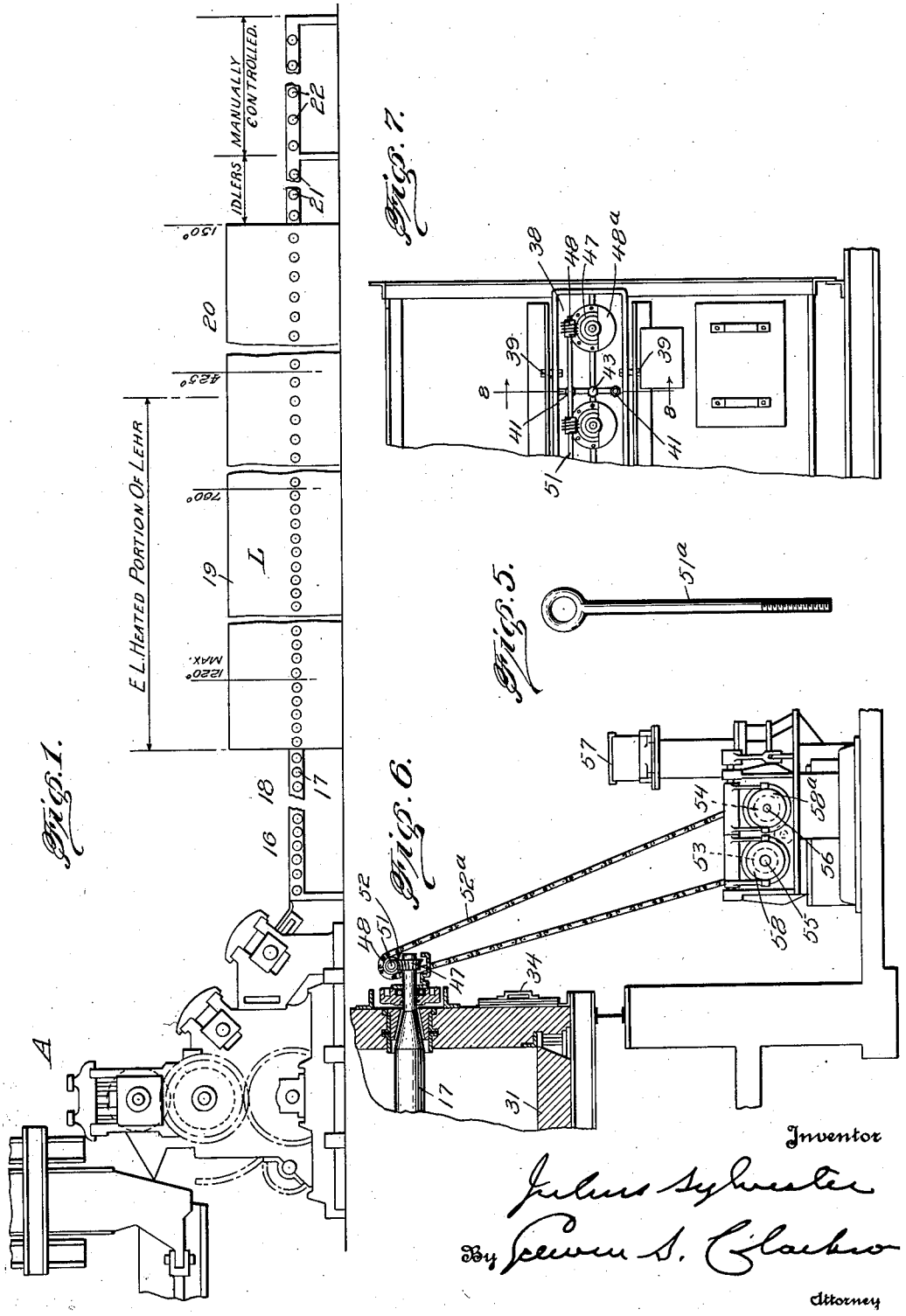
Nov. 1, 1932. J. SYLVESTER 1,885,306

CONVEYER ROLLER

Original Filed Jan. 21, 1929 4 Sheets-Sheet 1



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CONVEYER ROLLER

Original Filed Jan. 21, 1929 4 Sheets-Sheet 2

