

July 3, 1928.

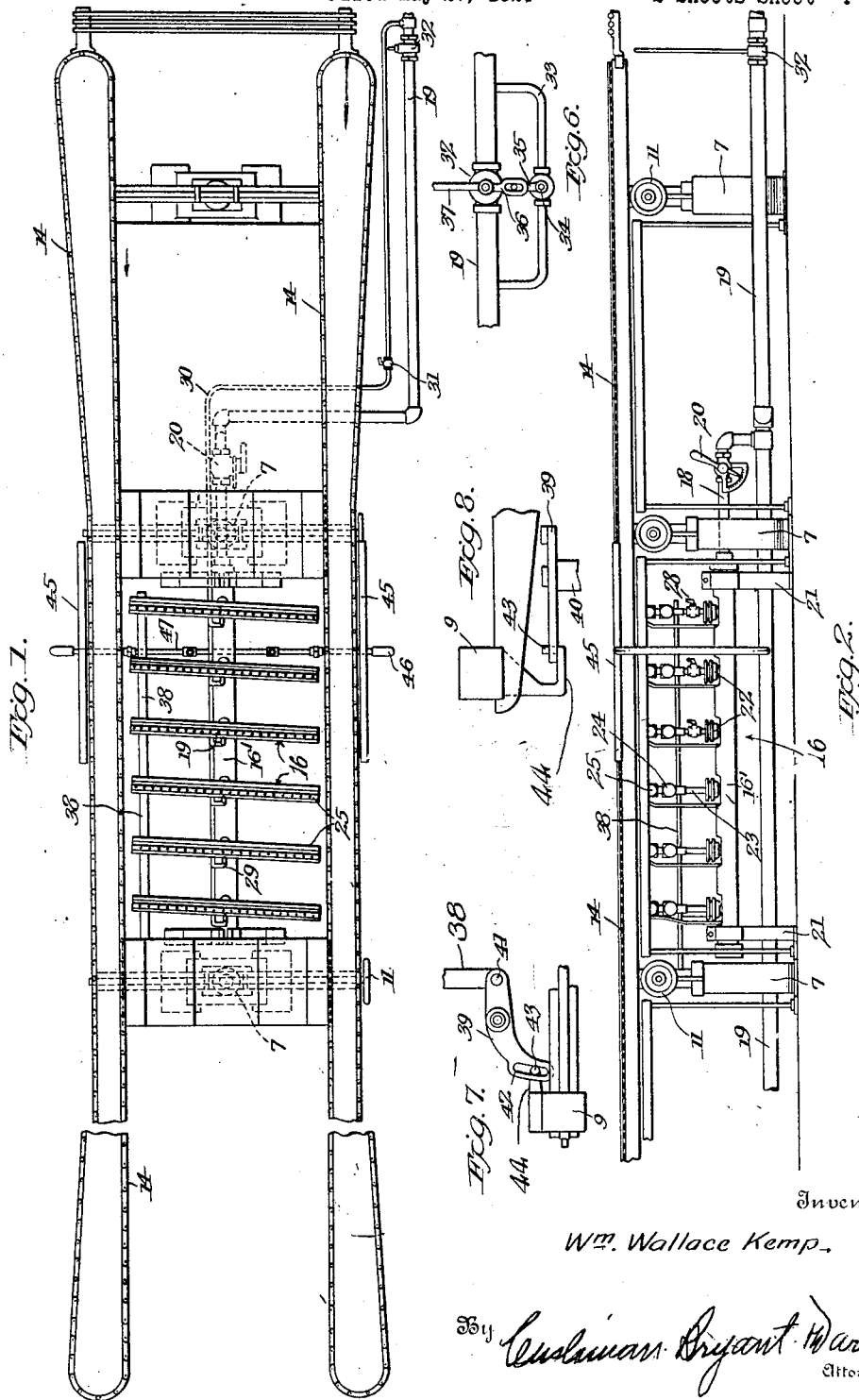
1,676,092

W. W. KEMP

DRYING APPARATUS

Filed May 27, 1925

2 Sheets-Sheet 1



July 3, 1928.

