Nov. 22, 1938. G. M. DYE 2,137,480

METHOD AND APPARATUS FOR DRYING PRINTS

Filed April 18, 1935 4 Sheets-Sheet 1

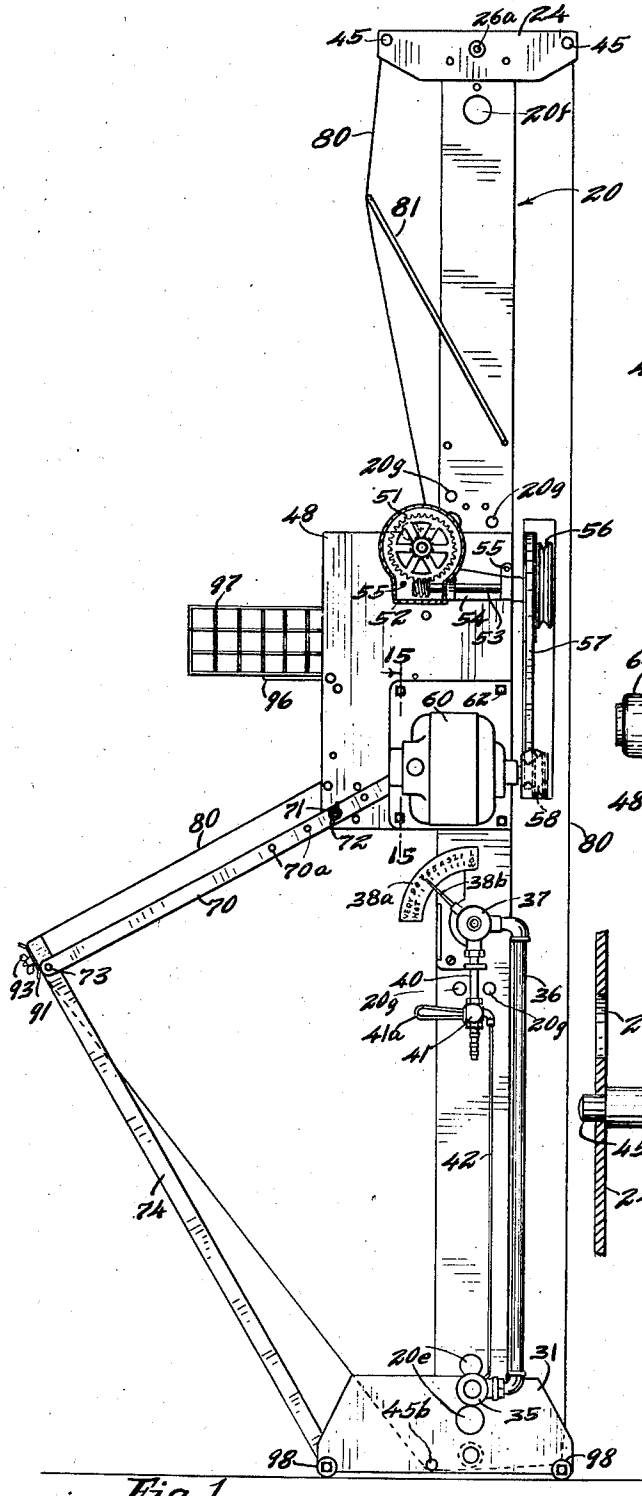

Fig. 1.

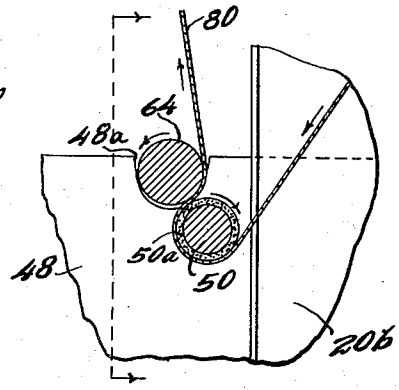

Fig. 7.

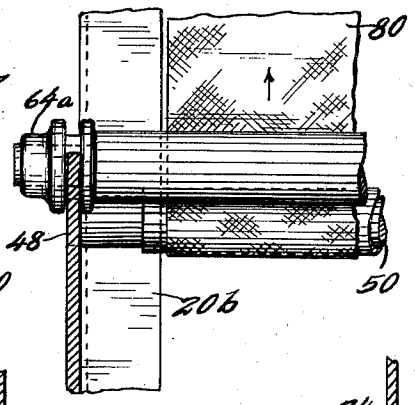

Fig. 8.

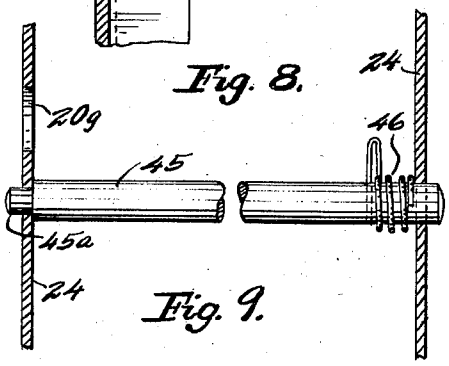

Fig. 9.

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METHOD AND APPARATUS FOR DRYING PRINTS

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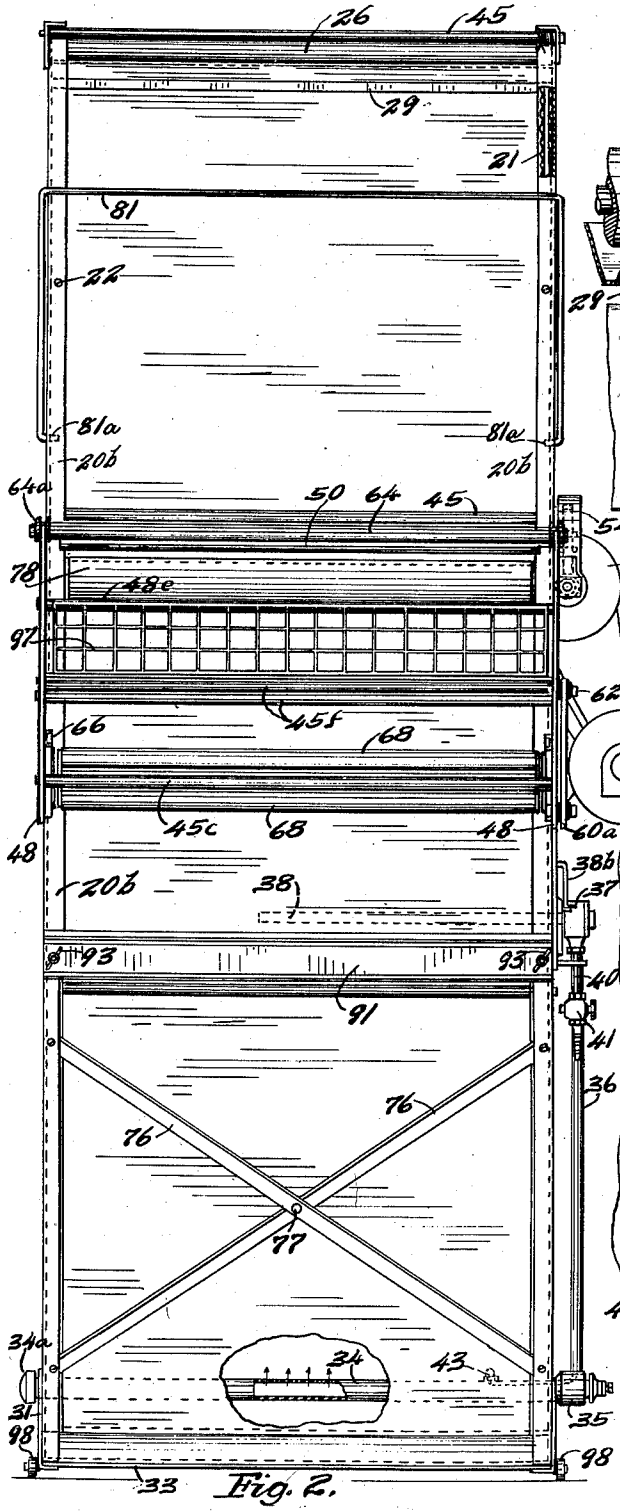