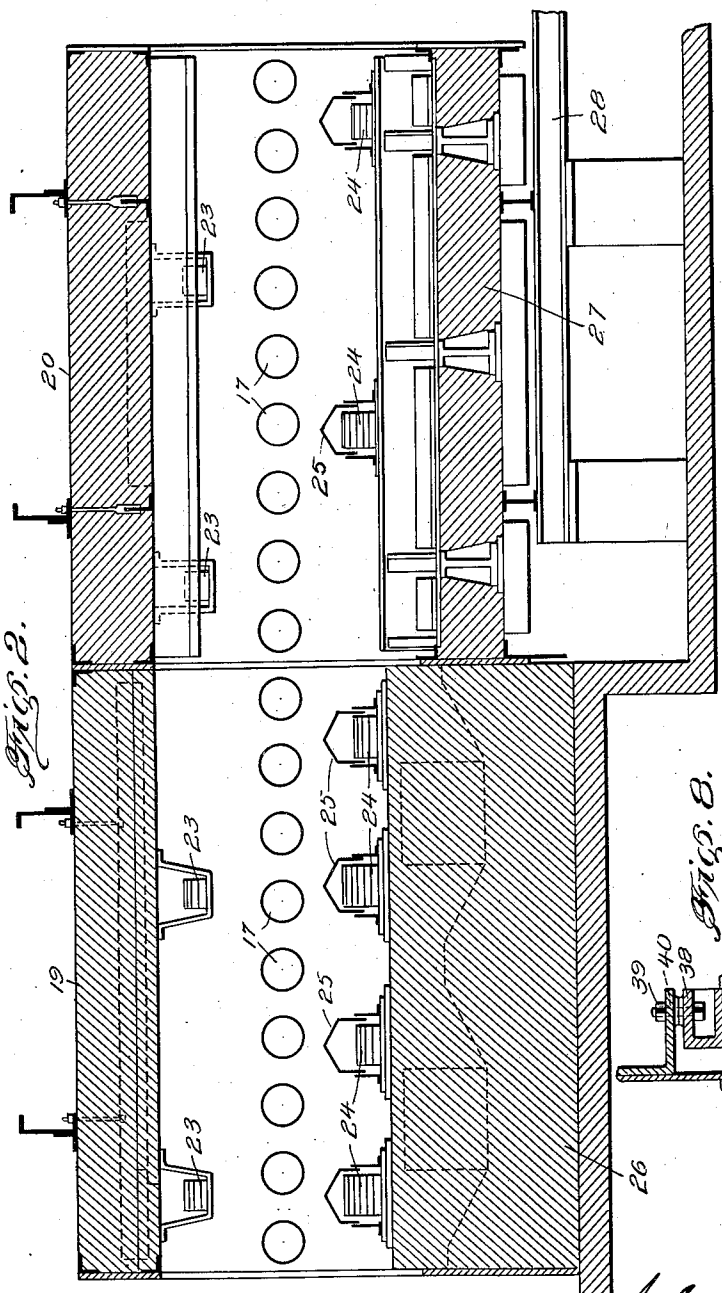


Fig. 2.

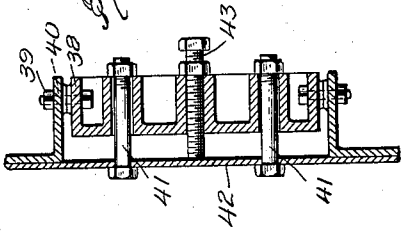


Fig. 3.

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CONVEYER ROLLER

Original Filed Jan. 21, 1929 4 Sheets-Sheet 3

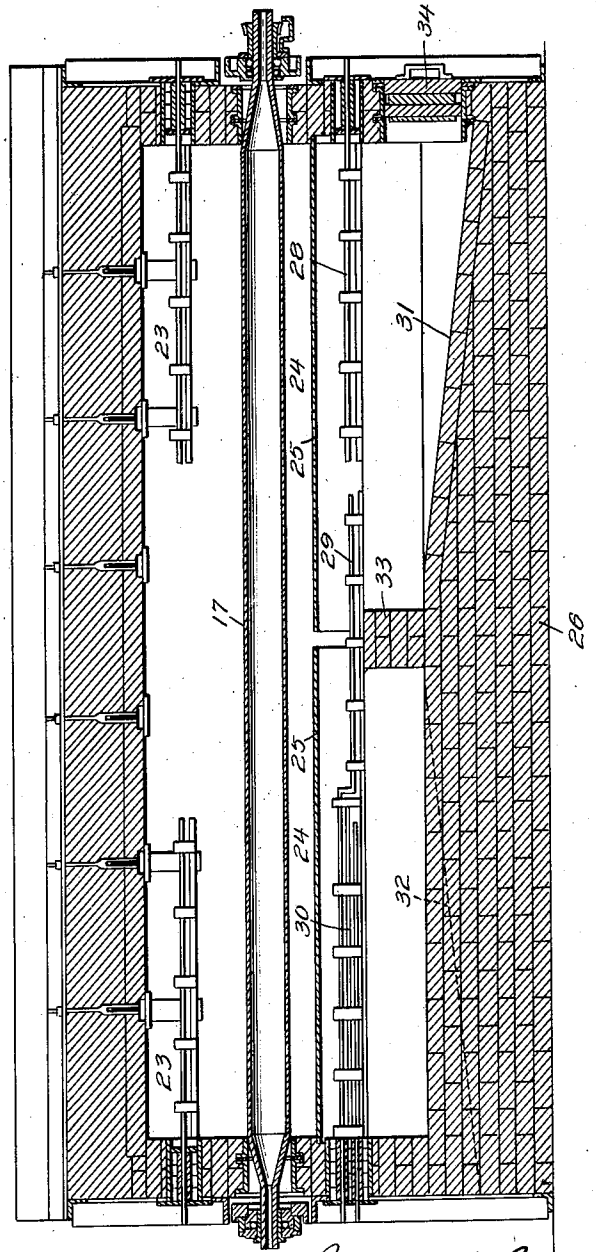


Fig. 3.

