Nov. 4, 1930. F. A. FAHRENWALD 1,780,382

APRON TYPE CONVEYER

Filed Oct. 11, 1928 2 Sheets-Sheet 1

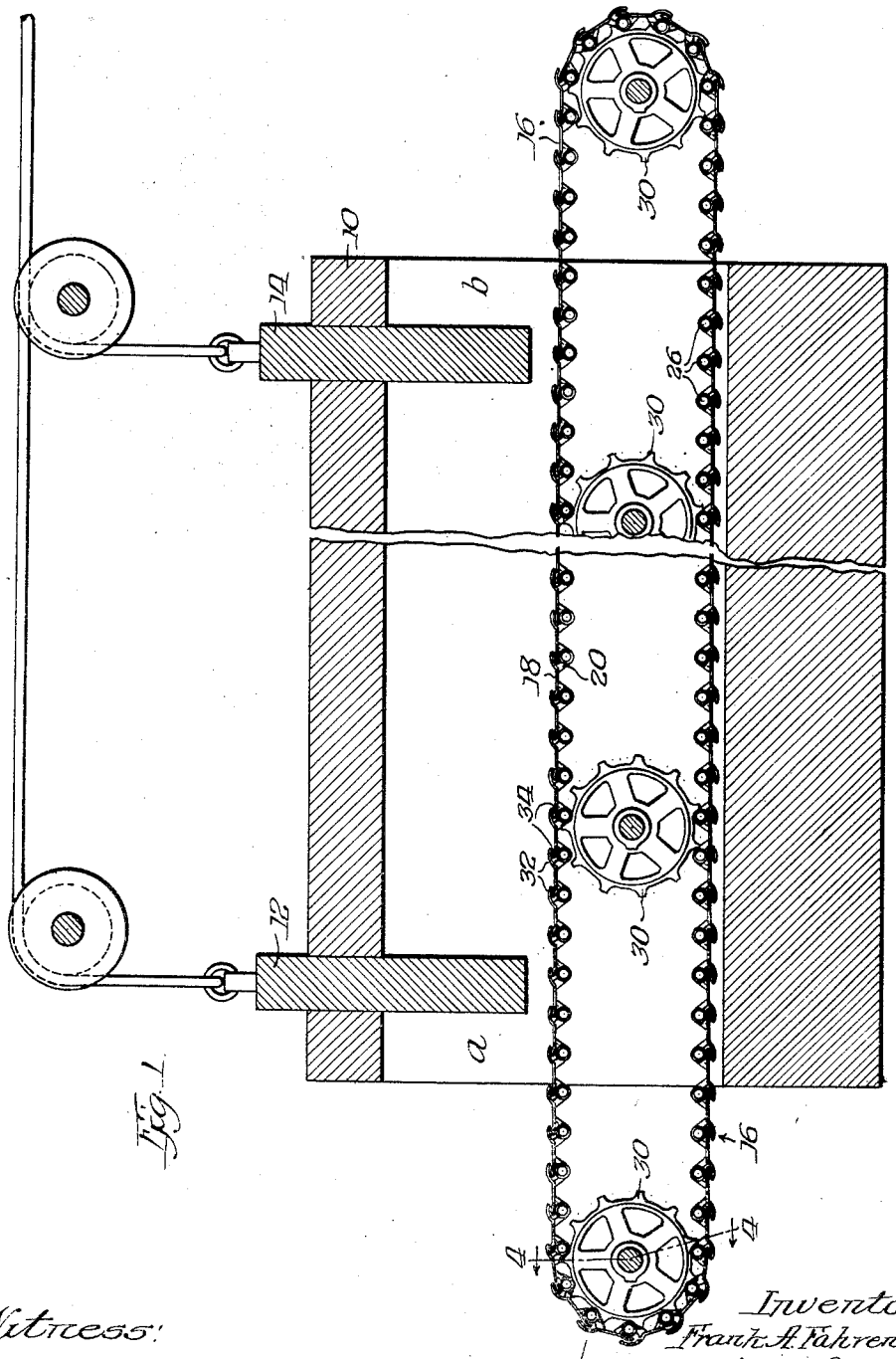


Fig. 1

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APRON TYPE CONVEYER

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Fig. 4

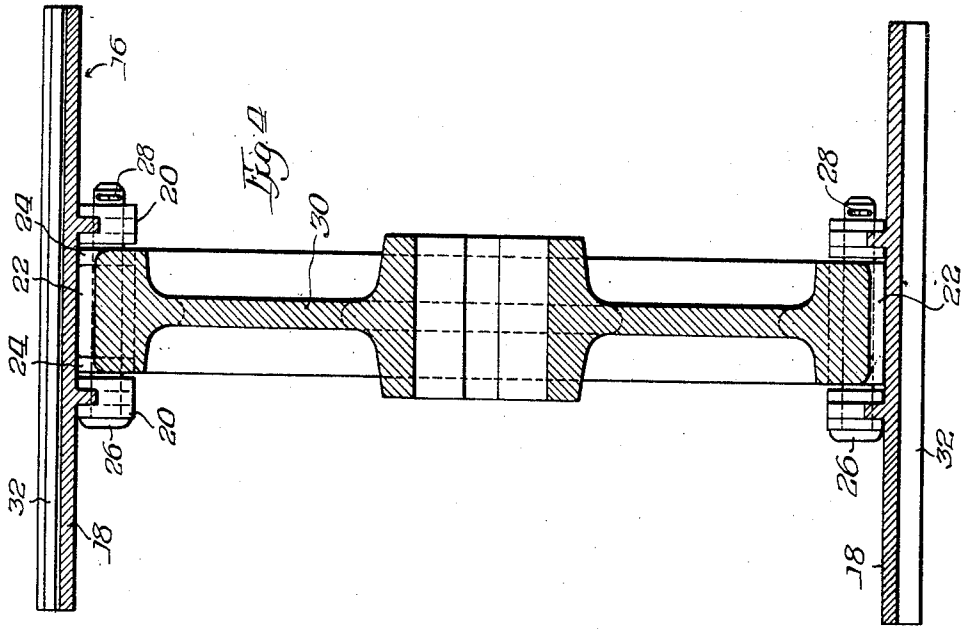


Fig. 2

