when these pipe sections are comparatively long. In order to rotate the wheels of each pair, it is necessary to mount one group of wheels on a shaft and the other group of wheels on sleeves that are rotated with and supported on the shaft. By employing a common source of power, one group of wheels may be driven through a clutch member whereas the other group of wheels would be driven directly from the source of rotary power. In this way the clutch member may be shifted to change its relative position so as to dispose the wheels of each pair in their predetermined proper relation to each other for the purpose of changing the size or the number of pockets adequate for conveying selected articles through the bath.

While it is necessary to provide rotary motion submerged within a bath of spelter or boiling salt, some of the structure is usually attacked by the bath and it is necessary to protect the same. In order to permit the rotary structure to operate submerged, it is necessary to provide large clearances, in other words, to employ a sloppy fit in order that the bath does not completely destroy or jam the rotary parts when they are operated in the heated bath. Structure of this character is made very rugged and will still operate with sufficient degree of accuracy to prevent any misaction in the conveying of the articles through the bath.

The clutch member which determines the relative position of one of each pair of wheels may be of a dent type and dials may be provided to indicate the exact location

of one wheel in respect to its mate in a pair, or of a simpler type of clutch such as coaxial flanges each having a relative series of holes where certain selected holes being lined and fitted with clamping bolts produces a series of adjusted positions or types of pockets. When the flanges are bolted together the bolts are in shear. This type of clutch member provides a simple protection to the device.

Other objects and advantages appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification, without limiting the invention or claims thereto, certain practical embodiments illustrating the principles of the invention wherein:

Fig. 1 is a view in side elevation of the conveying device as disposed in a bath type furnace.

Fig. 2 is a view in end elevation of the structure as illustrated in Fig. 1.

Fig. 3 is a detailed view in section illustrating a manner of drive of the structure described in Fig. 1.

Fig. 4 is a view in end elevation of the structure illustrated in Fig. 1 with the conveying wheels having their pockets congruent to each other.

Fig. 5 is a view in end elevation of the structure illustrated in Fig. 1 with the pockets of the conveying wheels offset relative to each other to reduce the size of the pocket.

Referring to the drawings, **1** represents the kettle which contains the bath material **2** and which is supported in and surrounded by a furnace structure **3**, only a part of which is indicated by the flue **4**. A series of vertical support post members **5** are arranged to carry superstructure **6** made up of the longitudinal I-beams **7** connected by the cross channel members **8**. Selected of said cross channels **8** have bearing stands **10** which support the bearing members **11** that carry the common drive shaft **12** that obtains its source of power from any suitable drive means to the sprocket member **13** driven by any suitable chain as indicated in **14**.

The bearing members **11** at the opposite ends of the shaft also function as thrust members. The shaft **12** supports the beveled gear members **15**, **16**, **17** and **18**. Each of these beveled gear members is meshed with a complementary beveled gear **19**, **20**, **21** and **22** respectively. The latter beveled gears are mounted on the ends of the four vertical shafts illustrated at **23** in Fig. 3 which has contained within, their housing members **24** supported between the channel members **8** and also tied together by the braced frame members **25** as shown in Fig. 1. Thus the housings **24** and the frame **25** when fabricated present a unitary structure which, with the whole of the mechanism suspended therefrom, may be raised and removed from the vicinity of kettle **1** for the purpose of working on the kettle or the furnace.

As shown in Fig. 3 the housings **24** have the lower bearing sleeves **26** secured to their lower ends and carry the upwardly spaced sleeve bearing members **27** adjacent to the upper ends of the sleeves in which sleeves are journaled the lower stub shafts **28** that are keyed to the upper shafts **23** and are journaled in the lower bearing members **30** each having a beveled gear attached to its lower end. As shown in Fig. 1 the opposite end of the shaft having bevel gear **19** is provided with bevel gear **31** and the consecutive shafts are provided with bevel gears **32**, **33**, and **34**. Each of these bevel gears mesh with complementary bevel gears **35**, **36**, **37** and **38**. The gears **35**, **36** and **38** are connected to sleeves and bevel gear **37** is connected to the shaft. Beveled gear **35** is connected to sleeve **40** on which the wheel **41** is secured. Wheel **42** is secured to the end of the shaft **43**. The shaft **43** extends the full length of the structure and has the wheels **42**, **44** and **45** keyed or otherwise secured thereto. Shaft **43** is driven by the bevel gears **17**, **21**, **33** and **37**. This shaft **43** is carried in bearings in the sleeves **40**, **47** and **52** and in the bearing **49**. As shown in Fig. 3 bevel gear **32** drives bevel gear **36** which is secured to the sleeve **47** that is in turn journaled within the bearing **48** and carried by the back bracket **29** from the housing over the shaft **28**. The other end of the sleeve **47** has secured thereto the wheel member **50** which mates with the wheel member **44** and a similar structure is illustrated for supporting the wheel member **51** which forms a pair with the wheel member **45** and is supported by the bearing member **52** and driven through the meshing bevel gears **34** and **38**. In this structure each of the wheels driven by a sleeve has an independent drive from the shaft **12** whereas the shaft **43** drives each of the wheels **42**, **44** and **45** through the single drive including the bevel gear train **17**, **21**, **33** and **37**.