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CONVEYER ROLLER

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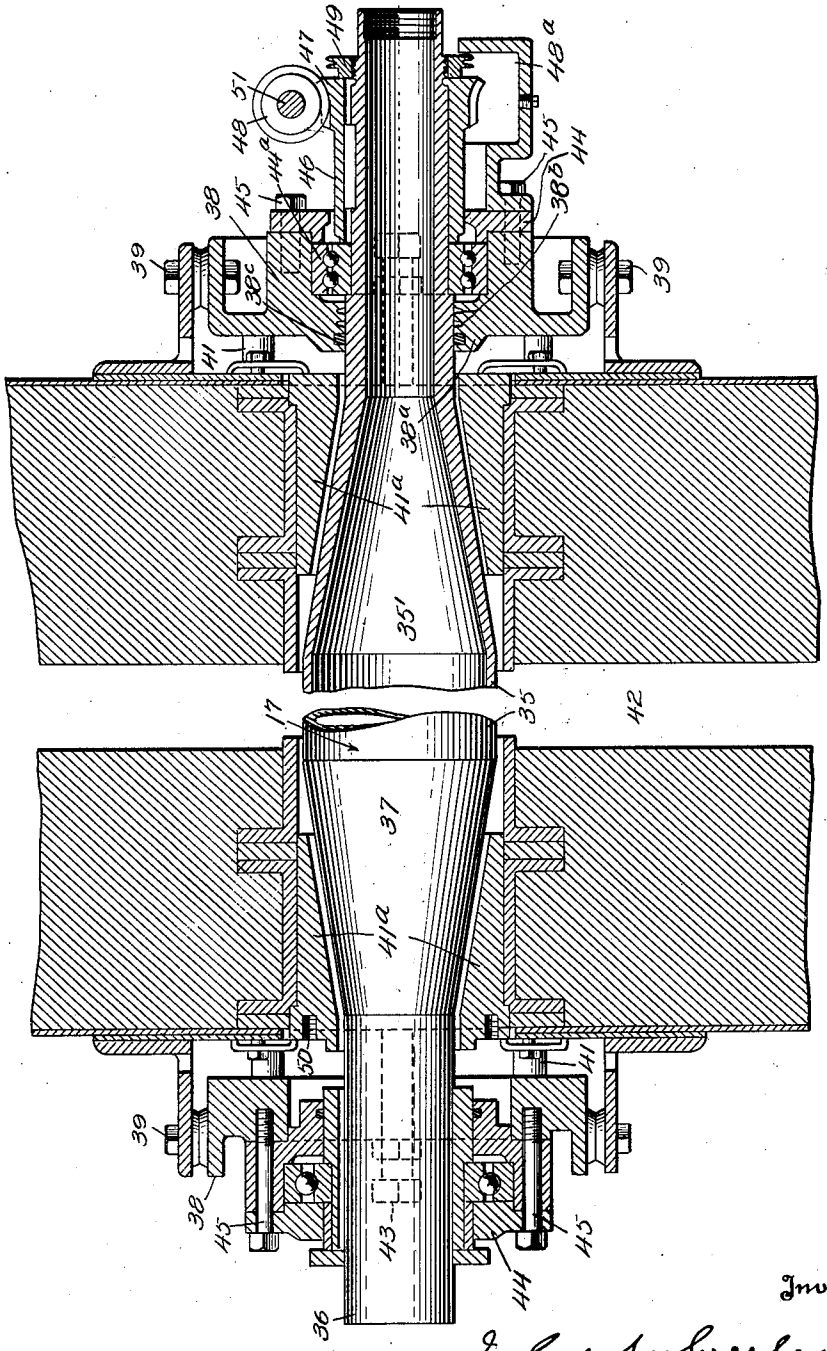


Fig. 4.

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Patented Nov. 1, 1932 1,885,306

UNITED STATES PATENT OFFICE

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CONVEYER ROLLER

Original application filed January 21, 1929, Serial No. 333,887. Divided and this application filed July 21, 1931. Serial No. 552,243.

This invention relates to improvements in conveyer rolls, and particularly to conveyer rolls for glass annealing lehrs and other similar apparatus; the present application being a division in part of my prior application filed January 21, 1929, Serial No. 333,887.

In my said application 333,887 I have disclosed a sheet glass forming and annealing apparatus embodying a roller lehr for supporting and conveying periodically formed sheets of glass through a lehr chamber, in which the glass sheets are annealed. The rolls employed are arranged in sets, comprising a primary set of rolls normally rotating constantly forward to convey the sheets on a preliminary traverse at a high rate of speed, a secondary set of reversing rolls driven at the same rate of speed as the primary set but which are periodically reversed so that they will periodically impart a differential back and forth movement to the sheets on their final traverse such that the sheets progress at a less rate on such traverse than on their preliminary traverse, and an intermediate set of transfer rolls which are alternately rotated backward and forward and synchronized successively with the primary and reversing sets of rolls for the transfer of the sheets from the primary set to the reversing set of rolls without buckling of the sheets. The sheets of glass formed by this apparatus are of some considerable width and very long and heavy and during a portion of their travel through the lehr chamber the sheets are subjected to a high annealing temperature. Thus the rolls are subjected to heavy load weight under which, because of their length, they are liable to sag and cause undue curvatures to be imparted to the glass sheets as well as the throwing of the roll ends or journals out of alinement, interfering with the free running of the rolls incident to their binding in their bearings. These difficulties particularly apply to the rolls employed in the highly heated portion of the lehr in which their tendency to depression or sagging or other deformation is increased because of the action of the heat thereon.

