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REMOVABLE ROLL MEANS FOR CALENDER

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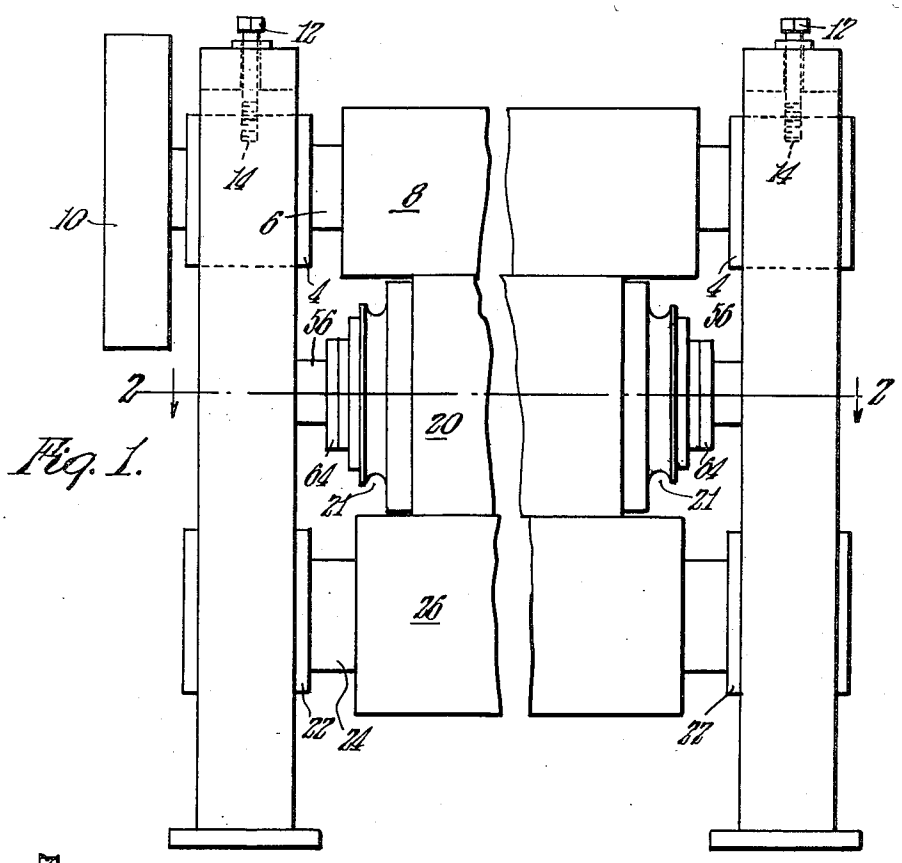

Fig. 1.

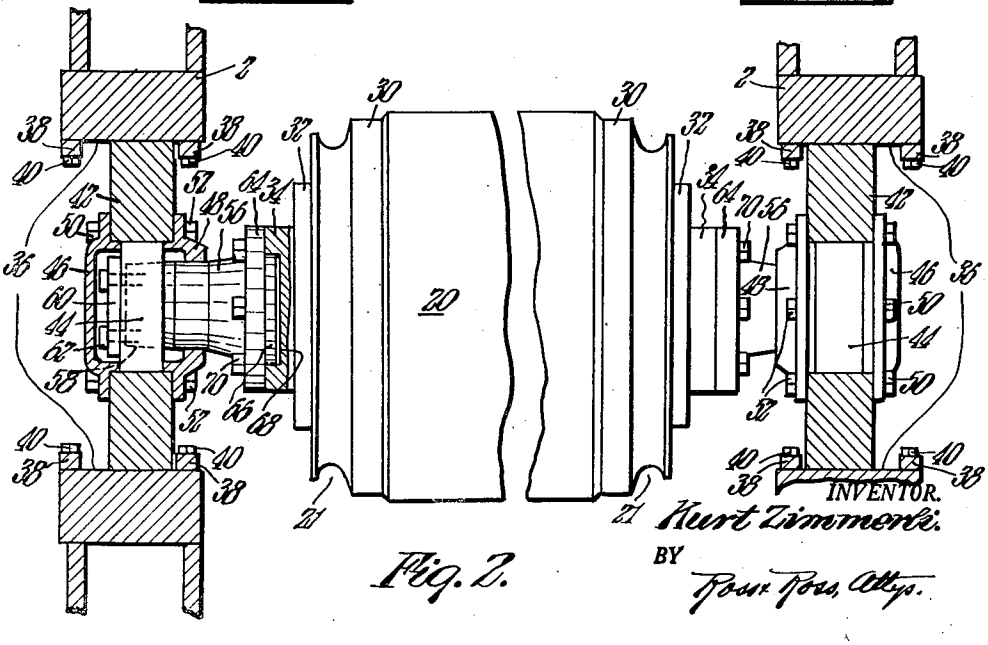

Fig. 2.

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REMOVABLE ROLL MEANS FOR CALENDER

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This invention relates to new and useful improvements in structural refinements in calender apparatus having coacting rolls, such as used in the paper and textile and other industries, for calendering webs of material, and is directed more particularly to the provision of a calender and roll construction to facilitate the removal of a roll from the calender frames.

