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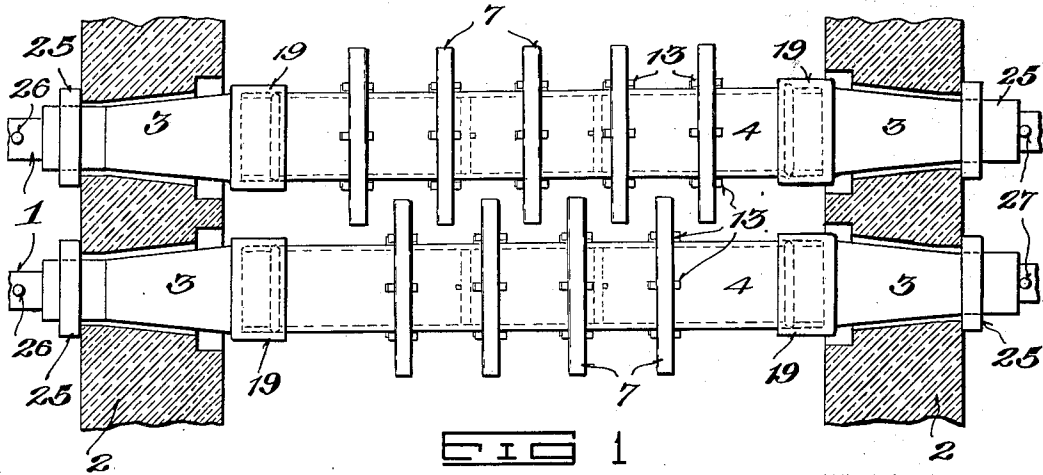
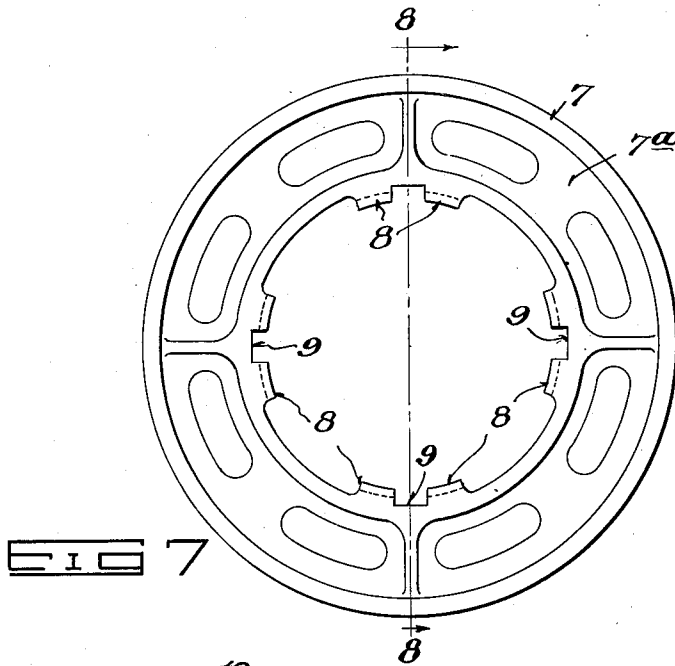
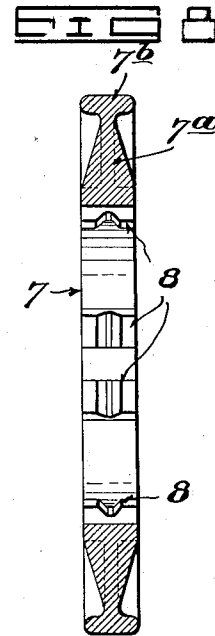
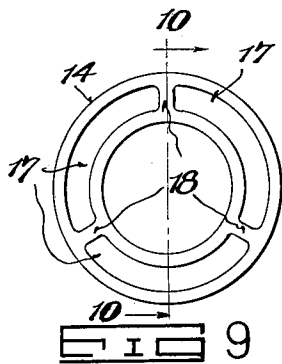
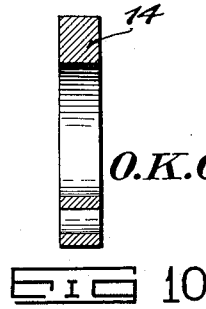
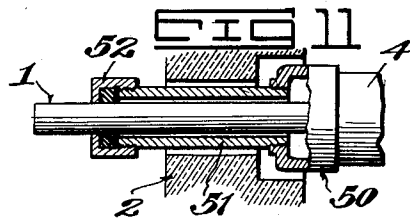
O. K. CARPENTER ET AL