Fig. 2.

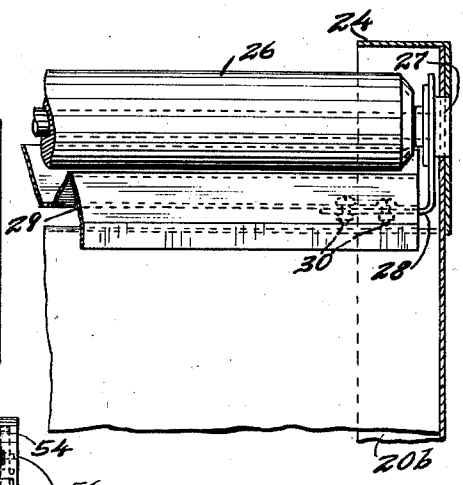

Fig. 14.

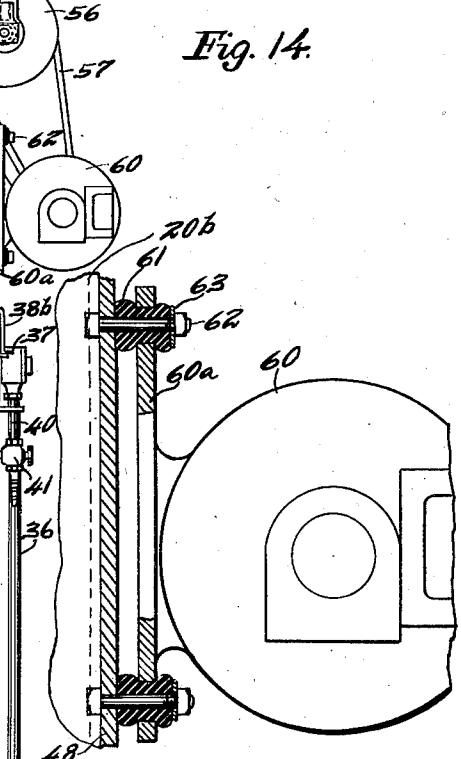

Fig. 15.

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METHOD AND APPARATUS FOR DRYING PRINTS

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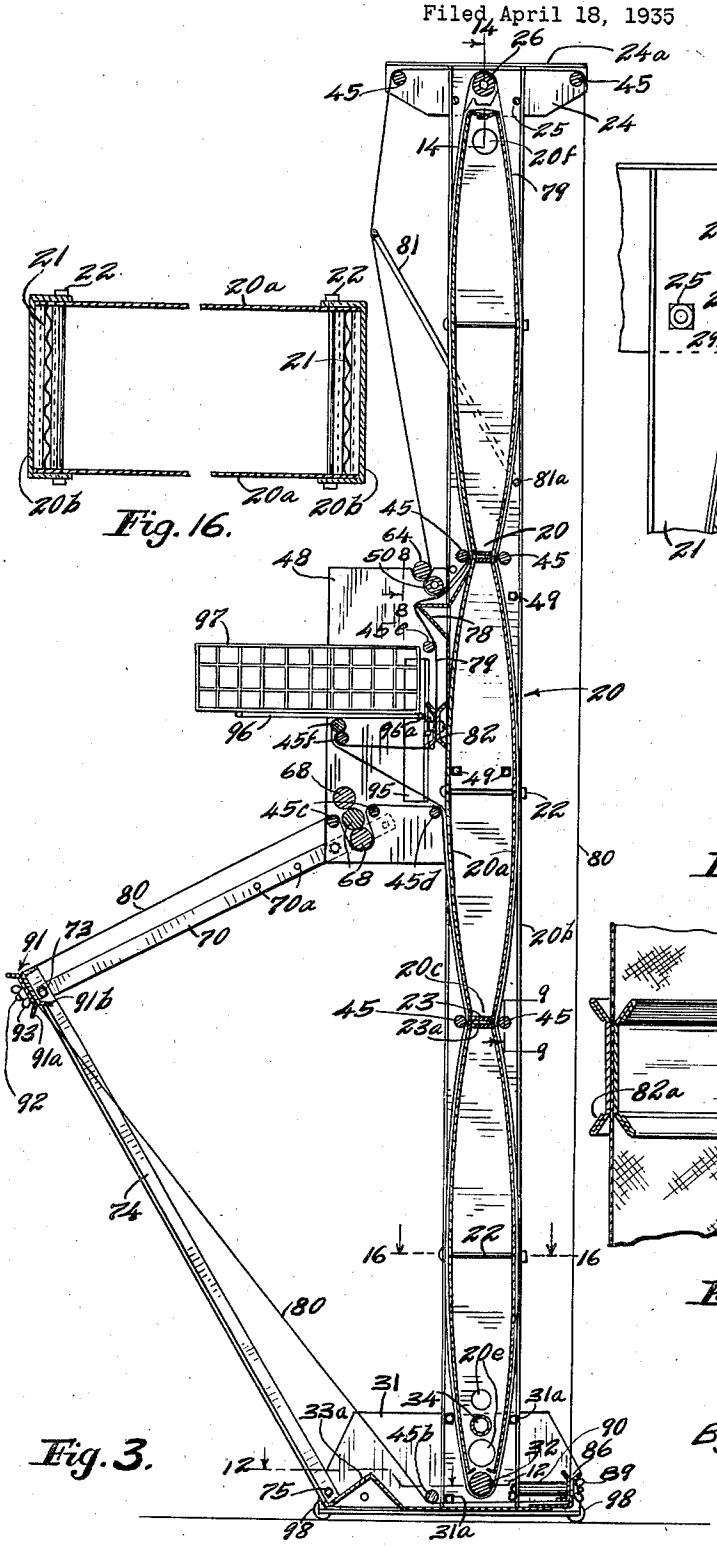

Fig. 3.