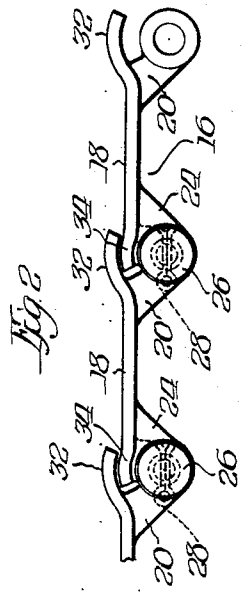
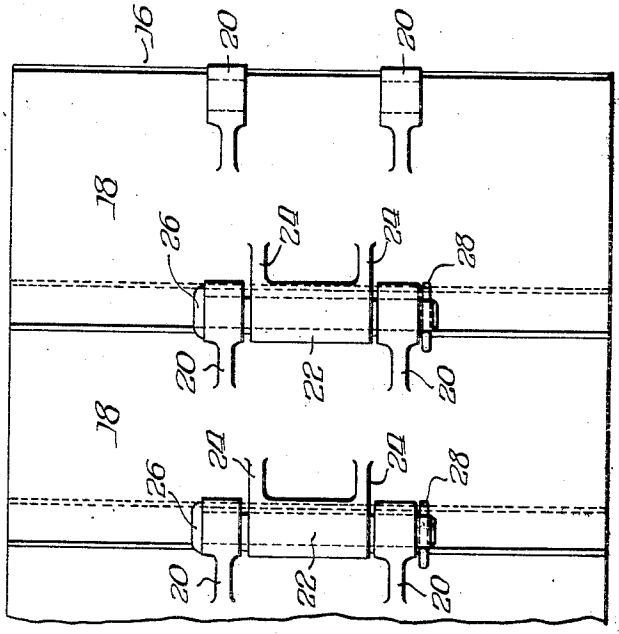


Fig. 3



Witness:

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Patented Nov. 4, 1930 1,780,382

UNITED STATES PATENT OFFICE

FRANK A. FAHRENWALD, OF CHICAGO, ILLINOIS

APRON-TYPE CONVEYER

Application filed October 11, 1928. Serial No. 311,805.

