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FLUID COOLED ROLL

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FIG. 2.

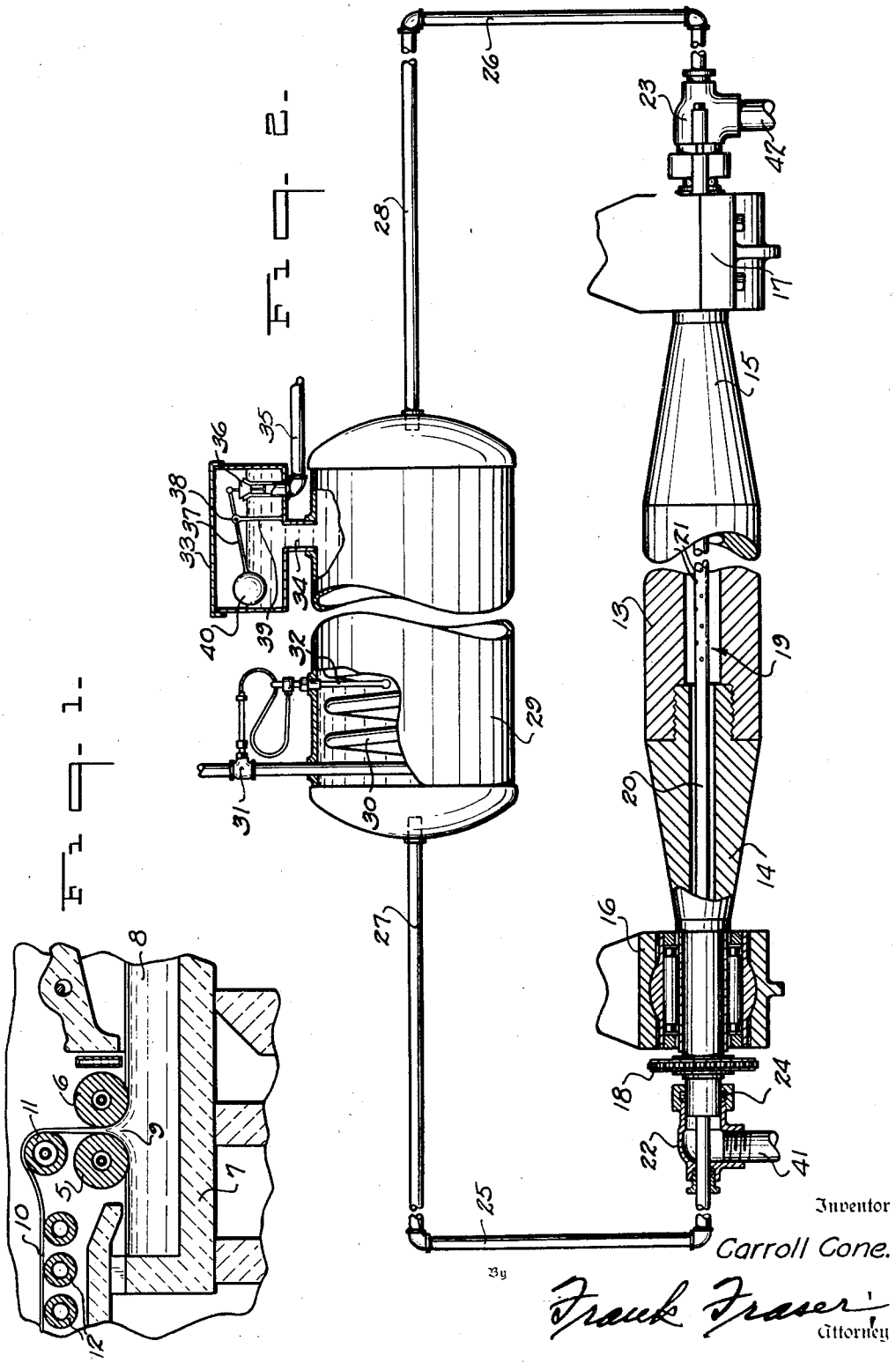


FIG. 1.

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FLUID COOLED ROLL

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12 Claims. (Cl. 257—95)

The present invention relates broadly to rolls and more particularly to fluid-cooled rolls for use in the making of sheet or plate glass, although the rolls are of course not limited to use in such relation.

An important object of this invention is the provision of a roll having improved means associated therewith for cooling the same whereby the said roll can be maintained substantially uniform in temperature and especially throughout that portion of its length which contacts with the glass.