1,676,092

W. W. KEMP

DRYING APPARATUS

Filed May 27, 1925

2 Sheets-Sheet 2

Fig. 3.

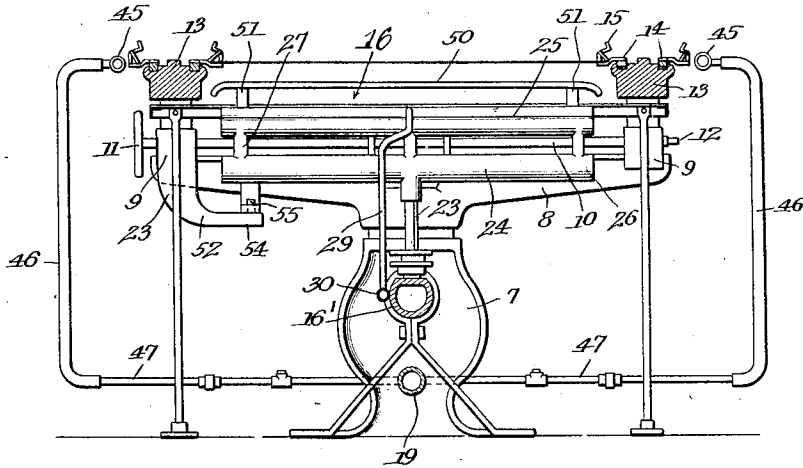
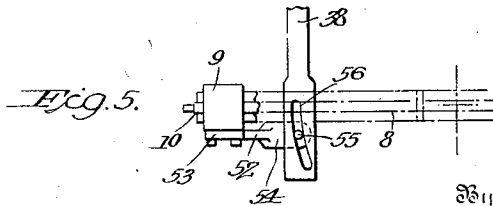
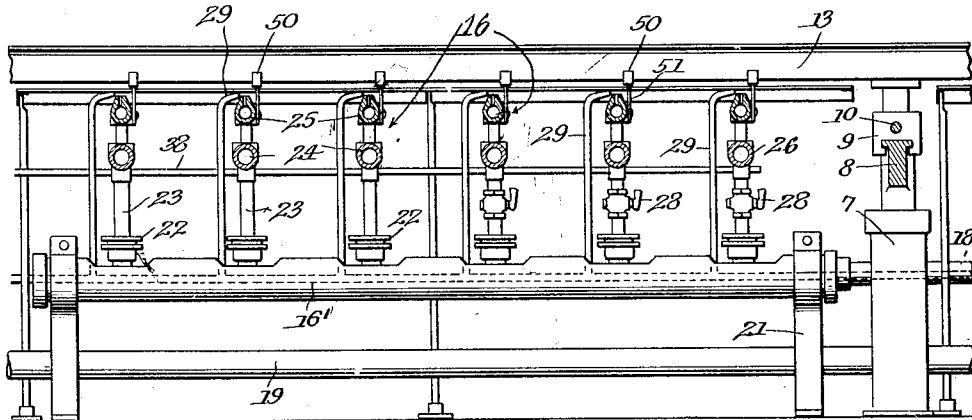


Fig. 4.



Inventor

Wm. Wallace Kemp

By *William Wallace Kemp*
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM WALLACE KEMP, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE C. M. KEMP MANUFACTURING CO., OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

DRYING APPARATUS.

Application filed May 27, 1925. Serial No. 33,242.

This invention relates to new and useful improvements in tentering machines employed for drying, stretching, and otherwise treating fabric.

5 An important object of the invention is to provide a novel arrangement of a drying device whereby the operating width of the same may be varied to correspond with the width of the fabric to be treated by the tentering machine.

10 Another important object of the invention resides in the provision of means connecting the side rails of the tentering machine with movably mounted burners in a manner that adjustment of the rails will automatically cause corresponding adjustment of the burners.