I overcome these objections by providing rolls having body portions of greater diameter and materially less cross-section or thickness than their end portions or journals, the cross-section or thickness being as low as can be used commensurate with mechanical strength and commercial workmanship, so as to retard or reduce the absorption of heat by the body portions of the rolls. To further reduce the absorption of heat and tendency of the rolls to deformation under load, I preferably make the rolls of a high temperature metal or metal alloy, such as a suitable molybdenum alloy, adapted to retain a high modulus of elasticity in the temperatures to which the rolls are subjected in the highly heated portion of the lehr, and having such a degree of low conductivity and heat resistance as to reduce the absorption of heat and tendency to deflection under load to the lowest possible degree. At their ends the body portions of the rolls taper toward the end journals, and these portions of the rolls are of increased cross-section or thickness to give additional mechanical strength in order to prevent twisting and failing of the material and to dissipate the heat through a greater cross-section resulting in lower temperatures, not unlike the principle of building up pressure in a tube and suddenly increasing the area which reduces the velocity. The rolls are thus made of maximum strength to support the heavy load weight and to resist deflection or deformation under their own weight and the weight of the load and the high heat to which they are subjected. The ends of the rolls are made to project through the sides of the kiln or treatment chamber to the exterior, where they are mounted in bearings of special construction. These bearings include bearing blocks of massive character and anti-friction bearings arranged so as to be shielded thereby from the heat of the kiln, this shielding action and the massiveness of the bearings preventing the bearings from being unduly heated and the anti-friction bearings being softened or otherwise injured by the heat. Suitable means are provided whereby the bearings may be adjusted to angularly adjust the journals or roll ends in such manner as to raise or "crown" the body portions of the rolls to

a sufficient extent to counteract or compensate for their degree of depression under the weight of the load, so that under working conditions the body portions of the rolls will be horizontal or level, thus eliminating or reducing to a minimum curvatures in the glass and allowing flatter and thinner sheets of glass to be drawn and reducing the amount of grinding necessary when sheets of glass of uneven thickness are formed. The bearings and the drive gearing for the rolls are so designed as to allow free ventilation of these parts and to cause a circulation of air in the driving action, thus assisting further in keeping the working parts cooled. Special provision is also made to permit of the independent removal of any of the rolls and its placement without interference from or with any of the other rolls. It is deemed desirable to construct the kiln or treatment chamber in transversely divided sections of suitable length and suitably united and to unitarily mount the drive mechanism of each chamber section, so that any chamber section and its rolls and drive gearing may be removed and conveniently replaced by another section interchangeable therewith, when repairs or replacements are required, thus obviating the necessity of shutting down the entire apparatus for a lengthy period of time. The massive bearing blocks of the bearing structures have their bearing and shielding portions closely surrounding the journals and provided with lubricating means to ensure easy running of the rolls and to reduce friction at this point.

My invention provides conveyer rolls and means for mounting the same whereby these desirable objects and advantages are attained, as fully hereinafter described and claimed.

The invention will be more fully understood by reference to the accompanying drawings disclosing a desirable embodiment of the invention. It will be obvious, however, that the invention is not to be limited to the particular embodiment shown, as many modifications may be employed without departing from the spirit of the invention.

The invention is shown in the accompanying drawings as embodied in a roller conveyer associated with an electrically heated glass annealing lehr, but it is to be understood that the invention is not restricted in application to a particular kind of roller conveyer or to a roller conveyer for use in connection with a particular type of lehr or other heat treatment apparatus, but may be embodied in roller conveyers of any kind for which it is adapted.

In the drawings:—

Fig. 1 is a diagrammatic side elevation of a lehr showing the use of my improved conveyer rolls as embodied in a lehr conveyer.

Fig. 2 is a longitudinal sectional view of two adjacent sections of the lehr at the juncture between the highly heated portion of the lehr and the cooling portion of the lehr.

Fig. 3 is a transverse section through the highly heated portion of the lehr.

Fig. 4 is a sectional view, similar to Fig. 3, on an enlarged scale through the sides of the lehr chamber and showing one of the high temperature rolls and its bearings.

Fig. 5 is a detail view showing a special tool employed in removing the rolls shown in Fig. 4.

Fig. 6 is a detail transverse section through one side of the lehr, showing the driving mechanism of the roll.

Fig. 7 is a side elevation of one section of the lehr showing one of the roll operating shafts.

Fig. 8 is a sectional view on an enlarged scale on line 8—8 of Fig. 7.

An apparatus embodying the invention is indicated diagrammatically in Fig. 1, and comprises a sheet glass forming or casting apparatus A, for periodically casting or rolling out glass sheets, and a lehr, kiln or treatment device embodying an open portion 18 along which the sheet of glass or other ware is advanced, by rollers 17, to the tunnel, closed or chambered portion L of the lehr. The entrance end of the lehr is provided in practice with suitable doors, not shown, which are opened at the beginning of the glass making operation to permit the sheets to pass into the lehr, and may be closed thereafter to prevent loss of heat from the lehr when glass is not being annealed. The closed portion of the lehr is heated by suitable means herein shown as electrical heating units 23 and 24. This closed portion of the lehr is made up of two principal divisions which may be referred to as the high temperature portion 19 and the cooling portion 20. Each of these portions may be made up of a plurality of sections, the sections of the two portions differing mainly in the special design of the high temperature portion to prevent heat radiation and the closer spacing of the heating units therein, as shown in Fig. 2, which figure shows the two adjacent sections of the high temperature and lower temperature portions of the lehr. Typical cross-sections of the high temperature portion 19 and the relatively lower temperature portion 20 of the lehr are shown in Figs. 4 and 6 respectively. The temperatures within the lehr chambers may be regulated as desired, but preferably range from a maximum of about 1200° F., at a point near the entrance to the highly heated portion of the lehr, to a temperature of about 150° F. at the end of the cooling portion of the lehr, the temperature more or less gradually decreasing between maximum and minimum, as in-

dicated in the diagrammatic showing in Fig. 1.