Another object of the invention is the provision of a roll construction having novel means for effecting the circulation of a cooling fluid therethrough.

A further object of the invention is the provision of means for maintaining the cooling fluid introduced into the roll at a constant predetermined temperature, and in also causing the fluid to flow through said roll at a uniform velocity.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawing.

In the drawing forming a part of this application and wherein like numerals are employed to designate like parts throughout the same,

Fig. 1 is a vertical longitudinal section through a portion of a sheet glass rolling machine with which the present invention may be incorporated, and

Fig. 2 is an elevation of one of the rolls, partially in longitudinal section, and also the means for supplying the cooling fluid thereto.

Referring first to Fig. 1 of the drawing, the rolling machine here shown by way of example includes generally a pair of forming rolls 5 and 6 positioned transversely above the working receptacle or pot 7 and disposed side by side closely adjacent to the surface of the mass of molten glass 8 contained therein. This mass of molten glass may be supplied to the receptacle in any desirable manner, and the forming rolls are preferably located substantially at the surface of the molten mass, being neither above nor beneath the same. The forming rolls 5 and 6 are adapted to be positively driven in a manner to draw a relatively heavy body of glass 9 upwardly from the receptacle and roll it to a sheet 10 of substantially predetermined and uniform thickness.

The rolls 5 and 6 are spaced from one another to create a sheet forming pass, and the width of this pass determines the thickness of sheet produced. The sheet 10, after being formed, is moved vertically from the sheet forming pass for a relatively short distance and is then deflected over a rotatable bending roll 11 into the horizontal plane, wherein it is carried forwardly upon a series of horizontally arranged conveying rolls 12. If desired, the bending roll 11 can be omitted and the sheet deflected first into an inclined plane about roll 5 and thence into the horizontal plane about the first roll 12.

The two rolls 5 and 6 are similar in construction throughout so that a description of one will serve for both. Thus, each roll includes a center part 13 and two end parts 14 and 15. The center part 13 is substantially cylindrical and is adapted to contact with the glass, while the end parts 14 and 15 taper towards their outer ends and are supported in the journals or bearings 16 and 17 respectively. The roll may be rotated by a chain and sprocket drive or the like 18 associated with one end thereof.

The roll is formed with an internal bore 19 extending longitudinally therethrough, and received within this bore is a pipe 20, the center part of which is provided with a plurality of perforations 21. The pipe 20 projects outwardly beyond the opposite ends of the roll and is supported by the stationary fixtures 22 and 23, each having a loose fit with the adjacent end of the roll as at 24. Secured to the opposite ends of perforated pipe 20 are the vertical pipes 25 and 26 which are connected by means of horizontal pipes 27 and 28 respectively to the opposite ends of a relatively large container 29. This container may be of any desirable capacity and is mounted above the roll in such a manner that the cooling fluid, such as water or the like, contained therein will be caused to flow therefrom to and through the roll under head pressure.

Arranged within the container 29 is a heating coil 30 through which is adapted to be circulated steam or the like, the steam entering the coil through a thermostatic valve 31 which is automatically controlled by a thermostat 32 projecting into the container. In this manner, the cooling fluid within the container 29 can be automatically maintained at a constant predetermined temperature.

Mounted upon the top of the container 29 is a relatively smaller receptacle 33 communicating with the said container through a neck 34. Entering through the bottom of receptacle 33 is a fluid inlet pipe 35, and associated with the upper end thereof in a manner to control the flow of fluid therefrom is a valve 36 carried at

one end of a rocker arm 37 pivoted intermediate its ends as at 38 to a support 39, and provided with a float 40 at its opposite end. By the provision of this float valve, the desired head pressure of the fluid within the container 29 will be automatically maintained as a result of which the fluid will be forced through the roll at a uniform velocity.

In operation, the cooling fluid within container 29 is adapted to flow therefrom under head pressure through pipes 27 and 28 into and through pipes 25 and 26 and thence into the opposite ends of perforated pipe 20. The fluid discharges from pipe 20 through the perforations 21 therein into the interior of the roll, and passes outwardly of said roll at opposite ends thereof, the fluid flowing through the space between the pipe and the interior of the roll into the fixtures 22 and 23, and thence outwardly through the drain pipes 41 and 42 associated therewith. Due to the provision of the heating coil 30, the fluid may be heated to the desired temperature, and it will be automatically maintained at such temperature by the thermostatically controlled valve 31. Likewise, the fluid will be caused to flow through the roll at a uniform velocity due to the provision of the float valve 36 which serves to automatically maintain a constant head pressure within container 29. In the event the temperature of the cooling fluid introduced into the roll were constantly changing, or if the velocity of the fluid travelling through the roll fluctuated, the roll would not be uniformly cooled and this would naturally adversely affect the glass passing in contact therewith. While the fluid within container 29 is heated, yet it is always maintained at a temperature less than that of the roll so that it will have a cooling action thereupon and not a heating action. By circulating the fluid through the roll at a uniform velocity, and in maintaining therewith a constant predetermined temperature, a much more efficient cooling action may be achieved.