Fig. 16.

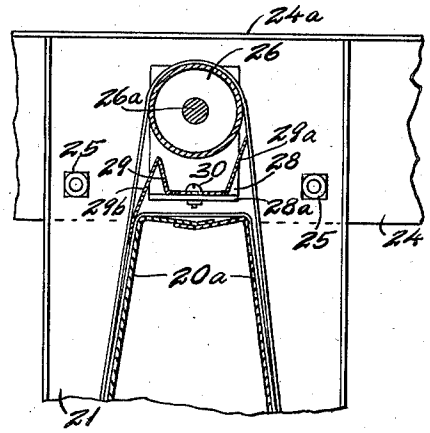

Fig. 4.

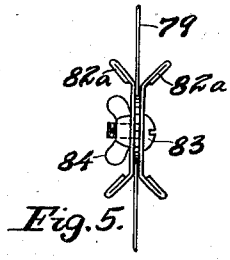

Fig. 5.

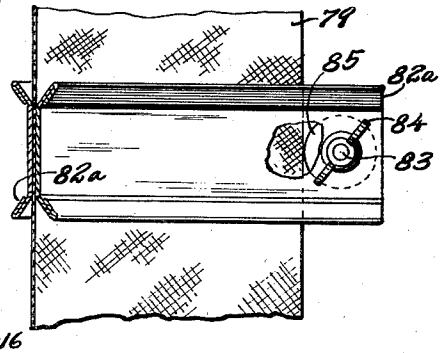

Fig. 6.

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METHOD AND APPARATUS FOR DRYING PRINTS

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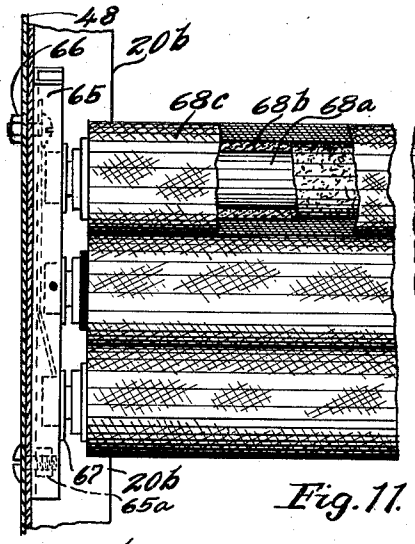


Fig. 11.

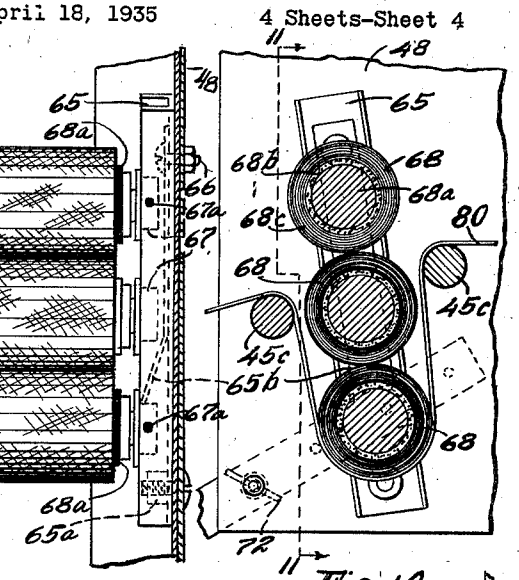
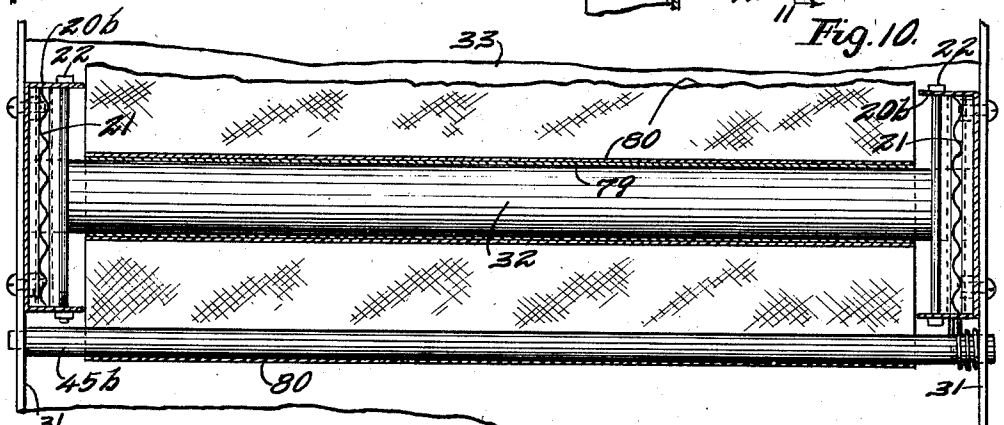


Fig. 10.



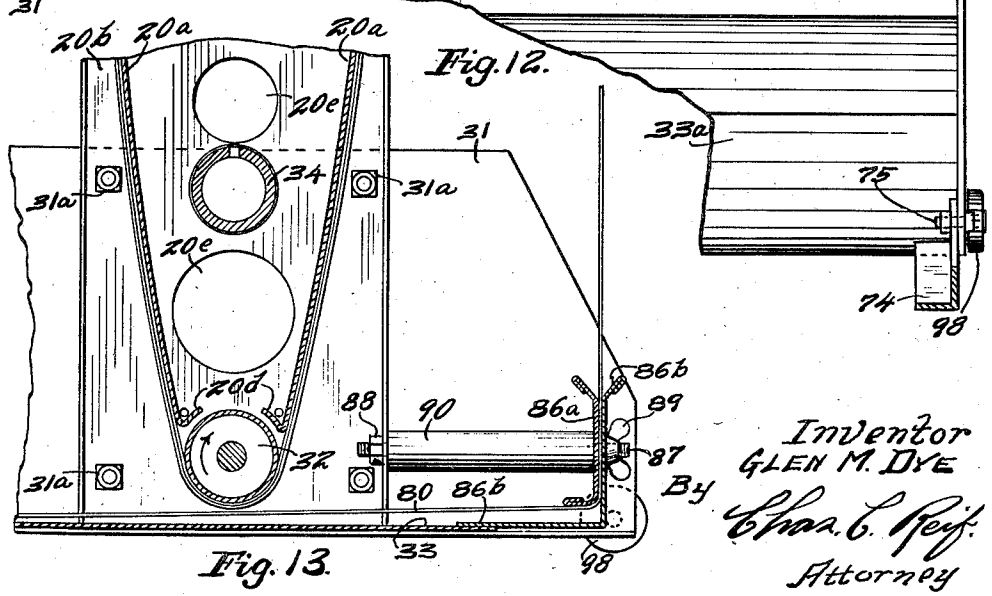


Fig. 12.