The rollers 17 are arranged in sets, comprising a primary set normally rotating constantly forward to convey the sheets on a preliminary traverse from the casting apparatus A to a point within the lehr chamber L, a secondary set of reversing rolls driven at the same rate of speed as the primary set, but which are periodically reversed to impart a differential back and forth movement to the sheets on their final traverse, such that the sheets progress at a less rate on such traverse than on their preliminary traverse, and an intermediate set of transfer rolls disposed between said primary and secondary sets and which are alternately rotated backward and forward and synchronized successively with the primary and secondary sets for the transfer of the sheets from the former to the latter without buckling of the sheets. The annealed sheets issuing at the exit end of the lehr pass onto idle rollers 21 and bridge the same between the final rollers 17 and delivery rollers 22, which rollers 22 may be operated by manually controlled power driving mechanism so that they may be stopped and started at will. It is not necessary to enter into a specific illustration or disclosure of the means for driving the rolls and periodically reversing the secondary rolls, as such means constitute no part of the present invention and are fully disclosed in my said prior application Serial No. 333,887. Suffice it to say that the present invention relates to a novel construction of certain rolls arranged in the lehr chamber, and which may be designated as the high temperature rolls 35, which rolls and their supporting and driving means are specially constructed, mounted and driven to permit of their independent application and removal and to support them against liability of deformation under heat and weight, as hereinafter described, as well as to permit ready independent removal of the roll bearings and their driving gears.

In order to provide for a uniform heating of the lehr and the rollers the heating units, as shown, are preferably arranged in two groups, one of the groups 23 being arranged above and the other groups below the conveyer rolls. Thus both the top and bottom of the glass sheets passing over the rolls will receive heat and the body portions of the rolls themselves will be uniformly heated to a sufficient degree to prevent any relative chilling of the glass sheets supported thereon.

One of the high temperature rolls 35 is clearly shown in Fig. 4, and comprises a cylindrical central or body portion 35′, reduced cylindrical end portions or journals 36 extending outwardly through openings in the side walls of the lehr and through bearing blocks 38, and tapered portions 37 connecting the central portions 35′ and 36. In the low temperature rolls the tapered portions 37 are omitted, but otherwise the construction may be the same, although different materials may be used in view of the differences in temperature to which they are subjected. From the point of intersection of the body portion 35′ with each tapered portion 37 to the end of the taper the cross-section of the roll is increased, i. e., the roll wall is gradually thickened. This form and construction of the roll secures certain important advantages, as hereinafter described.

The rolls in each section are carried by the bearing blocks 38 which are detachably secured to the frame of the lehr by means of bolts 39, which pass through slots 40 in brackets 40′ (Fig. 8). These bearing blocks may be adjusted angularly by means of tension bolts 41 which engage the side of the lehr 42, and compression bolts 43 which engage the outside of the lehr. By this angular adjustment of the bearing blocks at the ends of the rolls the ends of the rolls may be bent downward or angularly adjusted to upwardly deflect or to "crown" the body portions of the rolls to a slight degree, i. e., sufficiently to counteract the tendency to downward depression of the rolls under their weight and weight of the glass sheets, especially when highly heated, and the adjustment given the bearing blocks will be just enough to establish a sufficient crowning action to limit this downward deflection to such a degree as to obviate liability of an undue curvature being imparted to the glass sheets. By this means an automatic compensating action is established to allow a certain degree of downward deflection under the weight of the glass, but not to an undesirable extent, and only to an extent sufficient to maintain a working alinement of the rolls to prevent the glass sheets from sagging, and thereby prevent the formation of wavy or fluted sheets, and at the same time to prevent distortion of the rolls and binding of their journals in their bearings.

The rolls of each adjacent lehr section are operated by a single shaft 51 (Fig. 7) which is provided with a plurality of worms 48 meshing with gear 47, carried by the individual rolls. According to my invention the rolls and their bearings and their individual drive shaft 51 of each lehr section are mounted so as to be removable as a unit with their lehr section, so that each lehr section may be disconnected from adjacent lehr sections for repairs or other purposes, and another similar unitary lehr section complete with its rollers, bearings and drive shaft substituted in its place, thus enabling repairs to be made without shutting down the entire lehr for any lengthy period. Also the construction is such that each of the individual rolls may be removed without interfering with the op-

eration of any of the other rolls of the same lehr section. The construction which makes this possible is shown in detail in Fig. 4.