The heating of the cooling fluid is desirable in that it renders possible the passing of the fluid through the roll at a sufficient velocity to prevent it from turning into steam before it emerges therefrom, while at the same time preventing an excessive cooling of the roll. In other words, it has heretofore been customary to employ cold water tapped directly from the city supply in the cooling of the rolls. When employing this cold water, however, it has been necessary to pass it through the roll at a relatively low velocity in order to prevent an excessive cooling thereof, as a result of which the water turned into steam before passing from the roll. This was, of course, an undesirable condition and could not be corrected by speeding up the flow of the water through the roll since this would cause a too-rapid cooling thereof. The above objectionable features incident to the use of cold water are entirely eliminated with the use of the present invention.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for feeding a cooling fluid into the opposite ends of said roll, means for conveying said cooling fluid therefrom, and means for maintaining the cooling fluid being fed to the roll at a constant predetermined temperature.

2. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for feeding a cooling fluid into the opposite ends of said roll, means for conveying said cooling fluid therefrom, means for maintaining the cooling fluid at a constant predetermined temperature, and means for causing the fluid to flow through the roll at a uniform velocity.

3. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for feeding a cooling fluid into the opposite ends of said roll, means for conveying said cooling fluid therefrom, means associated with said feeding means for heating the fluid being fed to the roll to a predetermined temperature which is less than that of the roll so that it will have a cooling effect thereupon, and means for automatically maintaining the temperature of the cooling fluid passing to said roll constant.

4. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means positioned above the roll containing a supply of cooling fluid, and means for causing the fluid to flow through the roll under the head pressure of its supply.

5. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for circulating a cooling fluid through said roll, means for causing the fluid to flow through the roll under head pressure, and means for automatically maintaining the said head pressure constant.

6. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for feeding a cooling fluid into the opposite ends of said roll, means for conveying said cooling fluid therefrom, means for heating the fluid to a predetermined temperature which is less than that of said roll so that it will have a cooling effect thereupon, and means for causing the fluid to flow through said roll under head pressure.

7. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, means for circulating a cooling fluid through said roll, means for heating the fluid to a predetermined temperature which is less than that of said roll so that it will have a cooling effect thereupon, means for automatically maintaining the temperature of the cooling fluid constant, means for causing the fluid to flow through the roll under head pressure, and means for automatically maintaining the said head pressure constant.

8. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, a container mounted above the roll and containing a supply of cooling fluid, means connecting and in communication with the container and roll and through which the cooling fluid is caused to flow from the former to the latter under the head pressure of its supply, and means for heating the fluid within the container to a predetermined temperature which is less than that of the roll so that it will have a cooling effect thereupon.

9. In combination, a roll mounted for rotation and having a central bore extending longitudi-

nally therethrough, a container mounted above the roll and containing a supply of cooling fluid, means connecting and in communication with the container and roll and through which the cooling fluid is caused to flow from the former to the latter under the head pressure of its supply, and means for automatically maintaining the head pressure constant.

10. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, a container mounted above the roll and containing a supply of cooling fluid, means connecting and in communication with the container and roll and through which the cooling fluid is caused to flow from the former to the latter under the head pressure of its supply, means for automatically maintaining the head pressure constant, and means for heating the fluid to a predetermined temperature which is less than that of the roll so that it will have a cooling effect thereupon.

11. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, a source of supply of cooling fluid, means for feeding the cooling fluid from said source of supply into the opposite ends of said roll, means associated with the source of supply for maintaining the cooling fluid at a constant predetermined temperature, and means for conveying the cooling fluid from said roll.

12. In combination, a roll mounted for rotation and having a central bore extending longitudinally therethrough, a source of supply of cooling fluid, means for feeding the cooling fluid from said source of supply into the opposite ends of said roll, means associated with said source of supply for heating the cooling fluid, means associated with the source of supply and operable automatically for maintaining the cooling fluid at a constant predetermined temperature, and means for conveying the cooling fluid from said roll.

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