The principal objects of the invention are directed to the provision of calender frames and a roll constructed and arranged for the removal of the roll from and the insertion of the roll into the frames.

It may be desired and necessary to remove a roll from the calender frames for the refinishing or repairing of said roll, or to replace it with a new one, all of which, according to the novel features of the invention, is readily and easily accomplished.

According to the known prior art, the transversely spaced calender frames usually extend vertically, and have vertically disposed slots for the reception of bearings, in which bearings the opposite ends of the roll are journalled.

For removal of a roll according to the prior art, corresponding sides of the side frames are cut away so as to provide openings into the vertical slots, and sections, commonly known as cheeks, are fitted in these openings, and are removably secured therein.

In order to remove a roll, the cheeks are removed from the openings of the side frames, wherefor the ends of he roll and the bearings may be withdrawn outwardly through the openings. In assembling the roll in the side frames, the roll ends and the bearings are passed inwardly through the openings, and the cheeks are secured in place.

The known prior art practice is expensive and has other disadvantages. The removal of a roll from and the insertion thereof into the calender side frames is a laborious operation and results in objectionable down-time of the calender. The fitting of the cheeks in the side frames requires extreme accuracy and entails great expense. The openings of the side frames into the slots thereof weaken the frames to the extent that the frames tend to yield under pressures to which the rolls are subjected, in the operation of the calender.

According to the novel features of this invention, the calender side frames and the roll are constructed and arranged for the separation of the roll without the provision of openings in the side frames which are necessarily closed by cheeks. The roll hereof is separable from its end bearings or boxes so as to facilitate the ready and easy removal of the roll between adjacent sides of the side frames. The side frames are in no ways weakened so that they may function for the intended supporting purposes.

In a general way, according to the novel features hereof, the bearings or boxes for the ends of the shaft of the removable roll are disposed in the slots of the side frames, the shafts are journalled in the bearings, and the inner ends thereof are releasably connected to opposite ends of the roll shaft for the operation of the calender.

The connections are such as to axially align the bearing shafts and roll shaft for normal operation of the calender. To remove the roll, the bearing shafts and the roll shaft are disconnected. The overall length of the roll shaft being less than the distance between adjacent inner sides of the side frames, the roll and its shaft may be passed outwardly between the said side frames.

Another of the primary purposes hereof is to provide advantageous structural and operational features in a device of the class to which reference has been made leading to its simplicity in construction, its adaptability to economical manufacture and its efficiency and dependability in operational use, and providing important distinct advantages in durability, efficiency, ease of operation and the like.

Another primary object hereof is to provide a device having the following inherent meritorious characteristics: first, the securement of a higher degree of accuracy and greater degree of variety in the manner of work performed therewith than has heretofore been possible with prior devices known in the art; second, the attainment of an improved apparatus wherein the components are coordinated for facile assembly and wherein the resultant structure is capable of more dependable operation than devices heretofore known; third, the attainment of a more economical and higher speed of construction and assembly of the device due to its simplification of design and its unique composition of coacting parts; fourth, the attainment of a flexibility or a capability of adjustment by which a large variety of work can be produced by means of the same device; fifth, the achievement of a greater ease in repairs than has been possible in related devices heretofore known; sixth, the provision of a construction which may be readily installed with respect to the various purposes for which it is intended, and seventh, the provision of such other improvements in and relating to calender apparatus of the type above referred to as are hereinafter described and claimed.

The invention resides in the particular arrangement, construction and relationship of the various elements of the calender apparatus as exemplified in the detailed disclosure hereinafter set forth wherein the above defined objects of the invention will be apparent.

Other objects and advantages of the present invention will be in part obvious or in part pointed out more fully hereinafter. All will become apparent as the detailed description of the exemplary form of the invention proceeds below, it being understood that the invention consists substantially in the combination, construction, location and relative arrangement of parts, all as described in detail hereinafter as shown in the accompanying drawing, and with particularity in the appended claims forming a part hereof.

In the accompanying drawing forming part of this specification and which illustrates, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle by way of a construction in accordance therewith, wherein like characteristics of reference or numerals are employed to designate like or corresponding parts throughout the several views:

Fig. 1 is a front elevational view of a calender embodying the novel features of the invention; and

Fig. 2 is a sectional plan view on the line 2—2 of Fig. 1.

Referring now to the drawing more in detail, the novel features of the invention will be described.

In explaining the invention, it will be understood that a calender is shown in the drawing which embodies a stack of three rolls, the intermediate roll of which is removable. A calender may include any desired number of rolls, and the novel features of the invention may pertain to any roll of the plurality thereof.

A pair of transversely spaced side frames are represented by 2 which extend vertically from a support to which they may be secured. Such support may be a foundation or the like. The side frames may be in the form of castings, or fabricated from welded together steel plate, as may be desired.

The side frames 2 are provided with vertical slots, as is usual in calender construction, and in which bearings or boxes 4 for the shaft 6 of an upper roll 8 are disposed.

A pulley 10 is fixed on the shaft 6 for driving the roll 8, and thereby the other rolls, in the operation of the calender.

