This invention relates to an apparatus for cleaning carpets and similar fabrics, one of the objects being to provide a continuous process whereby the fabric to be cleaned can be directed into one end of the apparatus and, after being subjected successively to the action of different parts of the apparatus, will emerge therefrom clean and dry ready for delivery.

A further object is to combine, in a single apparatus, means whereby the successive steps of the cleaning operation will be carried out in properly timed relation, these steps including, first, the subjecting of the fabric to the action of suction thereby to remove dust and other particles, second, washing the fabric thoroughly, third, extracting the cleaning fluid from the fabric, fourth, subjecting the fabric to the action of acid water, fifth, applying a size to the bottom surface of the fabric, sixth, subjecting the fabric to the action of a dryer whereby all moisture is removed therefrom, seventh, subjecting the fabric to the action of a steam board and brush whereby the nap is lifted and the rug properly finished prior to delivery.

Another object is to provide a means of cleaning whereby soapy water or a volatile cleansing fluid can be utilized, means being employed, in the latter case, for preventing combustion during the cleaning operation.

A further object is to utilize a means of cleaning fabrics which greatly facilitates the cleaning operation, it being possible with this apparatus to properly clean, size, dry and finish a rug in less than thirty minutes.

A still further object is to provide an improved means whereby a rug or other fabric can be cleaned thoroughly, dried and finished during one continuous operation.

With the foregoing and other objects in view the invention resides in certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings there has been shown apparatus whereby the several steps of the method can be carried out efficiently and quickly.

In said drawings:

Figure 1 is a view, in diagram, showing a complete apparatus for use in cleaning fabrics according to the method constituting the present invention.

Figure 2 is a similar view showing a modified form of apparatus utilizing a volatile cleansing fluid and showing a type of dryer differing from that illustrated in Figure 1.

Figure 3 is a view similar to Figure 2 showing another type of dryer.

Figure 4 is a section through another form of dryer.

Figure 5 is a section through a modified form of size applying means.

In carrying out the method it is necessary, in order to have a continuous process, to utilize an endless conveyor such as shown at 1, this conveyor being formed of a flammable material through which fluids can flow freely, or, if preferred, being made of endless chains to which a rug or the like can be attached. The fabric under treatment, which can be a rug shown at R, may be fed between spaced pairs of feed rolls 2 and between these rolls may be located a suction flue 3 adapted to contact with the top or nap side of the rug at a point directly above an air trough 4 located beneath the fabric. Thus as the fabric passes across the space between the feed rolls 2 it will be subjected to the action of suction which will result in extracting from the fabric any loose foreign particles of dust, etc.

After leaving the feed rolls 2 the fabric is directed on to the endless belt 1, this fabric passing between rolls 5 one of which guides the belt while the other acts to grip the rug and direct it on to the belt or conveyor. Adjacent to the feed rolls 5 there is provided a washing trough 6 for holding a cleansing fluid such as soapy water directed on to the fabric from a distributing nozzle 7. A cylindrical brush 8 is located above the trough 6 and is so positioned as to cause the conveyor belt 1 to bend downwardly into the trough as it passes thereover. The fabric R carried by the conveyor belt will also be bent or dipped downwardly into the trough as it passes under the brush and this
brush, acting on the fabric, tends to scrub it thoroughly while submerged in the contents of the trough, thereby to quickly and efficiently wash the fabric.

After leaving the trough 6 the fabric is conveyed between rolls 9 which act to express the cleansing fluid from the fabric so that it can drain downwardly into an outlet receptacle 10 provided therefor. After leaving the rolls 9 the fabric is subjected to the action of a stream of water issuing from a distributing nozzle 11, this water being used for rinsing the fabric so as to remove therefrom any of the water remaining from the washing operation. After leaving the rinsing point the excess water is extracted from the fabric by rolls 12 located above and below the path of the fabric, the expressed water flowing downwardly into an outlet container 13.

After leaving the rolls 12 the fabric is conveyed over a container 14 holding acid water and in the upper portion of this container is a lower roll 15 while an upper roll 16 is positioned directly thereabove. These rolls cooperate to extract from the fabric the acid water which has been directed thereon from a nozzle 17 supported above the receptacle 14 between the rollers 15 and 16. Nozzle 17 is supplied with acid water through a pipe 18 extending from the bottom of the container 14, there being a suitable pump 19 for forcing the acid water longitudinally within the pipe to the nozzle.