15 A further object of the invention resides in the provision of a plurality of batteries of burners arranged at spaced intervals longitudinally of the tentering machine with means for independently controlling the flow of fuel to each battery whereby the fabric to be treated by the machine may be subjected to successively increasing temperatures as it is moved longitudinally of the tentering frame.

20 A still further object of the invention is to provide pilot light arrangements for each battery of burners in one of which the pilot lights are automatically lighted upon cessation of the main supply of fuel to the burners, and in the other arrangement, the pilot lights are permitted to burn constantly.

25 Other objects and advantages of the invention will become apparent during the course of the following description.

30 In the drawings wherein like numerals are employed to designate like parts throughout the several views:

Figure 1 is a fragmentary top plan of a tentering machine embodying my invention.

Figure 2 is a side elevation of the same.

35 Figure 3 is an enlarged transverse section of the machine.

Figure 4 is a longitudinal section of the same.

40 Figure 5 is an enlarged fragmentary plan of the connection between a side rail and the burner operating means.

Figure 6 is a side elevation of a modified form of the means for maintaining the pilot lights.

Figure 7 is a top plan of a modified form

of connection for the operating bar and a saddle block.

Figure 8 is a side elevation of the same. The present invention relates to improvements upon the drying apparatus disclosed in my co-pending application, Serial No. 15,968, filed March 16, 1925, and contemplates the provision of means for automatically varying the operating width of the burners to correspond with the width of the fabric to be treated.

Referring more particularly to the drawings, the numeral 7 designates a plurality of floor stands forming the main support of the tentering machine frame, and which are arranged at spaced intervals along a straight line and secured to the floor or other suitable support. Although the drawing illustrates only three of these floor stands, adjacent the feeding end of the tentering frame, it will be understood that in actual practice, about ten of these floor stands are employed for the support of the tentering frame and that they are arranged equal distances apart throughout the length of the machine. Upon each floor stand 7 is mounted for oscillation, a cross arm 8 upon the ends of which are slidably mounted for adjustment, saddle blocks 9 of the usual construction. The customary means for adjusting these saddle blocks 9 toward or away from the center of the tentering machine to adjust the frame to receive fabric of different widths, consists of the shaft or rod 10 having right hand screw threads on one end, and left hand screw threads on the opposite end. The threaded portions of this rod, of course, pass through the saddle blocks, and at its extremities is provided with suitable means for turning the rod, such as a hand wheel 11 attached to the rod, or a polygonal end 12 for the accommodation of a wrench or other suitable tool.

Side rails 13 are carried by these saddle blocks in the usual manner, and the rails are each provided with a pair of longitudinal grooves or raceways for the reception of the runs of endless tentering chains 14. An endless tentering chain is provided to ride upon each side rail 13, and passes around sprockets arranged at the ends of the machine in the usual manner, the sprockets being driven in any suitable manner. These tentering chains 14 carry automatic fabric

clamps 15, such as referred to in my co-pending application, above mentioned. My invention is well adapted for use with either the "swing type" tentering machine or the
 5 ordinary tenter.

The means I provide in the present instance for drying the fabric to be treated by the tentering machine consists of a plurality of batteries 16 of drying devices or burners,
 10 one battery being positioned between each pair of floor stands 7, and as each battery is of the same construction, as well as the means for adjusting the burners to different operating widths, a description of one will
 15 serve for all.

Each battery of drying devices consists of a pipe or conduit 16' arranged longitudinally along the center of the tentering machine a distance below the side rails thereof.
 20 Fuel in the form of gas or any other medium is supplied to this pipe 16' by a branch pipe 18 communicating with the main fuel conduit 19 which extends longitudinally of the machine throughout its length. In order to
 25 regulate the amount of fuel to be consumed by the burners of each battery, each branch pipe 18 is equipped with an index valve 20, as clearly shown in Figure 2.