Referring to Fig. 4 it will be noted that the journals 36 of the rolls are carried by removable bearings 44 held in place on the blocks 38 by bolts 45. The driven end of the roll is provided with a sleeve 46 splined thereto, and carrying the gear 47 meshing with the driving worm 48. This sleeve is held in place by means of a nut 49. A drip pan 48*a* is removably secured below the sleeve 47 by one or more of the bolts 45 for the tapered rolls in the high temperature portion of the lehr. Bearing blocks or bushings 41*a* are also employed adjacent the tapered portion 37, and which correspond internally in taper to the external taper thereof. These bushings fit within the openings in the side walls of the kiln through which the roll ends project and about the tapered portions of the rolls to normally reduce the sizes of the openings, which are large enough to permit of the endwise insertion and withdrawal of the rolls, and correspondingly reduce heat losses at such points when the rolls are in working position and the lehr in action. To remove the roll the drip pan 48*a* is first unbolted and taken off, then the nut 49. This permits the sleeve 46 to be withdrawn to the right, due to the shape of the gear 47, which gear 47 comprises a worm gear portion concentric with the worm 48 that drives it, and a spiral gear portion, said spiral gear portion having a tooth parallel with its axis of rotation, to permit withdrawal of the gear 47 without removing the driving worm 48. The bearing 44 at the left of the roll may now be unbolted and removed. Then the conical bearing 41*a* at the left hand side of the lehr is withdrawn by means of special tools 51*a* which are inserted into openings 50 provided for that purpose. The rolls 17 or 35 may then be removed to the left. Preferably, in this operation a long rod is inserted through the roll and the roll withdrawn over the rod to prevent the roll from being damaged during withdrawal. Preferably the bearing for each cylindrical end or journal of the roll includes a ball bearing structure 44*a* held in position between the bearing elements 38 and 44.

The rolls in the highly heated portion of the lehr are made of a heat resisting metal of low conductivity and having a high modulus of elasticity in the high temperatures they are subjected to, the metal employed being preferably a high chromium molybdenum alloy, which is not only a resisting material of low conductivity, but also is quite ductile.

The rolls formed of this alloy are not readily subject to warping, twisting or sagging depressions under their own weight and the load weight thereon due to softening or decrease of bending resistance under the action of heat, but because of their lengths and the great weight of the sheets of glass are subject to a certain degree of sagging. I therefore make the rolls of special construction in order to adapt them to withstand these opposed strains and to increase their strength and resistance to deforming load stresses and provide novel means for mounting the rolls whereby a smooth running of the rolls is ensured and a bending stress, counteracting any sagging tendency, may be applied to the rolls to prevent any undue sagging thereof. Each roll 35 is, therefore, provided with a center or body portion 35′ of increased diameter with respect to its end portions or journals such as will allow a roll body of minimum wall thickness but of maximum resistance to bending and torsional stresses to be produced. The relative thinness or reduced wall thickness of the body of each roll is such as to reduce the absorption of heat and flow of heat therethrough, as such absorption and flow of heat is in direct proportion to the thickness of the wall of the roll, and such thickness or cross-section is reduced to a minimum degree which can be used commensurate with mechanical strength and practical workmanship. The cylindrical end portions or journals 36 of each roll are of much greater wall thickness than the body portion 35′, and between the ends of the body portion 35′ and the journals 36 the tapered intermediate portions 37 are made of a gradually increasing wall thickness, giving such intermediate portions of the rolls an internal as well as an external taper. This increased thickness of the journals 36 and intermediate portions 37 gives additional mechanical strength to the rolls to prevent twisting and failing of the material and to dissipate the absorbed heat through a greater cross-section of wall thickness, which results in a reduction of temperature through an action not unlike the principle of building up a pressure in a tube and then suddenly increasing the area, which reduces the facility. The bearing block 38 is so designed as to snugly enclose the journal of the roller inside the drip pan, and so as to bring the ball bearing between the drip pan and a part 38^a of the bearing block lying between the same and the side of the kiln and forming a heat shield between the ball bearing and the kiln. This part 38^a of the bearing block is preferably provided with internal lubricant receiving grooves 38^b and a suitable packing 38^c to prevent leakage at this point. The blocks 38 are of massive construction and of such great cross-section or wall thickness that they are adapted to readily absorb the heat from the roll journals without unduly increasing the temperature of the blocks owing to the distribution of the heat through a wide area. The blocks and coacting bearing elements are also so arranged as to be spaced from the kiln and expose all surfaces thereof to the cooling action of air outside the kiln, and the bearing brackets

40′ are provided with ventilation ports 52 and the elements 47 and 48 are so constructed as to institute a fan-like action in driving the rolls, whereby the flow of air about and between the bearing parts is promoted, giving adequate ventilation to keep the roll journals and bearings cool. The construction of the bearings also, owing to their wall thickness, ensures more efficient and reliable lubrication to the roll journals owing to the extent of lubricated surfaces and reduction of heat.