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FURNACE CONVEYER

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2 Sheets-Sheet 1



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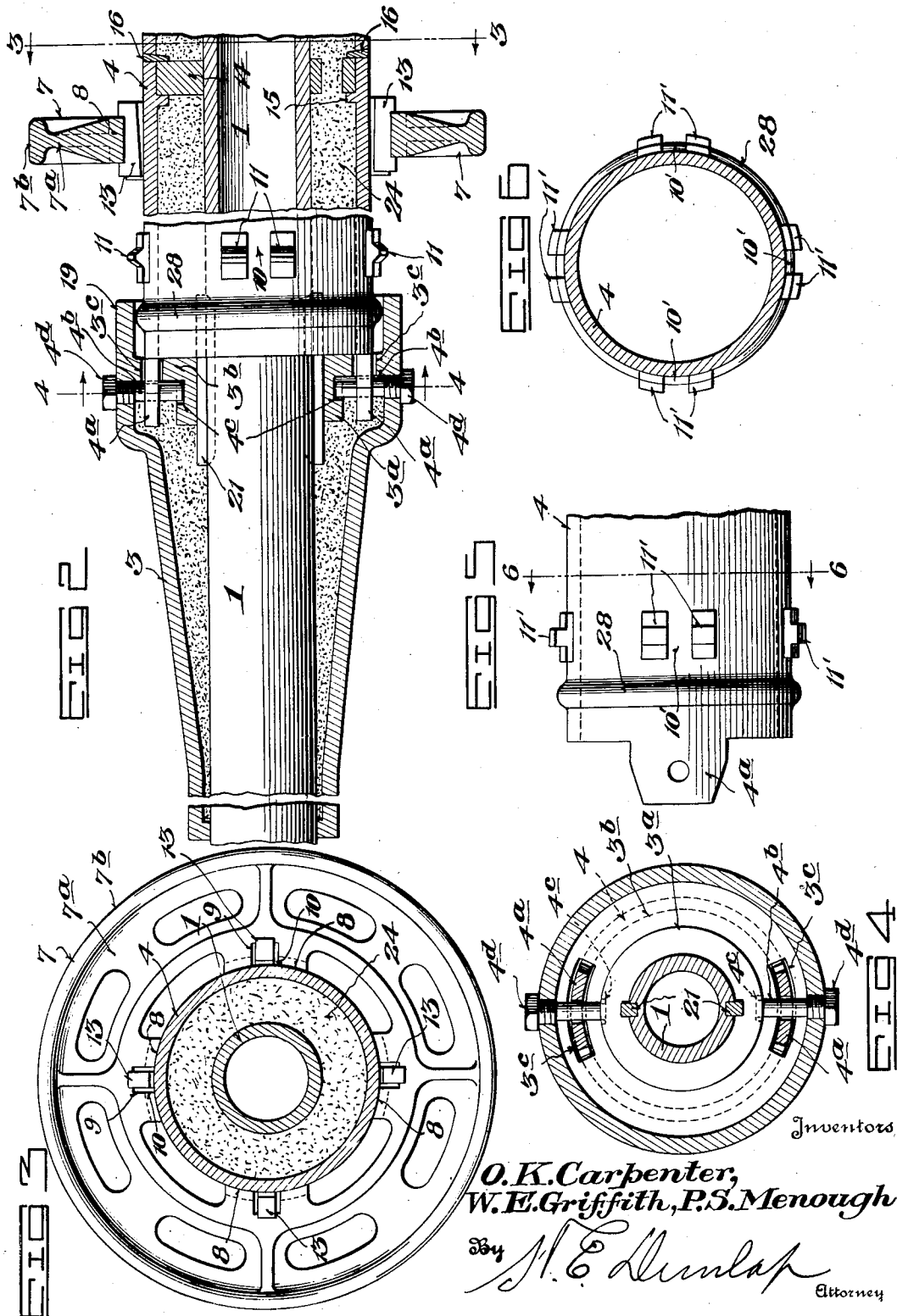
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

1,944,217

FURNACE CONVEYER

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11 Claims. (Cl. 263—6)

This invention relates to furnace conveyers, and more particularly pertains to an improvement on the subject matter of an application for patent filed December 29, 1928, Ser. No. 329,224, O. K. Carpenter.