Each pipe 16 is supported upon the floor
 30 by means of stands or brackets 21 of any suitable construction. The top of each pipe or conduit 16 is provided with as many depressions as the battery has burners, and the nipple of a stuffing box 22 is tapped
 35 through each depression. A pipe 23 rises from each stuffing box and has fitted on its upper end a burner, indicated in its entirety by the numeral 24. Each burner consists of
 40 an upper pipe section 25 which is provided in its upper surface with one or more outlet orifices, and a lower pipe section 26 arranged in spaced parallel relation to the upper section and communicated therewith by a plu-
 45 rality of spaced nipples 27, for conveying the gas from the lower section to the upper burner section 25.

As will be clearly seen in Figure 1, these burners 24 are arranged at spaced intervals and transversely of the tentering machine
 50 slightly below and between the side rails thereof, whereby they will be disposed in rather close proximity to the fabric treated by the machine. From Figure 4, it will be
 55 apparent that the outlet ports of each upper burner section 25 are at all times disposed coincident with a vertical plane of the axis of its respective stuffing box 22, regardless of the angular adjustment of the burners, whereby the operating width of the flames
 60 issuing from these outlet ports corresponds exactly with the effective operating length of the burner, regardless of its angular adjustment upon the stuffing box. This is due to the burner being pivotally mounted and
 65 its outlet ports extending in a direction per-

pendicular to the plane of movement of the burner. Due to the fact that these burners are pivotally mounted intermediate their ends to swing horizontally, their opposite
 70 ends will be caused to simultaneously move in opposite directions, so that the operating width of the burner on opposite sides of its pivot will be varied to the same degree upon
 75 swinging movement of the burner, thereby providing for the pivotal support of the burners at the longitudinal center of the tentering machine and whereby both ends of the burners will extend substantially to
 80 both longitudinal edges of fabric regardless of its width.

As best seen in Figures 2 and 4, the first three burners of the batteries arranged nearest the feeding end of the machine, are each provided in its pipe 23 with a valve 28, so
 85 that the flame from these burners may be regulated independently of the index valve 20. This arrangement is provided for the purpose of permitting, if desired rather low flames to be issued from the first few burners
 90 adjacent the feeding end of the machine, and higher or more intense flames to be issued from the remaining burners of the same battery and succeeding batteries, so that the fabric being treated by the machine can be
 95 subjected to a gradually increasing temperature as it is moved longitudinally.

A pilot light for each burner 25 is provided, and I have disclosed two ways for maintaining the pilot lights. One of these
 100 consists of providing a pilot pipe 29 for each burner arranged in proximity thereto and having its upper end deflected toward the outlet orifice of the burner, while the lower end of each pilot pipe is connected
 105 to a common pilot supply pipe 30, which extends longitudinally of the machine to supply the pilots of all of the batteries of burners. This supply pipe 30 is provided with a valve 31 for controlling the amount of
 110 fuel passing therethrough. Fuel to this supply pipe is furnished from the main fuel conduit 19, as clearly seen in Figure 1, by connecting the pipe 30 thereto between the source of supply, not shown, and a quick
 115 opening gate valve 32 interposed in the main conduit 19. By this arrangement it will be apparent that when the gate valve 32 is closed, the fuel will still pass through the supply pipe 30, when the valve 31 is
 120 open, to the individual pilot pipes 29, so that these pilots will continue to burn when the burners 25 are turned off. As the flames from the pilots are small and will not interfere with the burner flames, the pilots may,
 125 if desired, remain lighted while the burners are in operation, so that upon cessation of the burner flames, the pilots will continue to burn.