This invention relates to conveyers and is illustrated herein as embodied in a conveyer of the apron type in which the load engaging surface is comprised of a series of alined sections having overlapping adjacent edges.

In the manufacture of certain types of steel parts such as bolts, nuts, small forgings, and the like, it has been found expedient to provide a furnace having open ends and a conveyer which extends from a point located outside of one open end of the furnace through the furnace, and thence to a point located outside of the opposite open end, and in the operation of such furnaces, the steel parts are deposited upon the exposed surface of the conveyer and as they advance through the furnace a suitable degree of heat is imparted to them. To the end of advancing the parts through the furnace, a great number of conveyer units, such, for example, as internal screw feed retorts, and continuous alloy sheet metal belts, have been developed and utilized in heat treating the steel parts but it has been found that these devices are open to a number of objections due on one hand to the complexity and great weight on the part of the screw feed retorts, and on the other hand to the tendency to break or warp on the part of the sheet metal belts.

Now, it has been found that apron type conveyers approach the requirements demanded in furnace use, but it has further been found that such conveyers heretofore known and developed are so heavy and rugged as to make their installation cost practically prohibitive, and in addition to this, the old type of apron conveyers are highly subject to breakage. It has been heretofore pointed out that the conveyer extends through the furnace from points outside thereof, the purpose of this being to permit an operator to deposit the steel parts upon the apron outside of the furnace and to remove them after they have passed through the furnace and have again gained the outside, and when a conveyer is used in this manner, the repeated submission of the various portions of the conveyer, first to furnace conditions and then to atmospheric conditions, produces an expanding and contracting action which tends to warp and break the conveyer links, and also, the links in passing from the atmosphere through the furnace tend to rob the furnace of a great deal of heat and to chill the articles which are carried upon the surface of the conveyer.

Such considerations as those just set forth render it extremely desirable to provide an apron type conveyer which is simple in design and construction, is light in weight, is durable in wear, and of such a construction that it does not tend to absorb very much heat upon passing into the furnace. In view of the foregoing desideratum, it is an important object of the present invention to provide an improved conveyer which may be efficiently employed in connection with furnaces for heat treating metallic parts as well as in connection with various other apparatuses and operations.

An important feature of the invention consists in the provision of a series of alined load engaging members having simple connecting means formed integrally therewith. The load engaging members comprise flat plates that are comparatively thin in cross section and are provided with overlapping adjacent edge portions, and being of such a construction, they are of small volume and hence do not tend to absorb very much heat in passing through the furnace.

Still a further important feature of the invention consists in constructing the means for connecting together adjacent plates in such a manner that the means may also serve as means for engaging a device for impelling the conveyer. In the illustrated embodiment of the invention, the means for connecting adjacent load engaging members comprises a plurality of spaced arms formed integrally with one of the members and a barrel portion carried by the adjacent edge of an adjoining member. The barrel portion is arranged to extend between the spaced arms, in which position it serves as a sprocket engaging tooth, and there is provided a fastening element which extends through alined openings formed in the barrel member and the spaced arms to hold such member and arms in assembled relationship.

An additional feature of the invention consists in locating the connecting portions centrally of the width of the plates whereby the elongated conveyer is supported centrally of its width, and there need be provided only a single row of centrally located sprocket engaging teeth as contrasted with a plurality of rows located along opposite side edges of the conveyer.

From a slightly different aspect, the invention consists in the provision of an improved article of manufacture comprising a conveyer section, or plate, having connecting portions formed integrally therewith along the outside edges of the plate thereby leaving a smooth unobstructed central portion. Such a construction attains simplicity in design and permits the connecting portions to be used as sprocket teeth without creating interference between the sprocket and the central portion of the plates.