The primary object of the present invention is to provide an improved mounting for the sheath and an improved and simplified mounting for the disks on the sheath.

A still further object of the invention is to provide an improved mounting for the sheath which more specifically facilitates machining thereof, as will be later set forth in detail.

Still another object of the invention is to provide an improved connection for driving the sheath from the collar or hub, and at the same time one which provides for free expansion and contraction without affecting the efficiency of driving.

Still further the invention aims to provide a connection between the driving collar or hub and the sheath wherein the sheath is permitted to rock about or relative to the collar or hub to compensate for warping resultant from uneven heating of the sheath.

Still further the invention aims to provide a supporting connection for the sheath wherein the joint is tightened upon expansion of the sheath upon heating thereof, thereby to eliminate leakage of the packing.

Still another object of the invention is to provide a connection between the driving collar or hub and the shaft carrying the same wherein leakage of the packing between such parts is eliminated, and to further provide a packed joint wherein same is disposed exteriorly of the furnace and which is visible for ready and free inspection at all times in order to detect leakage, and to enable the latter to thus be more readily and easily stopped.

The invention has further and other objects which will be later set forth and manifested in the course of the following description.

In the drawings:—

Fig. 1 is a top plan view of two adjacent conveyer shafts equipped with the present invention;

Fig. 2 is an enlarged fragmentary side elevation of an end of one of the shafts of Fig. 1, parts being broken away and shown in section;

Fig. 3 is a section on line 3—3 of Fig. 2;

Fig. 4 is a section on line 4—4 of Fig. 2;

Fig. 5 is a side elevation of an end of the sheath, showing a modified form of a disk securing lug;

Fig. 6 is a section on line 6—6 of Fig. 5;

Fig. 7 is a front elevation of one of the disks;

Fig. 8 is a section on line 8—8 of Fig. 7;

Fig. 9 is a front elevation of the sheath supporting disks;

Fig. 10 is a section on line 10—10 of Fig. 9, and

Fig. 11 is a detail view of a modified form of driving collar.

Referring to said drawings, 1 designates a conveyer shaft which is preferably of tubular form to permit of circulation therethrough of a cooling medium. Said shaft is designed to be mounted transversely of the furnace chamber with its ends protruding through the opposite furnace walls 2, and is further designed to be journaled outside the furnace walls.

Mounted upon the shaft 1 and keyed thereto adjacent to its opposite ends are driving collars or hubs 3 which constitute supports for the opposite ends of a hollow cylindrical sheath 4. Said sheath, which has an internal diameter materially greater than the diameter of the shaft 1, has its opposite ends mounted within the supporting collars 3 and suitably attached to the latter, by means of perforated lugs 4a carried by the sheath and receiving pins 4b therein.

It will be noted that the lugs 4a are diametrically opposed and that the collars or hubs 3 have hubs 3a connected thereto by webs 3b, the latter being formed with slots 3c to receive the lugs 4a, by means of which it will be noted that the sheaths will be driven by the collars or hubs. The pins 4b preferably have their inner ends received in apertures 4c provided therefor in the hub 3a and are held in place by cap screws 4d.

The sheath 4 is adapted for having removably mounted thereon a plurality of relatively spaced disks 7 upon which the material to be heat-treated within the furnace is advanced. Each disk comprises a web portion 7a, an annular rib or carrying portion 7b, and a plurality of pairs of lugs 8 formed integrally with and projecting inwardly from said web. The lugs of each of said pairs are separated to provide an intermediate space 9 which is adapted to be disposed in register with spaces 10 provided between lugs 11 which are formed integrally with and on the exterior surface of the sheath 4.

As shown in Figs. 7 and 8 of the drawings, the lugs 11 are of substantially V-shape, while the lugs 8 have substantially V-shaped grooves so as to receive the V-shaped lugs 11 of the sheath 4 therein. As shown in Figs. 5 and 6 the lugs of the sheath instead of being of V-shape may be rectangular as indicated at 11'. The hub 3a is keyed to shaft 1 by splines or keys 21. Keys or wedges

13 are driven through the respective spaces 9 and 10 or 9' and 10' between the lugs of the disk and sheath in order to rigidly secure the disks in position on the sheath.