It will be understood that in practice the degree of angular deflection imparted to the roll ends in order to effect a longitudinal bending or "crowning" of the rolls may be that amount required to arch or deflect the body of each roll upwardly to compensate for the degree of sagging tendency of each roll under its load weight and according to the degree of temperature to which it is subjected, so that a corrective action will be established allowing each roll to sag under the stress of the load weight thereon to just the degree necessary to bring it and maintain it at a level or horizontal position. When all the rolls in the high temperature portion of the lehr are in this manner angularly adjusted or crowned to compensate for depression under load weight the upper peripheries of the roll surfaces will be located in a substantially true horizontal plane and the tendency of the glass sheets to sag between the rolls will be reduced to the minimum, thus restricting to the minimum the amount of curvature imparted by the rolls to the glass sheets. As a result, sheets of glass which are almost uniformly flat may be produced and as a consequence thinner sheets of glass may be made and, owing to the substantially uniform degree of thickness of the produced glass, the amount of grinding required to put it into marketable shape will be greatly reduced over prior processes.

From the foregoing description, taken in connection with the drawings, the construction, mode of operation and advantages of my novel and improved high temperature roll and mounting will be readily understood without a further and extended description, and it will be seen that a structure of this kind is provided which is especially adapted for use in lehrs, kilns or other chambers for supporting glass or other ware, where the rolls and ware are subjected to high temperature and the rolls themselves to distortion, as the roll construction itself not only ensures protection of the roll against undue heat, but the mounting of the roll facilitates and promotes the dissipation of undue heat, while the adjustability of the roll bearings, whereby the roll may be crowned, as set forth, effectually ensures maintenance in the horizontal alinement of the upper surfaces of the rolls and the prevention of distortion causing injury to the rolls and the glass sheets or other articles supported thereby. The construction of the bearings further enables removal of any roll independently of and without disturbing another roll, and the ready application of a new roll in its place, all without the necessity of shutting down the apparatus. The particular formation of the roll set forth also gives the roll additional mechanical strength to prevent sagging thereof and so disposes its material as to effect a transference of the heat from the body portions to the end portions of the rolls and elimination of the heat at the bearing points without causing heating of the bearing.

As stated, I do not limit the invention to any particular application in use, but reserve the right to employ it wherever a roll of this character may be advantageously used, and, while the construction of rolls and bearings shown is preferred, it is, of course, to be understood that changes in the form, proportion and details of construction may be made, within the scope of the appended claims, without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, I claim:—

1. A conveyer roll comprising a cylindrical body portion of minimum thickness, cylindrical end portions of major thickness, and tapered portions between the body portion and end portions of progressively increasing thickness between the body portion and the end portions.

2. In a roller conveyer, a roll having a body portion of maximum diameter and minimum thickness, end journals of minimum diameter and major thickness, and intermediate tapering portions between the body portion and journals, bearings for the journals of the rolls, and means coacting with the bearings and acting upon the roll ends for imparting an angular bending stress to the roll to deflect the body portion of the roll upward to a degree to counteract and compensate for downward deflection of the roll body under the weight of a load thereon.

3. In a roller conveyer, a roll formed of a metal of low heat conductivity and having a high modulus of elasticity in the presence of great heat, said roll being provided with a cylindrical body portion of minimum wall thickness and major diameter, cylindrical end journals of minimum diameter and major wall thickness, and intermediate tapering portions of progressively increasing thickness between the body portion and journals.

4. In a roller lehr, a roll formed of a metal having a high modulus of elasticity in the presence of great heat, said roll being provided with a cylindrical body portion of minimum wall thickness and major diameter, cylindrical end journals of minimum diameter and major wall thickness and intermediate tapering portions between the body portion

and journals, bearings for the journals of the roll, and means acting on said bearings for applying angular bending stresses to the roll journals to deflect the body portion of the roll upwardly to a degree to counteract and compensate for downward deflection of the roll body under the weight of a load thereon.

5. In a roller conveyer, spaced side supports having alined roll receiving openings therein, an integrally continuous roll bodily insertible and withdrawable through one of said openings and comprising a cylindrical body having reduced end portions extending outwardly through said openings, bushings removably mounted in the openings in the supports about the portions of the rolls disposed therein, and bearings for the roll ends on the outer sides of the supports removably mounted like the bushings to permit endwise withdrawal of the roll, the roll being hollow and open from end to end, whereby in withdrawing the roll a rod or the like may be inserted through the roll and the latter drawn outward on said rod as a support.

6. In a roller conveyer, spaced supports having roll receiving openings therein, an integrally continuous roll comprising a cylindrical body having reduced end portions extending outwardly through the openings in the supports, bearings for the roll ends on the outer sides of the supports removably mounted to permit endwise withdrawal of the roll, the roll being hollow, whereby in withdrawing the roll a rod or the like may be inserted through the roll and the latter drawn outward on said rod as a support, and means for angularly adjusting the bearings to impart bending stress through said end portions to crown the body of the roll.

7. In a roller conveyer, spaced supports having roll receiving openings therein, an integrally continuous roll comprising a cylindrical body having reduced end portions extending outwardly through the openings in the supports, bearings for the roll ends on the outer sides of the supports removably mounted to permit endwise withdrawal of the roll, the roll being hollow, whereby in withdrawing the roll a rod or the like may be inserted through the roll and the latter drawn outward on said rod as a support, means for adjusting the bearings to bend the rollers so as to crown the cylindrical body thereof, a drive shaft, a drive worm thereon, and a worm gear on an end of the gear meshing with the worm, said gear being detachably secured to and removable longitudinally from the roll end and having its toothed surface parallel with its axis of rotation for sliding motion transversely of and into and out of engagement with the worm.