These and other objects and features of the invention will become apparent from a reading of the following specification in the light of the accompanying drawings, in which—

Figure 1 is a view in side elevation showing diagrammatically a furnace and a conveyer extending therethrough;

Figure 2 is a fragmentary view of a portion of the conveyer shown in Figure 1;

Figure 3 is a view in bottom elevation of the portion of the conveyer shown in Figure 2; and

Figure 4 is a view in section taken along the line 4, 4 of Figure 1.

As shown in the drawings, the reference numeral 10 indicates, generally speaking, a heat treating furnace that is provided with open ends *a*, *b* which may be closed by means of vertically movable sealing doors 12, 14. The purpose in providing the open ends of the furnace is to the end of accommodating a conveyer 16 which extends longitudinally through the furnace and terminates at points located beyond the open ends thereof. As shown in Figure 1, the conveyer is of the endless or apron type in the use of which a continuous work engaging surface is constantly moving through the furnace and this surface is utilized as a support in advancing steel parts, or other metallic objects to which it is desired to apply heat, from a point outside of the furnace at one end through the furnace and thence to a point outside at the other end.

It has heretofore been pointed out that an extremely desirable consideration in conveyers of this type resides in the simplicity and lightness of the conveyer, and, in considering the construction and arrangement of the conveyer parts as described in the following paragraphs, it is requested that attention be directed to the outstanding simplicity and consequent lightness of the invented conveyer. As shown in Figure 3, the conveyer 16 is composed of a plurality or series of approximately rectangular plates 18, 18 which are of the same width and are alined with one another in order to provide a long narrow conveyer surface. The conveyer elements 18, 18 are each provided with a plurality of spaced parallel arms 20, 20 which extend downwardly from each conveyer element in a direction oblique to the bottom surface of the element, and with a barrel or bearing portion 22 which is formed integrally with a plurality of spaced supporting arms 24, 24 that extend obliquely downward from the edge of the plate lying opposite to the spaced parallel arms 20, 20. Thus, it will be seen that each conveyer element or plate 18 has a plurality of downwardly extending arms formed integrally along one edge of the plate and a barrel portion formed integrally along the other edge of the plate, and it will also be understood, of course, that the spaced parallel arms of one plate have interfitting engagement with the barrel portion of the next adjacent plate and serve in securing the plates to one another. As illustrated, the arms 20, 20 and the barrel portions 22, 22 of the several plates are bored out in such a manner that when the plates are assembled there are presented elongated openings through which suitable fasteners 26, 26 may be inserted to hold the plates in assembled relationship. If desired, a locking means 28, herein illustrated in the form of a cotter pin, may also be provided.

It is to be appreciated that forming the connecting portions integrally with the conveyer elements in the manner described results in the production of a conveyer that is essentially simple in design and construction, and yet, owing to its very simplicity is extremely durable in operation and little likely to get out of repair.

As shown in Figure 1, the conveyer is mounted to pass over a plurality of actuating, or impelling, members or devices which in the figure referred to are illustrated in the form of sprockets 30, 30. As the members or elements 18 of the conveyer pass over the end sprockets there is a tendency for adjacent members to spread apart leaving a space between them and to the end of preventing the presence of such spaces the adjacent edges or ends of the members 18, 18 are overlapped in the manner illustrated in Figures 1 and 2. As there shown, the forward edges 32, 32 of the several plates are formed with a convex upper surface and a concave lower surface which overlies the slightly upwardly flexed rear edge portions 34 of the members.

It is to be pointed out at this interval that the distance between the center of the connecting pins or fasteners 26, 26 and the top of the plates 18, 18 is slight, from which fact it follows that in passing across the

sprockets 30, 30 the ends of the plates in pivoting about the fasteners 26, 26 do not tend to spread far apart owing to the short radius about which they pivot. As a result of this feature, the overlapping of plates may be small whereby the major portion of each plate remains clear and unobstructed.