- 5 In assembly it will be noted that the disks are placed on the sheath with their lugs 8 moved through the spaces between the adjacent pairs of lugs 11, following which the disks are rotated slightly to cause the lugs 11 of the sheath to be
10 received within the respective lugs 8 of the disk. It will be seen that the lugs 8 and 11 hold the disks against movement lengthwise of the shaft and when the key 13 is in position, the latter holds the disks against rotation. The disks are thus
15 held by the lugs and keys against movement either longitudinally of the sheath or circumferentially thereof.

- Due to the fact that the sheath is subjected to the high temperatures within the furnace chamber, and also to the weight of the conveyer material, in order to prevent sagging of the heated sheath, disks 14 are employed as shown in Figs. 2, 9 and 10. The disks are held in position by abutting lugs 15 formed integral with and projecting interiorly of the sheath and pins 16, which
25 latter are driven through the sheath and abut the opposite sides of the disk 14. In order to decrease the heat radiation, the disks are formed with arcuate slots 17, which form thin connecting
30 webs 18 between the central and peripheral parts of the disks, so that the heat must traverse these webs to reach the shaft 1 and due to the spaces between the webs, less heat reaches the shaft than were the disks made solid.

- 35 As shown in Figs. 1 and 4, the collars 3 are formed with flared end portions 19 to receive the ends of the sheath. In the present invention, the ends of the sheath are received interiorly of the end portions 19, while the collars have their webs
40 3b abutted by the ends of the sheath.

- With this construction, it will be observed that the sheath can be finished on its exterior with a single set-up in an engine lathe or the like, as distinguished from said prior application, where-
45 in the ends of the sheath engage over or about the inner ends of the collars, requiring that the ends of the sheath be bored in order to accurately fit over the collars. This boring operation necessitates that the sheath be first bored at one
50 end, then removed from the lathe and connected thereto in reversed position, followed by boring of its opposite end. Obviously the collars can be more easily and accurately bored in the present invention and each thereof is merely bored
55 at its inner end.

Obviously as many supporting disks 14 may be employed as is necessary or desirable, and these disks may be supported at various positions along the length of the sheath.

- 60 The space between the shaft 1 and the sheath is filled with suitable heat resisting or insulating material 24, which latter extends through the cut-outs of the supporting disks 14 and is held in position by the webs 3b of the driving collars 3.

- Referring now to Fig. 1, it will be seen that the collars or hubs 3 extend through the furnace walls 2, and have sealing collars 25 applied to and over their outer ends. These collars at their inner ends abut the furnace walls and seal the opening therein through which the driving collars and the shafts extend. Stop pins or other like abutments 26 and 27 are secured to the shaft ends and restrict outward movement of the collars 25. Preferably the pins 26 are initially spaced from the adjacent collars, which as-
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sembly is that wherein the parts are cold, so that when the parts are subjected to the high heat, expansion causes the collars 25 adjacent the pins 26 to abut or approximately abut the latter pins.

As depicted in Figs. 2 and 5 of the drawings, 80 the sheath 4 is formed with a ring 23 of convex form on its periphery and which engages the inner circumference of the flared end 19 of the collar, whereby it will be seen that a compensatory action will be had should the sheath warp 85 from the high heat to which it is subjected. This action enables the sheath to rock about the ring 23 as is apparent. This compensatory action is important, since in actual practice it has been found that any warping of the sheath, 90 if rigidly connected to the drive collar, is transmitted from the latter to the shaft, which results in a marked tendency to bind the shaft in the bearings.

Obviously by disposing the outer ends of the 95 driving collars without or exterior of the furnace, such ends are free of the high heat to which the remaining parts are subjected, and consequently are at the temperature of the outer ends of the cooled shaft. 100

Thus, there is no tendency for the creation of space between the outer ends of the shafts and collars so that a perfect seal is there maintained preventing any leakage.

Preferably the sheath is made of chrome nickel 105 steel and the driving collars 3 are made of chrome steel. It is characteristic of chrome nickel steel to have a much higher heat coefficient of expansion than chrome steel, consequently as the temperature rises and a tendency for leak- 110 age of the packing increases, the joint becomes tighter.