Another way of maintaining the pilots is disclosed in Figure 6. In this modifica- 130

tion, the supply pipe 30 and individual pilot pipes 29 may be eliminated. In place of the supply pipe 30, a by-pass 33 communicates with the main conduit 19 at one end on one side of the gate valve 32, and with the main conduit at the other end at the opposite side of the gate valve. A valve 34 is installed in this by-pass, and is provided with an operating handle 35 which projects through a slotted lower end 36 of an operating handle 37 of the valve 32. The valves 32 and 34 are constructed so that when one is opened, the other is closed, and it will therefore be apparent that when the operating handle 37 is actuated to close the valve 32, the valve 34 will be opened and permit only a small amount of fuel or gas to pass around the valve 32 through the by-pass 33, and back into the main conduit 19, where it will be directed to the various batteries of burners to maintain a small flame in each burner to serve as pilot lights.

It will be recalled that each burner is connected to its source of supply by means of a stuffing box 22, and consequently each burner is swivelly mounted intermediate of its ends. Corresponding ends of all of the burners 25 are pivotally connected to an operating bar 38 which is arranged adjacent one side of the machine with one end thereof arranged beneath and adjacent a cross arm 8. Longitudinal movement of this bar 38 will cause the burners of the battery to pivot and to have increased or decreased operating width depending upon the direction in which the bar 38 is moved. By the term "operating width" I desire to be understood as meaning the width of the flames or heated air from the burners measured transversely of the machine regardless of the angle at which the burners are disposed. In other words, the operating width of the burners will be decreased by movement of the bar 38 to the right of Figure 1, due to the fact that the burners will be caused to swing so that their ends more nearly approach the longitudinal center of the machine, or vice versa.

Before the machine is started and in order to automatically adjust the burners of each battery so that their operating width will correspond with the distance between the side rails 13 of the machine when they are moved relatively to accommodate fabric of different widths, I provide a connection between the operating bar 38 of each battery of burners and a saddle block 9 adjacent thereto. I have shown this connection in two forms in the present instance, although it will be obvious that many others can be devised without departing from the scope of my invention. In Figures 7 and 8, this connection consists of a lever 39 fulcrumed between its ends on a suitable stationary support 40. One end of this lever is piv-

otally connected to one end of the operating bar 38 at 41, and the opposite end of the lever is provided with an arcuate slot 42 to receive an upstanding terminal 43 of an arm 44 which is secured to and depends from the saddle block 9.

Another form of connection is shown in Figure 5, wherein a substantially L-shaped arm 52 has a vertical part 53 secured to one side of a saddle block 8, and a horizontal part 54 extending inwardly toward the center of the machine to terminate in an upwardly projecting pin 55. This pin is received in an arcuate slot 56 provided in the adjacent end of the operating bar 38.

From the first arrangement in Figures 7 and 8, it will be obvious that when the threaded rod 10, extending through the saddle blocks is rotated, they will be moved, carrying therewith the arm 44, and causing the lever 39 to swing upon its fulcrum to move the operating bar 38, thereby causing all burners connected therewith to swing and change their position or operating widths to correspond with the width of the fabric to be run through the machine. In the connection shown in Figure 5, rotation of the threaded rods to effect inward movement of the saddle blocks will cause inward movement of the arm 52, and due to the angular arrangement of the burners and the pin and slot connection 55 and 56, the bar 38 will move longitudinally and cause the burners to shift to the desired positions. It will of course be understood that the burners remain stationary during the time the fabric is passing through the machine.

Attention is directed to Figure 1 which illustrates the burners 24 arranged at the limit of their outward swinging movement and at an angle to facilitate their swinging movement upon actuation of the bar 38. In this position the burners are capable of issuing flames of maximum width, and when it is desired to treat narrower fabric, the burners are adjusted by means of the connection between the saddle block and operating bar 38 to decrease the operating width of the flames or combustible gases.

As illustrated in my co-pending application hereinbefore referred to, a pair of burners 45 are arranged longitudinally of the machine and at opposite sides thereof parallel with the outer runs of the tentering chains to direct flame upon the chains and their automatic clamps 15, whereby they are preheated prior to their engagement with the fabric. These burners are furnished with fuel through flexible pipe sections 46 connected to branch pipes 47 which communicate with the main supply pipe 19.