After the fabric has been treated with acid water which, as is well known to those skilled in the art, restores the colors of the fabric, the said fabric is carried over a distributing nozzle 20 located beneath that portion of the conveyor belt on which the fabric is mounted. This nozzle extends from and communicates with a holding tank 21 holding a solvent and a compressor indicated at 22, can be utilized for maintaining a pressure on the size so that it will be forcibly expelled through the distributing nozzle 20 upwardly through the conveyor belt 1 and on to the bottom surface of the fabric.

After leaving the sizing apparatus the fabric is carried by the conveyor into the dryer. This dryer can be of several types although in every instance it is essential that it include a means for supplying hot air to the fabric and a means for withdrawing the hot air quickly so that it will carry off the moisture absorbed thereby from the fabric. The speed of the conveyor 1 is so timed that as the fabric passes through the dryer it will be subjected to the action of the hot air for a sufficiently long period to remove all of the moisture therein. In the structure illustrated in Figure 1 the dryer includes a bottom section 23 having a drain pipe 24 through which excess moisture may escape. This bottom section 23 is located under and close to that portion of the conveyor on which the fabric is mounted. Over said portion of the conveyor is located the hood 25 of the dryer. This hood is preferably substantially conical with a large exhaust pipe 26 at the apex thereof while a desired number of supply pipes 27 are located adjacent the margin of the hood for directing heated air into the hood where it will come into direct contact with the fabric being dried. The air is preferably heated before it enters the hood although, if preferred, and as shown in Figure 4, a heating coil 28 can be located within the hood whereby the heated air, admitted through the pipes 29, will be superheated by the coil 28 which can contain steam or any other suitable heating medium. In every instance the heated air supplied to the hood must be dry so as to quickly absorb the moisture from the rug or other fabric.

After leaving the dryer the fabric is carried by the conveyor over a trough 30 having a foraminous top indicated at 31. This trough is furnished with steam through a pipe 32 and constitutes a steam board whereby, as the fabric passes thereover, steam will be directed therethrough as well as through the adjacent portion of the conveyor and will result in the lifting of the nap.

After leaving the steam board the fabric is carried beneath a cylindrical brush 33 which rotates to comb through the nap and properly finish the fabric which, leaving the brush, will pass over the inlet 34 of a suction pipe 35 so that remaining moisture will thus be carried away and the fabric can then be placed on a roll 36 and delivered to the customer.

The method hereinafter described utilizes a soapy water or a similar fluid for cleaning the fabric. Under conditions it is desirable to use a highly volatile cleaning fluid such as gasoline or benzine but, obviously, fluids of this type are dangerous because of their explosive nature. In order to utilize cleaning fluids of this kind in connection with the apparatus described, the structure can be modified as shown in Figure 2. In this modified form of apparatus the endless conveyor 37 has its upper flight extended over a tank 38 for holding the cleansing fluid, over a second tank 39 for holding a rinsing fluid, and over a third tank 40 for holding acid water or the like.

A trough 41 is arranged within the upper portion of the tank 38 directly beneath the scrubbing brush 42 which is cylindrical as shown. Rollers 43 are also located within and above the tank 38 beyond trough 41 for the purpose of expressing excess cleansing fluid from the fabric being treated and directing it back into the tank 38. The tank has an outlet to a filter or purifying device indicated generally at 44 from which the
cleansing fluid can be withdrawn by a pump 45 and elevated to a distributing nozzle 46 located above the conveyor and adjacent trough 41. This cleansing fluid will thus be directed downwardly on to the fabric which will subsequently be dipped into trough 41 and there scrubbed by the brush 42.

The tank 39 is also provided with rollers 47 one of which is located above the tank and conveyor while the other is located within the tank. These rollers are utilized for expressing cleansing fluid and directing it back into the tank 39. A filter or purifying device has been indicated at 48 and is used for receiving cleansing fluid from the tank 39. A pump 49 withdraws the fluid from the filter and directs it through a pipe 50 to a nozzle 51. Thus the fluid in tank 39 is used for rinsing the fabric after it has left the rollers 43 following which excess fluid is extracted from the fabric by the rolls 47.

On leaving the rolls 47 the fabric is conveyed over the tank 40 containing the acid water although, if desired, this tank can be used for holding another quantity of cleansing fluid. Where acid water is used it is forced by a pump 52 through a pipe 53 to a nozzle 54 supported above the conveyor.

A hood 55 is extended over the tanks 38, 39, and 40 and those portions of the apparatus cooperating therewith so as to prevent the escape of fumes. As a further means for preventing ignition of the cleansing fluid containers 56 and 57 can be supported adjacent the hood and can open thereinto through a pipe 58. One of these containers may hold ammonia while the other container can hold carbonic acid gas. These two gases, combined, and directed into the hood 55, will act to render the cleansing fluid non-explosive.