From the foregoing, it will be further seen that a more simplified and economical structure is provided in that but a single group of lugs are 115 provided on the sheath, as distinguished from the double group in the aforesaid application. Also, the lugs of the sheath are received within or housed by the disks and are thus protected thereby. 120

As depicted in Fig. 11, of the drawings, the flared mouth 50 of the driving collar 51 may be threaded, instead of cast onto the collar. A packing gland 52 may be secured to the outer end of the collar, to avoid machining of the said end 125 of the collar and to provide a flexible, but tight connection between the shaft 1, and the collar.

What is claimed is:—

1. In a furnace conveyer, a plurality of shafts, a cylindrical sheath on each shaft, a plurality 130 of carrying disks on each sheath, said sheath having a plurality of spaced pairs of spaced V-shaped lugs on its exterior, corresponding spaced pairs of spaced lugs on the disks having V-shaped openings to receive the lugs of the sheaths and 135 to register therewith, and keys in the spaces between the pairs of lugs of the disks and of the sheath to hold the disks against rotary movement.

2. In a furnace conveyer, a plurality of shafts, 140 a cylindrical sheath on each shaft, a plurality of carrying disks on each sheath, said sheath having a plurality of spaced pairs of spaced lugs on its exterior, corresponding pairs of spaced lugs on the disks having openings to receive the lugs 145 of the sheaths therein and to register therewith, and keys in the spaces between the pairs of lugs of the disks and of the sheath to hold the disks against rotary movement.

3. In a furnace conveyer, a plurality of shafts, 150

a cylindrical sheath on each shaft, a plurality of carrying disks on each sheath, lugs on the exterior of the sheath, lugs on the disks formed to receive the lugs of the sheath therein so as to hold the disks against movement longitudinally of the shafts, and means cooperating with the lugs to hold the disks against rotary movement of the shafts.

4. In a furnace conveyer, a plurality of shafts, a cylindrical sheath on each shaft, a plurality of carrying disks on each sheath, driving collars on the shafts having portions to receive the ends of the sheaths therein and having webs formed to abut the ends of the sheaths, and means to connect the sheaths to the collars for rotation therewith, including perforated lugs carried by the ends of the sheaths and received in openings provided therefor in the webs, and radial pins carried by the collars and extending through the perforations of the lugs.

5. In a shaft conveyer, a shaft, driving collars on the shaft, a sheath on the shaft having rings on its ends, the rings having convex peripheries, said collars having portions formed to receive the rings therein whereby to enable the sheath to rock about the rings, and means to connect the driving collars to the sheath.

6. In a shaft conveyer, a shaft, a sheath, driving collars on the shaft telescopically related to the ends of the sheath, means including a rocking connection to secure the collars to the sheath, and means whereby to enable the sheath to rock relative to the collars upon warpage or the like of the sheath.

7. In a furnace conveyer, a shaft, a tubular sheath on the shaft, driving collars on the shaft each having a perforated web, and projections on the ends of the sheath received in the perforations of the webs to form driving connections between the collars and sheath.

8. In a furnace conveyer a shaft, a sheath on said shaft, said sheath having a materially great-

er inside diameter than the diameter of the shaft; a heat resisting, heat insulating packing in the space between said sheath and said shaft, a driving collar which includes an inwardly projecting annular ring which embraces the end of the sheath, said annular ring being made of a metal which has a lower coefficient of heat expansion than the metal of which the sheath is formed.

9. A furnace conveyer including a cylindrical sheath, a plurality of carrying annuluses on the sheath, the sheath having a plurality of spaced pairs of V-shaped lugs on its exterior, correspondingly shaped pairs of spaced lugs on the annuluses having V-shaped openings to receive the lugs of the sheath and to register therewith, and keys in the spaces of the pairs of the annuluses and of the sheath to hold the annuluses against rotary movement.

10. A furnace conveyer including a cylindrical sheath, a plurality of carrying disks on the sheath, said sheath having a plurality of spaced pairs of spaced lugs on its exterior, corresponding pairs of spaced lugs on the disks having openings to receive the lugs of the sheath therein and to register therewith, and keys in the spaces between the pairs of lugs of the disks and of the sheath to hold the disks against rotary movement.

11. A furnace conveyer assembly including a cylindrical sheath, a plurality of carrying disks on the sheath, lugs on the exterior of the sheath, lugs on the disks formed to receive the lugs of the sheath therein so as to hold the disks against movement longitudinally of the sheath and means cooperating with the lugs to hold the disks against rotary movement relative to the sheath.

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