In the operation of the machine, the inside runs of the tentering chains 14 are driven in the direction of the arrows shown in Figure 1, and the fabric to be treated is adapted

to be fed into the machine from the right hand end of Figure 1. Before the machine is started the chains 14 are adjusted to accommodate fabric of the width to be treated, the threaded rods 10 being rotated to space the side rails 13 and tentering chains a distance corresponding to the width of the fabric to be treated. Movement of the saddle blocks to cause this adjustment of the side rails causes the operating bars 38 of the several batteries to move longitudinally, one way or the other, depending upon whether the side rails are moved inwardly or outwardly, which movement of the operating bars causes the individual burners of each battery to swing upon their respective stuffing boxes, thereby causing the operating width of the burners to correspond with the width of the fabric.

Assuming that fabric of less width than the distance between the tentering chains as shown in Figure 1 is to be treated, the rods 10 are rotated to cause the saddle blocks to move toward the longitudinal center of the machine carrying with them the side rails 13 and tentering chains 14. This inward movement of the saddle blocks causes the operating bars 38 of each burner to move toward the right of Figure 1, thereby causing the burners of each battery to pivot carrying the ends of the burners toward the longitudinal center of the machine so that the operating width of these burners is decreased and corresponds with the width of the fabric to be treated.

With the machine properly adjusted and the pilot lights burning, the operator opens the valve 32 in the main feed conduit, permitting fuel to flow to the burners of each battery. The valves 28 on the first three burners of the battery adjacent the feeding end of the machine may, if desired, be regulated so that these burners issue smaller flames than the succeeding burners throughout the length of the machine, in order that the fabric will be gradually heated as it enters the machine. Of course, it will be understood that the intensity of the flames to be issued from the various burners or batteries thereof may be regulated as desired and found advantageous, and I do not limit the invention in any manner to the particular flame adjustment of these burners or batteries thereof.

The fabric is then fed into the machine and its edges are gripped by the automatic clamps 15 of the tenter chains and drawn or conveyed longitudinally of the machine in the customary manner. It is to be noted that the burners of the various batteries are arranged in close proximity to the fabric moving through the machine, and much closer to the fabric than in my above mentioned co-pending application, wherein hot air blasts are directed against the fabric. Yet, in this

present application, the flames from the burners 25 do not impinge the fabric, nor do they direct blasts of heated air against fabric but to the contrary, the burners are preferably, but not necessarily, arranged in respect to the fabric just the proper distance whereby only the combustion gases from the burners impinge upon the fabric. By this arrangement, the burners are capable of directing a very intense heat upon the fabric without burning or damaging the fabric in any way, and since the combustion gases are not forced through the fabric, but create a stratum of hot combustion gases under the fabric which travels with the same, the fabric can be run through the machine at a high rate of speed which will result in economy of fuel, maximum production, and uniform quality of product.

As the fabric is moved longitudinally of the tenter frame by the tenter chains, the combustion gases from the burners of all of the batteries are directed toward the fabric and form a stratum of hot gas directly under the same, and which moves along with the fabric. The burners being arranged close together with very little space therebetween, and the stratum of hot gases traveling with the fabric, it will be seen that the fabric is subjected to uniform drying temperature. Even in cases where open mesh fabric is treated by the machine and some of the combustion gases pass through the same, still the fabric will be subjected to a uniform temperature throughout the length of the tenter frame, due to the close arrangement of the burners relative to each other. Of course, it is preferable to regulate the valves 28 of the burners at the feeding end of the machine to issue lower flames than the other burners of the various batteries, in order that the fabric will be gradually dried as it passes lengthwise of the frame, but it is to be understood that any other regulation or adjustment of the various burners may be made as may be found desirable without departing from the scope of my invention.