The upper roll 8 may be elevated by any suitable means, such as bolts or screws 12 extending through the upper sides of the side frames, which are engageable in threaded sockets 14 of the upper bearings 4. The upper roll 8 is elevated to relieve an intermediate roll 20 of its weight and pressure thereon so that same may be removed from the calender.

Lower bearings 22 for the shaft 24 of a lower roll 26 are disposed in the vertical slots of the side frames.

The roll 20 may be of the so-called type having a stack of discs of non-metallic material held on a shaft, under endwise pressure, by end members 30 and 32 which are locked to the shaft. Opposite ends of the shaft are indicated by 34.

It will be understood, of course, that the novel features of the invention are adapted for rolls of types other than that above mentioned.

The vertical slots, normal in such side frames 2, are indicated by 36, in Fig. 2. Elongated bars or stops 38 are secured in spaced-apart relation in the slots 36 by screws or bolts 40, such as shown.

Housings or bearing members 42 are disposed in the slots 36, and are movable up and down in said slots, in the normal manner as is usual in operation of the calender.

Further, the housings 42 are slidable horizontally axially in the slots between the stops 38 for the removal of the roll 20 from the calender side frames and the insertion of the roll thereinto.

Anti-friction bearings of suitable well known form are indicated by 44. These bearings are held in the housings 42 by outer and inner cap plates 46 and 48 respectively which are secured to the housings as by bolts 50 and 52 respectively.

Supporting shafts 56 have tapered outer ends, such as 58, which fit in the bearings 44. Plates, such as 60, abut the bearings 44, and are secured to the end faces of the shafts 56 as by bolts or screws 62.

Inner ends of the shafts 56 carry flanges 64, and have pilot portions, such as 66, which fit snugly in recesses 68 provided in the opposite end faces of the shaft. Bolts 70 releasably secure the flanges 64 of the shafts 56 to the ends of the shaft.

Thus, the shafts 56 and the shaft 34 are centered by the pilots 66 and the recesses 68, and are held together by the bolts 70 so that the roll 20 is supported for rotation by the housings 42.

To remove the roll 20 from the calender, it is relieved of weight by slightly elevating the upper bearings 4 by means of the respective screws 12. The bolts 70 are removed to disconnect the shafts 56 and shaft ends 34, and the housings 42 are moved horizontally outwardly in the slots 36 so as to separate the ends of shaft 34 from the adjacent ends of the shafts 56, wherefor the pilots 66 may be removed from the recesses 68.

The roll 20 being free, it may be moved outwardly between the side frames 2 by any suitable means. For illustrative purposes, the roll 20 is provided on opposite ends thereof with annular grooves 21 for the reception of the sling of a hoisting mechanism of suitable type. There also may be provided a platform or support onto which the roll may be rolled.

It will be observed that the removable roll 20 is rotatable relative to the housings by means of the connections between the ends of the roll shaft and the ends of the shafts 56 which are rotatable in the housings.

The ends of the roll shaft and the ends of the shafts 56 are disconnected by the removal of the bolts 70, and the moving of the housings 42 in the slots outwardly. The connections between the ends of the roll shaft and shafts 56 are readily and easily made by moving the housings inwardly to enter the pilots 66 in the recesses 68 and by replacing the said bolts 70.

It will be noted that the overall length of the shaft of roll 20 is less than the distance between the adjacent inner sides of the side frames so that the roll may readily be moved outwardly between the side frames.

It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

Accordingly, limitation of this invention should be made only as determined by a proper interpretation of the terms used in the subjoined claims.

It is intended to claim the invention, broadly as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:

1. Calender apparatus comprising in combination, a pair of transversely spaced side frames and having bearing slots therein, upper bearings in the slots of said side frames for the shaft of an upper roll, means for elevating said upper bearings and roll to relieve a roll therebelow of weight and pressure, elongated stops secured in spaced relation adjacent opposite edges of the slots of said side frames, housings slidable axially in the slots between said stops, bearings in said housings, holding means holding said bearings in said housings against axial movement, shafts in said bearings, securing means holding said shafts against axial movement in said bearings, a roll having shaft ends at opposite ends thereof, means for releasably connecting inner adjacent ends of said shafts and ends of said roll shaft, and means for centering said shafts and roll shaft, said roll and its shaft having an overall length relatively less than the distance between adjacent inner sides of said side frames whereby said roll may be withdrawn from and inserted between said side frames.

2. Calender apparatus as set forth in claim 1 wherein, said holding means includes members at outer and inner sides of said bearings secured to outer and inner sides of said housings.

3. Calender apparatus as set forth in claim 1 wherein, said securing means includes outer end portions of said shafts having converging sides in said bearings and plates secured to outer end faces of said shafts engaging outer sides of said bearings.

4. Calender apparatus as set forth in claim 1 wherein, the means for connecting inner ends of the shafts and ends of said roll shaft include flanges on said shafts and threaded means securing said flanges to ends of the roll shaft.

5. Calender apparatus as set forth in claim 1 wherein, said centering means includes recesses provided in the faces of the ends of said roll shaft and pilots receivable therein provided on inner ends of the shafts of said housings.

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