Fig. 13.

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Patented Nov. 22, 1938 2,137,480

UNITED STATES PATENT OFFICE

2,137,480

METHOD AND APPARATUS FOR DRYING PRINTS

Glen M. Dye, Minneapolis, Minn.

Application April 18, 1935, Serial No. 17,014

24 Claims. (Cl. 34—48)

This invention relates to a drying apparatus and particularly to such an apparatus for drying photographic prints or similar articles.

It is an object of this invention to provide a drying apparatus, the main extent of which is in a vertical direction so that the apparatus takes up very little floor space.

It is another object of the invention to provide a drying apparatus comprising one or more traveling flexible fabric aprons of considerable width, together with means for guiding and positioning said aprons as desired.

It is a further object of the invention to provide a drying apparatus comprising a pair of traveling aprons between which a print is carried together with novel and efficient driving means for said aprons.

It is still another object of the invention to provide a drying apparatus comprising a heated chamber having walls over which a pair of aprons travel together with means insuring that the aprons will be kept in smooth unwrinkled position throughout their travel.

It is also an object of the invention to provide a drying apparatus for photographic prints comprising a traveling apron upon which the prints are deposited together with a pair of blotting or liquid-absorbing rolls between which the prints pass.

It is still another object of the invention to provide a drying apparatus comprising a casing having opposed walls, the height of the casing being many times the distance between said walls.

It is a further object of the invention to provide an apparatus as set forth in the preceding paragraph, said casing having contracted portions forming a series of swells therein.

It is still another object of the invention to provide a drying apparatus including a casing and flexible aprons movable thereabout and carrying prints therebetween, said casing being shaped so that said prints are flexed in opposite directions as said aprons travel over said casing.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings, in which like reference characters refer to similar parts throughout the several views and in which:—

Fig. 1 is a view in side elevation of said apparatus;

Fig. 2 is a view in front elevation of said apparatus, certain parts being broken away and others shown in vertical section, certain aprons used being omitted;

Fig. 3 is a central vertical section through the device;

Fig. 4 is a partial view similar to Fig. 3 shown on an enlarged scale;

Fig. 5 is a view in end elevation of the apron-guiding means;

Fig. 6 is a partial perspective view of said guiding means;

Fig. 7 is a partial view of a portion of Fig. 3 shown on an enlarged scale;

Fig. 8 is a vertical section taken substantially on line 8—8 of Fig. 3 as indicated by the arrow;

Fig. 9 is a vertical section taken on line 9—9 of Fig. 3 as indicated by the arrow and shown on an enlarged scale;

Fig. 10 is a partial view similar to Fig. 3 shown on an enlarged scale;

Fig. 11 is a vertical section taken on line 11—11 of Fig. 10 as indicated by the arrows, the apron being removed;

Fig. 12 is a horizontal section taken on line 12—12 of Fig. 3 as indicated by the arrows;

Fig. 13 is a partial view similar to Fig. 3 shown on an enlarged scale;

Fig. 14 is a vertical section taken on line 14—14 of Fig. 3 as indicated by the arrow;

Fig. 15 is a vertical section taken on line 15—15 of Fig. 1 as indicated by the arrow; and

Fig. 16 is a horizontal section taken on line 16—16 of Fig. 3 as indicated by the arrows.

Referring to the drawings, a machine is shown comprising a casing 20. This casing comprises opposed sides 20*a* of sheet material such as sheet metal, said sides being of considerable width. Said casing has end members 20*b* in the form of channels having their open sides facing each other and said channels are many times the distance between plates 20*a* in height. While, of course, the machine may be made in different sizes, in one embodiment of the device made in practice the casing 20 is 90 inches in height, while the distance between plates 20*a* at its greatest dimension is approximately four and one-half inches. Disposed within the channel members 20*b* and against the inner sides of the webs thereof are fiber or insulating boards 21 shown as of three thicknesses and of corrugated formation. The plates or sides 20*a* are disposed at the inner sides of the flanges of the channel members 20*b* and extend therebetween. Headed and nutted bolts 22 extend through and between the flanges of channels 20*b* and through the plates 20*a*, said bolts engaging the inner sides

of the boards 21. The casing 20 has contracted portions 20c at which the sides 20a are closest together, said sides thus converging at said points. The casing 20 thus has a plurality of swells or expanded portions therein. Spacing members 23 are disposed between walls 20a at their closest points and bolts 23a extend through said walls and spacing members, thus securing said walls in position.