8. In a roller conveyer, a roll, and bearing supports for the ends of the roll, said roll having reduced end portions journaled in bearing supports and a cylindrical body portion of substantially uniform diameter throughout its length for directly supporting the load, the bearing supports being angularly adjustable to apply bending stresses to the roll ends to crown the center of the roll.

9. In a roller conveyer, a roll, and end supports for the roll, said roll being integrally continuous and hollow from end to end thereof and having reduced end portions journaled in bearings on the end supports and a cylindrical body portion of substantially uniform diameter throughout its length for directly supporting the load, the bearings being angularly adjustable to apply bending stresses to the roll ends to crown the center of the roll.

10. In a roller conveyer, main supports, spaced demountable roll supports on the main supports, said roll supports having openings therein, bearing members detachably mounted on said openings in said roll supports, conveyer rolls having journals mounted in said bearings, each roll end being slidably removable from its bearing, a drive shaft at a side of the conveyer, gears on the shaft, a worm engaging each gear and a shaft journal so as to be slidable into and out of engagement with the former and longitudinally removable from the latter, means detachably mounting each bearing on its support, and means for angularly adjusting each bearing to crown the body of the roll.

11. In a roller conveyer, supports at the sides of said conveyer and having openings therein, rollers having end journals extending outwardly through said openings in the supports, bearings on said supports for the journals, a drive mechanism in gear with one journal of each roller, said drive mechanism including a gear element detachable without interference from said drive mechanism, each bearing including a part removable to permit endwise removal of the roller from the supports, and means for angularly adjusting each bearing to crown the body of the roll.

12. In a roller conveyer, supports, a conveyer roll having end portions extending outwardly through openings in said supports, bearings on the supports for the ends of the roller, each detachably mounted in position, drive gearing including a drive shaft and a drive gear connection between the same and the other end of the roller comprising a drive gear on said shaft and a driven gear on said roller end, said driven gear being slidably engageable with and disengageable from the roller end and having its toothed surface tapered and provided with teeth curved on an arc eccentric to the axis of the driving gear to adapt the driven gear to be applied and removed by sliding motion transversely of the driving gear, whereby the gearings may be detached and the roller withdrawn endwise from the support, and means for angularly

adjusting each bearing to crown the center of the roll.

13. In a roller conveyer, supports at the sides of the conveyer comprising detachably united interchangeable sections, conveyer rolls having journals extending outwardly beyond the support sections at the sides of the conveyer, bearings for said roll journals on each support section, driving means for the rolls comprising a shaft on each support section detachably connected with the shafts of adjacent support sections and in gear with journals of the rolls of its section, and means for angularly adjusting each bearing to crown the center of the roll.

14. In a roller conveyer, supports comprising detachably united interchangeable sections, conveyer rolls having journals extending outwardly through the support sections at the sides of the conveyer, bearings for said roll journals on each support section, and driving means for the rolls comprising a shaft on each support section detachably connected with the shafts of adjacent sections, worms on each shaft for driving the rolls associated therewith, a sleeve on a journal of each roll removable endwise therefrom, gears on the sleeves of the rolls of each support section in gear with the worms on the drive shaft of said section, and means for angularly adjusting each bearing to crown the center of the roll.

15. In a roller conveyer, spaced supports, bearings on the outer sides of said supports, a roller comprising a cylindrical body portion extending between the supports and having cylindrical journals at its ends projecting through said supports and rotating in said bearings, each bearing comprising a bearing block and an anti-friction bearing carried thereby, the block being provided with a portion interposed between the adjacent support and the anti-friction bearing and closely surrounding the journal, means detachably and adjustably connecting the bearing blocks with the supports, and means for angularly adjusting each bearing to crown the center of the roll.

16. In a roller conveyer, a conveyer roll having reduced end journals and a cylindrical body forming a load supporting surface of equal diameter and extending continuously between the journals, and means acting on the journals for imparting upward deformation to the cylindrical body of the roll to counteract downward deformation thereof under a load weight thereon.

17. In a roller conveyer, a rotary article supporting and conveying roll having reduced end journals and a cylindrical body forming a load supporting surface of equal diameter and extending continuously between the journals, bearings for the end journals of the roll, and means acting on said bearings for angularly adjusting the roll ends so as to crown the cylindrical body portion of the roll.

18. In a roller conveyer, a supporting and conveying roller having reduced end journals and a cylindrical body forming a load supporting surface of equal diameter and extending continuously between the journals, bearings for the end journals of the roller, means detachably securing each bearing in position, and means for adjusting the bearings at an angle to effect a downward depression of the roll ends and an upward deflection of the cylindrical body of the roll so as to normally crown the center of the roll to a degree to counteract downward deflection of the center of the roll under load weight.

19. In a roller conveyer, a roll having a cylindrical load supporting body portion of uniform diameter from end to end and provided with end journals, bearings for the end journals of the roll, and means for applying a bending stress to the roll journals to give an upward deflection to the body of the roll to counteract and compensate for downward deflection of the roll body under the weight of a load thereon.

20. In a roller conveyer, spaced supporting bearings, a roller comprising a cylindrical body portion of uniform diameter having cylindrical journals at its ends rotating in said bearings, and means for adjusting said bearings to crown the cylindrical body portion of the roll.

In testimony whereof I affix my signature.

JULIUS SYLVESTER.