It is customary in silk fabric to have a cotton strip attached to the tail end thereof, and in order to prevent this strip from falling into the burner flames, a guard 50 is provided for each burner, and consists of a bar arranged slightly above the burner and parallel therewith. Each guard 50 is suitably supported upon its respective burner; in the present instance by means of a pair of legs 51 depending from the guard and attached at their lower ends to the side of the burner 25. It will be observed that these guards are arranged upon the sides of the burners nearest the feeding end of the tentering machine, and consequently will prevent the tail end of the fabric from fall-

ing into the flames from the burners and catching on fire.

It is to be understood that various changes in the arrangement, shape, and size of the various parts of the invention may be varied without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In a device of the class described, a gaseous fuel burner bodily movable to vary the operating width thereof upon the material treated by the device, said burner extending substantially the full width of material treated in said device.

2. In a device of the class described, means for holding material, and an angularly adjustable burner associated therewith, said burners extending substantially the full width of material treated by said machine and being adjustable to cause its operating width to correspond with different widths of material treated in said machine.

3. In a tentering machine, carrying means for moving material, drying means extending substantially the full width of said carrying means, and means for simultaneously varying the width of said carrying means and the operating width of said drying means whereby the operating width of said drying means corresponds with the width of the material adapted to be associated with said carrying means.

4. In a tentering machine, a drying device extending transversely of the machine substantially the full width of material treated thereby and arranged to move relative to said machine, and said device being pivotally mounted to vary the operating width thereof.

5. In a tentering machine, a drying device associated therewith, and said device being pivotally mounted to permit its opposite ends to simultaneously move in opposite directions toward and from the longitudinal center of the machine.

6. In a tentering machine, a drying device pivotally supported between its ends, substantially at the longitudinal center of the machine, and arranged transversely thereof, whereby opposite ends of said device simultaneously move in opposite directions to and from the longitudinal center of the machine upon pivotal movement of said drying device.

7. In a tentering machine, adjustable side members, a battery of pivotally supported burners arranged longitudinally of the machine, the burners extending at an angle transversely thereof, a bar connecting said burners, and an L-shaped arm rigidly connected to a side member and having slotted connection with said bar.

8. In a tentering machine, adjustable side members, a battery of pivotally supported burners arranged longitudinally of the ma-

chine, the burners extending at an angle transversely thereof, a bar connecting said burners, and a lever pivotally connected to a side member at one end and to said bar at its other end.

9. In a tentering machine, means for moving material, a fuel conduit, a stuffing box mounted thereon at substantially the longitudinal center of the machine and communicating with said fuel conduit, a burner supported substantially intermediate its ends upon said stuffing box and extending substantially the full width of material treated by said machine, and means for varying the angle of the burner whereby the operating width of said burner can be varied to correspond with different widths of material treated by said machine.

10. In a tentering machine, means for moving fabric, burner means, and guard means adjacent said burner means to prevent the fabric from falling into the flame of said burner means.

11. In a tentering machine, a battery of burners, and guard means associated with each burner to prevent the tail end of fabric from falling into the flames from said burners.

12. In a tentering machine including adjustable side rails, a heat directing device pivotally mounted between its ends at substantially the longitudinal center of said machine and extending substantially the full width of material treated by said machine, and one of said side rails and heat directing device being connected to provide for simultaneous adjustment thereof.

13. In a tentering machine including a pair of adjustable side rails, a heat directing device pivotally mounted between its ends at substantially the longitudinal center of said machine and adapted to extend substantially transversely thereof substantially the full width of material treated by said machine, and said heat directing device and one of said side rails being connected to provide for simultaneous adjustment thereof.

14. In a tentering machine, a fuel supply conduit arranged longitudinally thereof, and a plurality of burners receiving fuel therefrom and being bodily movable to vary their operating widths, each of said burners extending transversely of the machine substantially the full width of material treated thereby.

15. In a tentering machine, a fuel supply conduit arranged longitudinally thereof at substantially the longitudinal center of the machine, a plurality of burners receiving fuel from said conduit and arranged substantially transversely of said machine to extend substantially the full width of material treated thereby, and each of said burners being pivotally connected between its ends

to said conduit whereby the operating width of each burner may be varied.