At the bottom of the casing the sides 20a are bent inwardly as shown at 20d and are spaced from each other, the bottom of the casing thus being open between said sides. At the top of casing 20 a plate 24 is provided at the outer side of each channel 20b and is secured to said channel by bolts 25. Plates 24 are of trapezoidal shape and have horizontal flanges 24a extending some distance over the channels 20b and said plates extend a considerable distance at each side of channels 20b. A roller 26 carried on a shaft 26a is journaled in bearings 27 mounted in members 20b and 24. A plate 28 is carried on said bearings and extends downward at each end of roller 26, the same having an inwardly extending horizontal flange 28a. A plate 29 has a horizontal portion resting on flange 28a and secured thereto by headed and nutted bolts 30. Plate 29 has at one side an upwardly and outwardly extending portion 29a and at its other side has a downwardly and outwardly extending portion 29b. Below flange 28a the sides 20a of the casing extend inwardly and overlap each other, the same extending somewhat downwardly. At the bottom of the casing 20 plates 31 are secured to the outer sides of channels 20b by headed and nutted bolts 31a, said plates also having horizontal flanges extending beneath said channels. Between said flanges of plates 31 and the bottoms of said channels is disposed a plate 33 extending horizontally but having an upwardly extending inverted V-shaped portion 33a at one end thereof. Casing 20 has holes 20e in the flanges in the webs of channels 20b, said holes thus being in the ends of said casing. A roller 32 has end portions journaled in bearings carried in plates 31 and channels 20b, said roller extending between said channels and centrally transversely of casing 20 just below portions 20d. A gas burner in the form of a tube 34 extends through casing 20, the same having a cap 34a at the outer side of one end of said casing and a connection 35 at its other end to which is connected a gas supply pipe 36 extending from a thermostatically regulated valve 37 secured to one end of said casing. A thermostat 38 extends from valve 37 into the casing 20 and a graduated indicating plate 38a is secured to one end of said casing. A pointer 38b is connected to the thermostat and valve 37, cooperating with indications on plate 38a to indicate temperatures and set said thermostat to maintain the desired temperature in the casing. A gas supply pipe 40 extends downward from valve 37 and is adapted to have secured thereto a supply tube or pipe. Pipe 40 is equipped with a shut-off cock 41 having an operating handle 41a. A small tube 42 extends downward from cock 41 to the burner 34 to a small pilot burner 43, said tube 42 always receiving gas whether cock 41 is closed or open. Casing 20 also has holes 20f adjacent the top thereof forming an outlet for the products of combustion. Disposed in and extending between the plates 24 are stationary cylindrical shafts 45. The structure of these shafts is shown in Fig. 9. Said shaft has a reduced portion 45a extending through a hole in one plate 24 substantially fitting said hole and the shoulder formed by said reduced portion engaging the inner side of said plate. Said shaft has a compression coil spring 46 surrounding it adjacent its other end, one end of said spring being bent and extending at one side of and through said shaft, thus anchoring the same longitudinally of said shaft. The spring 46 also forms a stop preventing rotation and squeaking of said shaft. The other end of said spring bears against the inner side of the other plate 24, said shaft extending through and substantially fitting a hole in said other plate and being supported therein. Stationary shafts 45 also extend through and between the channel members 20b, the inner sides of which are closely adjacent the plates 20a at the contracted points 20c. The shaft shown in Fig. 9 is one of the shafts extending between plates 24. Preferably a hole 20g is provided adjacent reduced portion 45a so that the shaft 45 may be grasped and moved endwise through the opening in the opposite supporting member until portion 45a clears its supporting member when it can be moved laterally and withdrawn through hole 20g. Another similar stationary shaft 45b extends between and through the plates 31. A pair of substantially rectangular plates 48 are secured to the outer sides of channels 20b adjacent their central portions by headed and nutted bolts 49 and extend forwardly from said channels. A pair of shafts 45c extend through and between plates 48, which shafts may have the construction already described in connection with shaft 45. Other shafts 45d and 45e also extend through and between plates 48, the same being in spaced vertical alinement adjacent channel members 20b, which shafts may also have the construction of shaft 45 already described. Another pair of shafts 45f also extend between and through plates 48 adjacent their outer edges and central portions. A roller 50 extends between plates 48, being journaled in bearings therein and this roller has secured to one end thereof a worm wheel gear 51. Gear 51 meshes with a worm gear 52 carried on a shaft 53, which shaft is journaled in bearings secured to a bracket 54 comprising a casing enclosing gears 51 and 52, said bracket being secured to the outer side of one of the plates 48 by bolts 55. Shaft 53 has secured to its outer end a double pulley 56. A belt 57 runs over pulley 56 and over a smaller pulley 58 secured to the armature shaft of a motor 60. Motor 60 has a base plate 60a which is provided with a plurality of apertures receiving resilient collars 61 through which pass headed and nutted bolts 62, also passing through one of the plates 48 and securing the motor to said plate. Bolts 62 have their nutted ends directed outwardly and washers 63 are disposed beneath the nuts thereon and in engagement with the collars 61. Motor 60 is thus resiliently supported so that little or no vibration is communicated to casing 20. Roller 50 as shown in Fig. 7 has a solid or rigid central portion covered with an outer resilient portion 50a. The plates 48 are provided with alined recesses and a metal roller 64 has its end portions journaled in ball bearings 64a disposed in said slots so as to move downwardly by gravity toward roller 50. Channel members 65 are bolted by bolts 66 to the inner sides of plates 48 and ball bearings 67 are disposed therein in which are journaled the ends of absorbent or blotting rollers 68. As shown in Figs. 3 and 10 channel members 65 incline downwardly and inwardly. Lower bearing 67 rests

on a stop 65a and its vertical movement is limited by a resilient plate 65b secured by bolts 66. The top rollers move down by gravity and rest on the second and lower roller respectively. The rollers 68 comprise a central solid core 68a preferably of metal such as steel to give considerable weight, which core is surrounded by a tube 68b of paper or cardboard material and tube 68b is surrounded or wrapped with a plurality of layers 68c of very absorbent fabric. While any strong fabric having high absorbent qualities could be used, in practice it has been found very satisfactory to use a cloth known as diaper cloth. The rollers 68 thus rest on each other to run in contact and the direction of rotation at their engaging lines should be such as to act to wind the cloth rather than unwind it. In order that the rolls may be replaced properly if removed, the ends thereof are marked with a certain color and the roller bearings are marked with a spot of the same color as shown at 67a.

Bars 70 extend along the outer sides of plates 48 adjacent their bottom corners, said bars having therein a plurality of spaced holes 70a. Said bars are secured to plates 48 by bolts 71 extending therethrough having thereon wing nuts 72. Bars 70 are pivotally secured at their outer ends by headed and nutted bolts 73 to the upper ends of a pair of angle bars 74 which extend downwardly and toward casing 20 and are pivotally secured at their lower ends to the outer lower corners of the plates 31 by bolts 75, said bars being inside of said plates. Bars 74 are connected by crossed angle bar brace members 76 connected at their central portions by bolts 77. It will be seen that the bolts 71 can be placed in any one of the holes 70a. A plate 78 extends between plates 48 and channel members 20b a short distance below the top of plates 48 and at the front of casing 20, said plate having its upper end lying closely against the front side of casing 20 adjacent its upper contracted portion and having an outwardly extending angular portion below its upper end a short distance below roller 50. The lower end of said plate lies closely against the front side of casing 20 about midway between shafts 45e and 45d.