The drive to the shaft **43** through this bevel train is proved with a clutch member as shown in **53** which has one flange **54** secured relative to the bevel gear **17** and the other flange **55** is secured relative to the shaft **12**. Each of these flanges is provided with a series of multiple openings, which when placed in alignment with each other, may receive one or more bolts as illustrated in **56** for the purpose of locking the flanges **54** and **55** together at a predetermined selected position such as may be illustrated in Figs. 4 and 5. Fig. 4 shows each pair of wheels in phase with one another and Fig. 5 shows a pair of wheels partially in phase, whereas Fig. 2 illustrates the wheels being at a pitch of one-half the pitch of the pockets provided in each wheel.

As shown in Fig. 2 the supply conveyor such as illustrated at **60** is to supply the articles such tubing which is short enough to pass between the support members **5** and roll down the skid members **61** one at a time, falling into an upwardly open pocket as illustrated by the pipe section **62**. Thus a series of pipe sections on the conveyor **60** may be timed so that each pipe section is dropped into a pocket as it is presented at the end of the skid **61** and controlled by the guide members **63** that form a throat. The pipe is then supported by the skid members **64** which extend around the perimeter of the wheels to the discharge point as indicated at **65** wherein the pipe members are permitted to drop over into and be caught by the V-shaped pockets **66** of the skids **64**. A number of skids may be provided and their ends are turned outwardly and rest on top of the furnace structure as indicated at **67**. When the pipe has been dropped into the pocket **66** a hook member such as illustrated at **68** may raise one end of the pipe section and engage it with the first of the series of the magnetic rolls **70** supported from the beam structure **71**. The rolls **70** are rotatably driven in order to drag the pipe upwardly along the inclined plane as shown in Fig. 1 and remove it from the bath. At this time the pipe is swabbed by means of an asbestos cloth structure or by means of vapor such as steam for the purpose of heating the inside and the outside of the same.

As shown in Fig. 2 there are twice as many small sections of pipe in the bath feeder than in that illustrated in Fig. 4 where the wheels are in phase for large pipe, and there are the same number of sections of pipe in Fig. 5 as that illustrated in Fig. 4 for an intermediate sized pipe, although the pipe and the pockets are smaller. In such an instance the speed of the mechanism may be reduced or may be increased in order to increase or reduce the conveying time through the bath. The medium sized pipe shown in Fig. 5 may take a different time than the larger pipe as shown in Fig. 4 in order that the pipe will not be underheated and remain in the bath longer than necessary. In other words, the different positions of the clutch member **53** together with the speed of the device determines the time each pipe section or other articles are permitted to remain within the bath.

While for clarity of explanation, certain embodiments of this invention have been shown and described, it is to be understood that this invention is capable of many modifications and changes in the construction and arrangement of parts and certain parts and steps may be employed without the conjoint use of other parts and

steps and without departing from the spirit and scope of this invention.

I claim:

1. A rotary feeder for moving articles to be treated comprising a support carrying a plurality of spaced bearing means, a sleeve means rotatably supported in each of said bearing means, a wheel mounted on said sleeve means and having outwardly open article conveying pockets, a shaft rotatably mounted in said sleeve means, a wheel mounted on said shaft and having outwardly open article conveying pockets co-operating with the pockets of the first wheel, a rotary power source, independent intermediate drive means connected between said rotary power source and said sleeve means and said shaft to rotate their respective wheels independently and at the same speed to permit said outwardly open article conveying pockets to co-operate with each other, and clutch means in said drive means to shift the relative rotary position of said wheels and change the relative position of their outwardly open article conveying pockets to determine the size and number of outwardly open article conveying pockets available for receiving and conveying articles.

2. The structure of claim 1 characterized in that the wheel on the sleeve means and the wheel on said shaft

are in pairs relatively close to each other and operate as a unit.

3. The structure of claim 1 characterized in that said clutch means can be engaged to provide twice the number of small pockets as there are large pockets in said wheels.

4. The structure of claim 1 characterized in that said clutch means can be engaged to provide smaller sized pockets than that obtainable with said wheels in phase with each other.

5. The structure of claim 1 characterized in that said independent intermediate drive means comprises a second shaft parallel with said first shaft and said sleeve means and independent take off means forming a drive from said second shaft to said first shaft and to said sleeve means, said clutch means being disposed between said second shafts and said independent take off drive means to said first shaft.

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