16. In a tentering machine, carrying chains at opposite sides thereof, said chains
5 being relatively adjustable to accommodate material of different widths, and a heat directing device of a length substantially equal to the distance between said carrying chains and being pivotally mounted whereby
10 its operating width can be made to correspond with the distance between said carrying chains.

17. A burner for tentering machines, comprising supporting means, a plurality of
15 vertical fuel supply pipes supported thereby, a burner swivelly mounted upon the upper end of each supply pipe and adapted to extend substantially the full width of material adapted to be treated in a tentering machine, whereby the operating width
20 of said burner can be varied to correspond with the width of material treated in the tentering machine, and means for connecting said burners for causing their simultaneous movement.

18. A burner for tentering machines, comprising a supporting stand, a fuel supply pipe, and a plurality of burners receiving fuel from said pipe and each burner being
30 pivotally supported between its ends and adapted to extend substantially the full width of material adapted to be treated in a tentering machine, whereby the operating width of said burner can be varied to correspond with the width of material treated
35 in the tentering machine.

19. A burner for tentering machines, comprising a supporting stand, a fuel supply pipe, a plurality of burners receiving fuel from said pipe and each burner being pivotally supported between its ends and adapted to extend substantially the full width of material adapted to be treated in a tentering machine whereby the operating
45 width of said burner can be varied to correspond with the width of material treated in the tentering machine, and means for swinging said burners simultaneously.

20. A burner for tentering machines, comprising a fuel supply pipe, a plurality of burners receiving fuel from said pipe and each burner being pivotally supported between its ends and adapted to extend substantially the full width of material adapted to be treated in a tentering machine, and a member connecting corresponding ends of said burners for causing them to swing simultaneously.

21. A burner for tentering machines, comprising a fuel supply pipe, a burner swivelly mounted between its ends on said pipe to move in a plane whereby the operating width of said burner can be made to correspond with the width of material treated by
60 said tentering machine, and said burner

having an outlet port arranged substantially perpendicular to said plane of movement.

22. A burner for tentering machines, comprising a fuel supply pipe, a burner swivelly mounted between its ends on said pipe
70 whereby the operating width of said burner can be made to correspond with the width of material treated by said tentering machine, and said burner having an outlet port arranged above the swivel connection and
75 substantially in a plane of the axis of said swivel connection.

23. A burner for tentering machines, comprising a substantially vertical fuel supply pipe, a burner comprising upper and lower
80 substantially parallel communicating horizontal pipe sections, said lower section being swivelly connected intermediate its ends to the upper end of said supply pipe to receive fuel therefrom and to swing in a horizontal
85 plane whereby the operating width of said burner can be made to correspond with the width of material treated by said tentering machine.

24. A burner for tentering machines, comprising a substantially vertical fuel supply pipe, a burner comprising upper and lower substantially parallel horizontal pipe sections connected at their ends, said lower section being swivelly connected intermediate its ends to the upper end of said supply pipe to receive fuel therefrom and to swing in a horizontal plane whereby the operating width of said burner can be made to correspond with the width of material
100 treated by said tentering machine, and said burner having an outlet port arranged coincident with the axis of said swivel connection.

25. In a tentering machine, a drying device arranged to move relative to said machine, said device being pivotally mounted to move in a plane and having an outlet port arranged substantially perpendicularly to said plane of movement of said drying device, and said drying device extending
110 the full width of material treated by said tentering machine, whereby said drying device can be moved to cause its operating width to correspond with the width of material treated by said machine.

26. In a tentering machine, a drying device arranged to move relative to said machine, said device being pivotally mounted between its ends and having its outlet port arranged above said pivot in substantially
120 a vertical plane of the axis thereof, said device extending transversely of the machine substantially the full width of material treated thereby, and said device being swingable on its pivot whereby its operating
125 width can be caused to correspond with the width of material treated by said machine.

In testimony whereof I have hereunto set my hand.

WILLIAM WALLACE KEMP.