A pair of traveling aprons are provided and one of these designated 79, which may be called the inner apron, extends outward a little below the center of plates 48, beneath the lower stationary shaft 45f and around the outer side thereof, between said shafts and over the top of the upper stationary shaft 45f, then downward and inwardly to casing 20. Said apron then extends over the top of stationary shaft 45d, downwardly closely along the side 20a of casing 20, said apron being guided into and along the contracted portion by passing inside of the stationary shaft 45 and then passing closely along casing 20 downwardly and around the roller 32 at the bottom of casing 20. Said apron passes in contact with said roller and then upwardly closely engaging the rear side of casing 20, passing inside of both stationary shafts 45 so that it follows the side of the casing at the contracted portions thereof. Said apron then extends over the top of casing 20 just above the overlapped portions of the sides 20a and beneath plate 28 and roller 26. Said apron then passes downwardly along the front of casing 20 inside of roller 45 just above plates 48, then downwardly beneath roller 50 around the forwardly projecting portion of plate 78 at the inner side of stationary shaft 45e through a guiding device to be later described and then forwardly beneath lower stationary shaft 45f as already described. Another apron 80 is provided which may be called the outer apron and this apron passes inside of the stationary shaft 45 at the front of casing 20 just above plates 48, downwardly beneath and around the driving roller 50, between the roller and the gravity roller 64, upwardly at the inner side of said gravity roller to the forward top stationary shaft 45 in the plates 24, then rearwardly to stationary shaft 45, above roller 26 over and downwardly at the rear side of said rear shaft 45, then vertically downward some distance at the rear of casing 20, through a guiding device to be later described, then substantially horizontally and forwardly beneath stationary shaft 45b extending between plates 31, then upwardly and forwardly through another guiding device and then sloping upwardly and rearwardly to and over the top of forward stationary shaft 45c, then downwardly around the lower blotting roller 68, upwardly and over the top of the inner stationary shaft 45c. Said apron 80 then extends inwardly to and over the top of stationary shaft 45d where it comes into contact with the other inner apron 79. Apron 80 then passes downwardly closely against apron 79 inside of stationary shaft 45 at the front of the casing below plates 48, then downwardly closely against apron 79 around the roller 32 at the bottom of casing 20 in engagement with apron 79 and upwardly along the rear side of the casing 20 in engagement with apron 79, both aprons passing inside of the stationary shafts 45. Apron 80 then passes over the top of roller 26, downwardly again in engagement with apron 79 at the front top part of the casing 20 at the inner side of front stationary shaft 45 just above plates 48 and beneath driving roller 50 as already described. The inner apron 79 is driven and moved with apron 80 at the same speed as apron 80, the same being moved by friction of apron 80.

A bail 81 has its end portions 81a journaled in the channel members 20b and swings outwardly by gravity having its top portion bearing against the inner side of apron 80 some distance below the upper front stationary shaft 45 as shown in Figs. 1 and 3.

Guiding devices for the aprons are provided. One of these designated 82 is disposed between stationary shafts 45e and 45d at an otherwise slack portion of inner apron 79. Said guiding device comprises a pair of oppositely disposed plates 82a having their edges extending in divergent relation, said edges being illustrated as reversely bent to lie against the main portion of the plates as shown in Figs. 5 and 6. Said plates are connected at the sides of the apron by a headed bolt 83 having thereon a thumb or wing nut 84. Between plates 82a and disposed on bolt 83 is a cylindrical washer 85. The apron 79 runs between plates 82a with light friction and the guiding device 82 rests upon or rides upon the apron, said guiding device being held in position endwise by engaging the inner sides of plates 48. The edges of the apron are engageable with the edges of washers 85. A somewhat similar guiding device 86 is provided for apron 80 at the lower rear corner of its run, the same comprising opposed plates 86a and 86b having their upper ends diverging and reversely bent. The lower edge of plate 86a extends inwardly substantially at a right angle and has its end reversely bent or folded. The plate 86b is bent substantially at a right angle at its lower end and extends forwardly some distance and rests upon the rear portion of plate

33. Studs 87 extend from the rear flange of channel 20b, rearwardly through plates 86a and 86b, the same being provided with nuts 88 at the forward side of the channel flange and with wing nuts 89 at the rear side of plate 86b. A spacer collar 90 surrounds said bolt between the rear side of the channel flange and the forward side of the plate 86a. Washers similar to washers 85 also surround bolts 87 between plates 86a and 86b and are engageable by the edges of apron 80. A similar guiding device 91 is provided for apron 80 at the upper ends of bars 74. This guiding device comprises opposed plates 91a and 91b having their lower edges diverging, the upper end of plate 91a extending outwardly and forwardly similar to its lower edge. The upper edge of plate 91b extends over the top of bars 74 and is secured thereto. Said plates are connected by headed bolts 92 equipped with the wing nuts 93 and a washer similar to washer 85 surrounds each bolt 92 between plates 91a and 91b and is engageable by the edge of apron 80. The apron 80 runs with light friction between the plates 86a and 86b and between plates 91a and 91b.

Angle plates 95 are secured to the inner sides of plates 48 and have one flange extending at right angles to said plates and vertically, the same forming with plate 78 a guide channel for the guiding and tensioning member 82. A bail 96 of rectangular form has its end portions bent outwardly and pivotally mounted in plates 95 and 48 at 96a, said bail having side portions resting on top of the upper stationary shaft 45f at the sides respectively of apron 79. A basket 97 of openwork formation and rectangular in horizontal and vertical cross section rests upon bail 96 and is adapted to receive prints as they pass from between the aprons over the edge of the forwardly projecting portion of plate 78. Castor rollers 98 are secured to plates 31 and support the machine.

In operation, when it is desired to dry prints the cock 41 will be opened by operating handle 41a and the pilot burner 43 will then ignite burner 34. Air is supplied for combustion through connection 35 and air can also pass into casing 20 through the openings 20e. Casing 20, and particularly walls 20a thereof, is thus heated and the hot air and products of combustion can pass out through the upper holes 20f. Motor 60 will be driven and through the belt 57, pulley 56 and gears 52 and 51 will be driven. Roller 50 is thus driven and this roller drives and moves the endless outer apron 80. This drive of apron 80 is greatly assisted by the gravity roller 64 which rests against apron 80, holding it in good contact with roller 50. Apron 80 thus moves upwardly at the front from rollers 50 and 64 and over the rollers and shafts previously described. Apron 80 engages the inner apron 79 adjacent stationary shaft 45d and throughout the surface of casing 20 and apron 79 is moved along with apron 80 by friction, both aprons thus moving over the surface of the casing walls 20a. As apron 80 moves around lower blotting roller 68 said roller is rotated and roller 68 being in contact the upper two rollers are thus rotated. The prints to be dried are taken from the washing bath and placed face downward upon apron 80 at the upwardly sloping portion moving above bars 70. The prints move upward on this portion of the apron and are thus moved in between the two top rollers 68. The prints can not make the sharp bend downward about outer roller 45c and as the line of contact between rolls 68 is substantially in line with the surface of apron 80, the prints move in between top rolls 68 and again move onto apron 80 where the same runs between stationary shafts 45c and 45d. As the prints move between rolls 68 all water which has been on the prints is blotted therefrom so that there are no pools or drops of water on the prints. The prints after passing through the rolls 68 are, of course, still moist or wet but the surface has been uniformly blotted. The prints now pass inward and are engaged by both aprons as they pass over shaft 45d and the prints are thus carried downward between the aprons closely against front wall 20a, around roller 32 at the bottom of casing 20 and upward closely along the rear wall 20a. The prints thus pass at the inner sides of the stationary shafts 45 at the contracted portions of casing 20. It will be seen that this movement of the aprons and prints inside of these shafts flexes the prints in opposite directions. This is very advantageous in the drying operation and tends to make the prints come out in flat condition. The prints pass upward and pass between apron 80 and the top roll 26. It will be noted that the inner apron 79 makes a short cut over the top of casing 20 and does not pass over roller 26. After passing over roller 26 the prints again move between and with the aprons 79 and 80, being guided between the aprons by the front side of plate 29. The prints now pass downward around the upper front side of casing 20, closely adjacent the casing and move downwardly as apron 80 turns around roll 50. Apron 79 makes a sharp turn around the front edge of the pointed portion of plate 78 and the prints move outwardly and drop over the edges of the apron at this point into basket 97. The prints delivered in basket 97 are in dried condition. The prints are in the desired flat condition and are not cockled or warped. The hand or pointer 38b will be set in connection with the scale on plate 38a to give the desired degree of heat or the desired temperature for drying the prints. The temperature must be nicely regulated because if too much heat is used the prints warp and wrinkle in a manner known as cockling. Too much heat also tends to objectionably change the color of the prints. The prints on the other hand must not be delivered with too much moisture therein.