Sizing apparatus similar to that heretofore described can be arranged under the conveyor beyond the tank 40 and has been indicated generally at 59. The hood 55 can be extended over this sizing apparatus as shown at 60 and up to the dryer 61. This dryer, in the structure illustrated in Figure 2, includes a lower section 63 extending close to and under the upper flight of the conveyor 37 and provided in its wall and bottom with a steam jacket 64 or the like. A drain pipe 65 may be extended from the section 63. A hood, preferably conical, is arranged over the section 63 and has been indicated at 66. This hood is also formed preferably with a steam jacket as shown at 67 and has pipes 68 adjacent the margin thereof for directing hot air into the hood while an exhaust pipe 69 of much greater capacity than the combined capacity of the pipes 68, is arranged at the apex of the hood for withdrawing the moisture laden heated air.

Steam pipes 70 are supported within the hood 66 and utilized for spraying dry steam on to the fabric under treatment, thereby to facilitate the extraction of the cleansing fluid from the fabric and to prevent ignition thereof.

After leaving the dryer the fabric is carried over the steam board 71 similar to that heretofore described, under a finishing brush 72, and over a suction nozzle 73 to a roll 74 on which it can be wrapped for delivery.

It might be stated that, instead of having the air enter the hood and leave through the apex portion thereof, as shown in Figure 2, the bottom section 75 of the dryer can be made substantially conical as shown in Figure 3, this section being provided with a steam jacket 76 and, at its apex, with an air outlet flue 77. Thus when heated air is directed through the pipes 78 into the hood 79 of the dryer it can flow outwardly by passing downwardly through the fabric thence through the flue 80. The exhaust pipe 80 on the hood can also be used for supplying heated air to the hood. In all other respects the structure illustrated in Figure 3 corresponds with that shown in Figure 2.

Instead of applying size by spraying it on to the fabric as described, a brush 81 can be mounted to rotate in a container 82 by the contact of the fabric therewith, thereby to lift the size and apply it to the surface of the fabric.

What is claimed is:

1. The combination with a foraminous conveyor, and means for feeding a fabric on to the conveyor, of a cleansing trough extending under a portion of the conveyor, a rotating scrubbing brush for engaging the fabric and depressing it with the adjacent portion of the conveyor into the trough to submerge the same, and means for rinsing the fabric on the conveyor, the movement of the conveyor and the fabric thereon being continuous and uninterrupted.

2. The combination with a conveyor of foraminous material, of means for directing air on to the conveyor a fabric to be cleaned, a cleansing trough, a rotating scrubbing brush for depressing the fabric and that portion of the conveyor thereunder into the trough to submerge the same, means for expressing excess fluid from the fabric after leaving the trough, means for rinsing the fabric on the conveyor, and means for again expressing excess moisture from the fabric, said conveyor being movable continuously to convey the fabric while being subjected to the action of the respective means.

3. Apparatus for cleaning rugs and the like including a foraminous conveyor, means for directing a rug or the like on to the conveyor, a cleaning trough, a rotary scrubbing brush adjacent thereto for depressing a portion of the conveyor and the rug or the like thereon into the trough.
4. The combination with a continuously movable foraminous conveyor, of means for directing thereonto a fabric to be cleaned, a trough for holding a cleansing fluid, a movable scrubbing element above the trough for depressing a portion of the conveyor and the fabric thereon into the trough and for scrubbing said fabric, means for elevating a cleansing fluid to discharge it on to the fabric and into the trough, and a hood closing said trough and the fabric being treated.

5. The combination with a foraminous conveyor, of separate tanks under a portion thereof, means for directing on to the conveyor a fabric to be cleaned, a trough extending across one of the tanks, scrubbing means movably mounted above the trough for engaging a fabric and scrubbing it, said means constituting a means for depressing the fabric and adjacent portion of the conveyor into the trough, means for elevating fluid from the tank and directing it on to the fabric and into the trough, means for draining excess fluid back into the adjacent tank, means for withdrawing fluid from one of the tanks and directing it on to the fabric to rinse said fabric, a hood extending over the tanks for receiving fumes therefrom, said conveyor constituting means for moving the fabric continuously.

6. The combination with a continuous conveyor, and means for feeding a fabric on to the conveyor, of means for submerging portions of the fabric and scrubbing the submerged portions, and separate means for successively rinsing the fabric and drying the same while said fabric is moving with the conveyor, said movement being uninterrupted.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

HERMANN KLEIN.