Furthermore, it is to be observed that the rear edges 34, 34 of the plates 18, 18 are normally located only a short distance in front of the downwardly depending arms 20, 20 and by means of such an arrangement if any appreciable sagging takes place in the conveyer the arms will engage the rear edges of the next adjacent plates and will tend to prevent the sagging action.

In still further carrying out the basic idea of simplicity in design and construction and lightness in weight, as well as durability in wear, the connecting portions or elements which join adjacent plates together are of such a construction that they may serve as sprocket engaging members, or teeth, thereby eliminating the necessity of further increasing the weight of the conveyer by providing sprocket engaging means separate and distinct from the connecting members. As illustrated, the barrel or bearing portions 22 are offset by means of the supporting arms from the lower surfaces of the plates 18, 18 and by reason of the location of the arms being restricted to the front and rear edges of the plates, the central portions of such plates are unobstructed, by virtue of which condition the conveyer along its bottom side presents a plurality of alined, equally spaced sprocket engaging teeth that are offset uniformly from the bottom of the plates 18, 18. Also, by disposing the row of sprocket teeth centrally of the elongated conveyer, and by providing sprockets the teeth of which are of a suitable width, the conveyer may be supported upon the sprocket by means of one row of teeth centrally spaced as contrasted with a plurality of rows located along the opposite edges of the conveyer.

Thus, it will be seen that the conveyer plates are provided with integrally formed connecting portions which serve also as means for engaging the sprocket teeth, and are of such a formation that they are lighter in weight and yet more rugged in design than are many of the heavy and complex arrangements which are in use today.

While the invention has been disclosed herein with particular reference to heat treating furnaces, it is to be appreciated, of course, that although the invention does have an outstanding applicability to furnace use, it may also be put to other suitable uses, and employed in connection with other apparatuses without in the slightest departing from the scope of the invention as set forth in the appended claims. Furthermore, there may be changes in design and construction of the conveyer or the component parts thereof which will from time to time occur to those skilled in the art, but the introduction of such changes or modifications into conveyers of the illustrated type will not in most events constitute departures from the present invention, for it is contemplated that in order to adapt the conveyer to different uses and even in order to readapt it to the same use it may be found desirable to make such changes and variations as will from time to time occur to those skilled in the art.

Having thus described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. A conveyer comprising in combination a plurality of plates, a pair of separate arms integrally connected with each of said plates and extending downwardly and rearwardly from a central portion near one edge of one plate, a pair of arms integral with the adjoining plate and extending downwardly and forwardly from a central portion near the adjacent edge of the said adjoining plate, the latter arms being integrally connected by a barrel portion and fitting between th first mentioned arms; a pin extending through all of said arms to pivotally join said plates; each of said plates having a large, substantially flat top surface, and opposite edge portions curved about said pin as an axis to overlap the adjoining plates, and having a bottom surface unencumbered except by two remote pairs of depending arms.

2. A conveyer comprising in combination a plurality of plates, a pair of separate arms integrally connected with each of said plates and extending downwardly and rearwardly near one edge of one plate, a pair of arms integral with the adjoining plate and extending downwardly and forwardly near the adjacent edge of the said adjoining plate, the latter arms being integrally connected by a barrel portion and fitting between the first mentioned arms; a pin extending through all of said arms to pivotally join said plates; each of said plates having a large, substantially flat top surface, and opposite edge portions curved about said pin as an axis to overlap the adjoining plates, and having a bottom surface unencumbered except by two remote pairs of depending arms.

3. As an improved article of manufacture, a conveyer section comprising a load engaging plate having remotely spaced pairs of arms integral therewith and extending downwardly and outwardly from opposite edge portions of the bottom face of said plate, one of said pairs being integrally joined by a barrel portion and the other of said pairs being spaced to receive such a barrel portion on another plate, all of said arms having openings for the reception of pins, said plate having a large, substantially flat top surface and opposite edge portions curved about said pin

openings as axes to overlap the adjoining plates, the bottom surface of said plates being unencumbered except by the two pairs of depending arms.

Signed at Chicago, Illinois, this 2nd day of October, 1928.

FRANK A. FAHRENWALD.