There has always been a serious problem in machines of this type of preventing the aprons from drifting or moving too far to one side or the other. Various methods and structures have been tried to keep the aprons moving without objectional lateral creeping or shifting. The guiding means devised in the present machine work perfectly and the aprons run continuously without any objectionable lateral movement. It has been found that the guiding means used must be disposed at a portion of the apron which is under little or no tension. In driving similar aprons in the prior art, the apron was usually so tensioned over rollers that the friction against the driven rollers would move the apron. In the present invention the drive is localized at the rollers 50 and 64. The apron is held firmly engaged and pulled toward the rolls one way and fed from them in the other direction. The apron 80 is under very light tension from the point of leaving the rollers 50 and 64 until it passes the blotting rollers 68. After passing these and passing over shaft 45d it becomes quite strongly tensioned and is under considerable tension as it moves along the walls of casing 20, over rollers 32 and 26 and beneath the shafts 45 adjacent casing 20. It may be

stated that these shafts **45** adjacent the portions **20***c* of casing **20** act to tension the aprons. The guiding devices **86** and **91** are therefore at the portions of very light tension. The apron **79** is likewise under considerable tension between shaft **45***d* in its downward run until it passes under shaft **45** just above plates **48** and said apron is under very light tension from this roller **45** until it again passes shaft **45***d*. Guiding device **82** is therefore disposed at a slack portion or portion of light tension. It will be noted that the guiding member **82** also acts as a tensioning means for the inner apron **79**. The guiding member **82** as described rests upon apron **79**. The outer apron **80** is tensioned by the bail **81** and also by adjustment of the bars **70**. The aprons stretch as they are used and become somewhat smaller in width due to the fact that they are under tension and are moistened and thus require proper tensioning.

Another problem was encountered in the wrinkling or ruffling of the aprons along the sides **20***a* when both aprons passed over the top and bottom rollers which was due to the fact that the outer apron must travel a longer path. This was overcome by having the inner apron make the short cut over the top of the casing and not pass over the top roller.

The method of blotting the prints by the blotting rolls is new. As stated the rolls are highly absorbent and all excess liquid is removed from the prints as they pass through the two upper rolls **68**. The rolls are in firm contact due to their heavy weight and the lower roll is rotated by apron **80** and imparts rotation to the other two. Moisture is taken by the middle roll and a large part of this is transferred to the lower roll. Apron **80** takes considerable moisture from the lower roll so that moisture is continuously being taken from the rolls.

With the present machine prints are perfectly dried within 12 minutes after being taken from the washing bath. This is a great improvement in the art. It has been the standard practice in studios to take the prints from the washing bath, pile them between blotters and allow them to remain for quite a period. The prints were then taken from these blotters and rolled up with other blotters between corrugated board. After standing several hours in this condition they were placed in cylinders over a stove or heater and dried. This operation usually took over night. The present machine, therefore, enables photographers to deliver prints a day earlier than before. In addition the prints are in perfect condition and the hazard of having the prints damaged in the drying process is eliminated. One great advantage of the machine is that it takes up very little floor space. The previous machines for drying prints have comprised large cylinders having a large horizontal dimension. Some of the drying machines now in use are of very large dimensions. It will be seen that the present machine takes up very little room in the print-handling establishment.

It is necessary at intervals to remove the aprons for laundering. This can be readily done as the rollers and shafts over which the aprons move are quickly removable. It has already been described how the stationary shafts can be removed by a simple endwise and lateral movement. These stationary shafts are also kept from turning by the laterally projecting portion of spring **46** which engages the flange of the channels **20***b* in some cases or some other stationary member. The rolls **68** are easily removed by being removed from the channel members **65**. The plates **86** and **33** together with the upstanding angular portion **33***a* and the plates **31** form a housing or protection for the apron **80** at its lowest portion. Said housing protects said apron from dirt and possible contact with a cleaning mop which might be used near the machine.

From the above description it is seen that applicant has provided a novel and highly efficient method and apparatus for drying photographic prints and similar articles. The structure of the machine is simple when the function performed is considered. The machine operates continuously and the drying can be nicely regulated. The device has been amply demonstrated in actual practice and is being commercially made.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the apparatus and in the steps and sequence of steps of the method without departing from the scope of applicant's invention, which, generally stated, consists in a method and apparatus capable of carrying out the objects above set forth, such as disclosed and defined in the appended claims.

What is claimed is:—

1. A drying apparatus for prints or the like having in combination, a vertically disposed casing of small thickness and great height having opposed substantially parallel walls, said casing having contracted portions forming a plurality of communicating chambers with converging top and bottom portions, a pair of aprons movable about said casing adapted to carry a print therebetween, and means adjacent said portions causing said aprons to engage and follow the surface of said casing and acting to tension said aprons.

2. A device of the class described having in combination, a traveling flexible fabric apron having a slack portion and a guiding and tensioning means riding on said slack portion and comprising flat members between which said apron moves with light friction and having means between said plates engageable by the edges of said apron.

3. The structure set forth in claim 2, said last mentioned means comprising cylindrical members, the cylindrical peripheries of which are engageable by the edges of said apron.

4. An apparatus for drying photographic prints or similar articles having in combination, a traveling apron of flexible sheet material, means for driving and supporting said apron and for creating therein a portion under light tension and a portion under greater tension and a guiding means for controlling the lateral position of said apron past which said apron travels, said guiding means being disposed at said portion of light tension.

5. A device of the class described having in combination, a flexible traveling fabric apron, means over which said apron passes and guiding means comprising plates between which said apron moves with light friction and having means therebetween engageable by the edges of said apron and means for determining the lateral position of said guiding means.

6. An apparatus for drying photographic prints or similar articles having in combination, a pair of blotting means movable about separate axes through which a print may pass, a casing having a heated wall and means for continuously moving a wet print through said means and subsequently along said wall in close proximity thereto.

7. An apparatus for drying photographic prints

or similar articles having in combination, a casing having a wall with substantially semi-cylindrical convex and concave portions, means for heating said wall and means for conveying a print closely adjacent said wall and pressing it toward said wall to cause it to follow the contour of said portions to flex it in opposite directions.

8. An apparatus for drying photographic prints or similar articles having in combination, a casing having a wall with a surface having substantially semi-cylindrical convex and concave portions, a pair of aprons of flexible sheet material movable in close proximity to said wall and carrying a print therebetween and means for constraining said aprons to follow the contour of said portions and flex said print in opposite directions.

9. The combination of a movable apron for carrying a print and a pair of parallel moisture-absorbing rollers having closely adjacent surfaces moving in the direction of travel of said apron, said apron being constructed and arranged to deliver a print to said rollers and receive said print after it passes between said rollers.

10. The combination of a movable apron for carrying a print and a pair of moisture-removing members having absorbent surfaces and movable about separate axes, said apron being constructed and arranged to deliver said print to said members and receive the same therefrom.

11. A print drying machine having in combination, three rollers with absorbent surfaces, two of said rollers having their surfaces in contact with the surface of the third roller and means for driving said rollers so that a print can be progressed between one of said two rollers and said third roller to have moisture removed therefrom and the other of said two rollers will absorb moisture from said third roller.

12. The structure set forth in claim 11, said rollers having their axes substantially in one line.

13. A print drying machine having in combination, three rollers one above the other with their axes substantially in one line, an apron for conveying a print movable closely adjacent said rollers, then downwardly and around the lower roller in contact therewith to drive the same, the middle roller being driven by said lower roller and the top roller being driven by said middle roller.

14. A print drying machine having in combination, three rollers one above the other with their axes substantially in one line, an apron for conveying a print movable in a plane substantially passing between the upper and middle rollers to aline adjacent the same, then downwardly around and in engagement with the lower roller, then upward in a line closely in the rear of said rollers and approximately in said plane and then away from said rollers, said rollers being driven by said apron.

15. A print drying machine having in combination, three rollers one above the other with their axes substantially in one line, an apron for conveying a print, guide means for said apron at both sides of said rollers and closely adjacent the same for supporting said apron, said apron passing over the guide means in front of said rollers in a plane passing substantially between the two upper rollers, then downwardly around the lower roller and upwardly over the guide means in the rear of said rollers.

16. A device of the class described having in combination, a traveling flexible fabric apron having a slack portion and a guiding and tensioning means through which said apron moves comprising flat members between which said apron moves with light friction against its sides and means between said flat members having convex surfaces engageable by the edges of said apron.

17. A blotting roller for a print drying machine comprising a rigid solid core, a tube of rigid but softer material surrounding said core and a multiplicity of layers of highly absorbent cloth fabric wound on said tube.

18. A print drying machine having in combination, a casing having spaced substantially vertical side walls with a chamber therebetween, the height of said casing being many times the distance between said walls, means for heating said chamber and walls, an inner apron movable from a line at one side of and intermediate the top and bottom of said casing downwardly along and in engagement with the front side wall of said casing for a large part of said side wall to the lower end thereof, across the distance between the lower ends of said walls, upwardly along the whole extent of said rear side wall in engagement therewith, across the distance between the upper ends of said walls, downwardly along a large part of said front side wall in engagement therewith and then outwardly to a discharge point and then to said line, and an outer apron movable with and over said inner apron, from said line around said casing to said discharge point and then movable upwardly and over said casing, downwardly at the rear side spaced from said casing, beneath said casing and upwardly and outwardly, then toward said casing to convey a print to said line and between said aprons.

19. A drying apparatus for prints or the like having in combination, a vertically disposed stationary casing having opposed side walls forming a chamber therein, the height of said casing being many times the distance between said side walls, means for heating said chamber and walls, means at the top and bottom of said casing constructed and arranged for the passage of an apron thereover in moving between said side walls and from one to the other, an endless apron of flexible material moving around said casing and from one side wall across said means to the other side wall at both ends of said casing, a second apron movable toward one side wall of said casing at a point intermediate the top and bottom of said casing to convey a print thereto, then movable along said side wall substantially in contact with said first mentioned apron, then movable around said means at the bottom of said casing and upwardly along the whole extent of the other side wall, then around said means at the top of said casing to and along said first mentioned side wall for a large part of its extent, said first mentioned apron being driven by friction with said second apron, a print being carried around said casing between said aprons.

20. A drying apparatus for prints or the like having in combination, a stationary casing having side walls spaced a small distance apart compared to their width and height, said casing having a chamber therein, means for heating said chamber and walls, an endless apron movable completely around and enclosing said casing along both side walls at the ends of said casing and across the distance between said side walls at both ends of said casing, a second apron movable toward and away from one of said side walls at intermediate points therein along the greater part of said one side wall in engagement with the outer side of said first mentioned apron and along the other side wall and around the ends

of said casing for carrying a print to said casing and around the same between said aprons, said first mentioned apron being driven by friction from said second apron.

21. An apparatus for drying photographic prints or similar articles having in combination, an elongated casing having opposed walls spaced a small distance apart compared to their length and width, a roller at each end of said casing and substantially between the planes of said walls at their end portions, a pair of endless aprons movable in contact with each other around the ends of said casing from one side wall to the other and along said side walls, at least one of which passes around both of said rollers.

22. An apparatus for drying photographic prints or similar articles having in combination, an elongated casing having opposed walls spaced a small distance apart compared to their length and width, a roller at each end of said casing and substantially between the planes of said walls at their end portions, an inner apron extending around said casing and engaging the whole length of one side wall and the greater part of the other side wall movable over one of said rollers at one end of said casing and from one side wall to the other but between the other of said rollers and the other end of said casing and a second apron movable in engagement with said inner apron at the top and bottom portions of both side walls but movable over both of said rollers at the ends of said casing whereby said inner apron takes a shorter path at one end of said casing than said second apron.

23. The method of handling a photographic print for drying the same which consists in continuously moving the same, passing the same between moisture absorbing surfaces of opposed rotating members and subsequently through a heated zone while holding said print in substantially flat condition.

24. An apparatus for drying photographic prints or similar articles having in combination, an elongated casing having side walls spaced a small distance compared to their length, said casing having apron-supporting means at one end thereof spaced longitudinally of said casing thus forming inner and outer supporting means, inner and outer aprons movable in contact along said side walls at the portions thereof adjacent said end of said casing, said inner apron moving from said portion over the inner of said supporting means and said outer apron moving from said portion over the outer of said supporting means so that said aprons are in contact inwardly of said inner supporting means but are spaced where they pass over said supporting means, the opposed sides of said aprons converging as they pass over said supporting means.

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