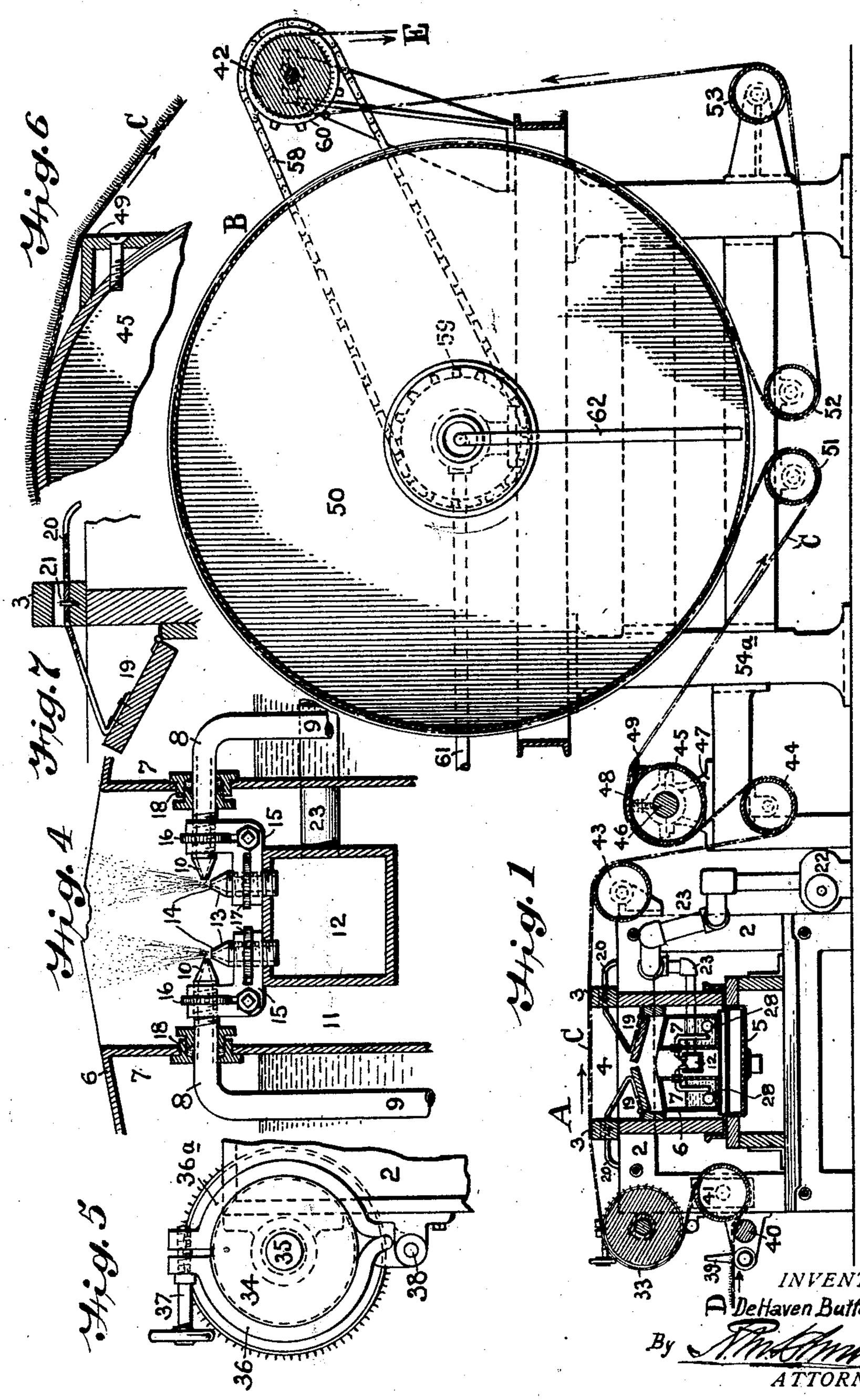
Oct. 7, 1930. DE HAVEN BUTTERWORTH 1,777,393

METHOD AND MEANS FOR TREATING CARPETS AND RUGS

Filed Sept. 16, 1927 2 Sheets-Sheet 1



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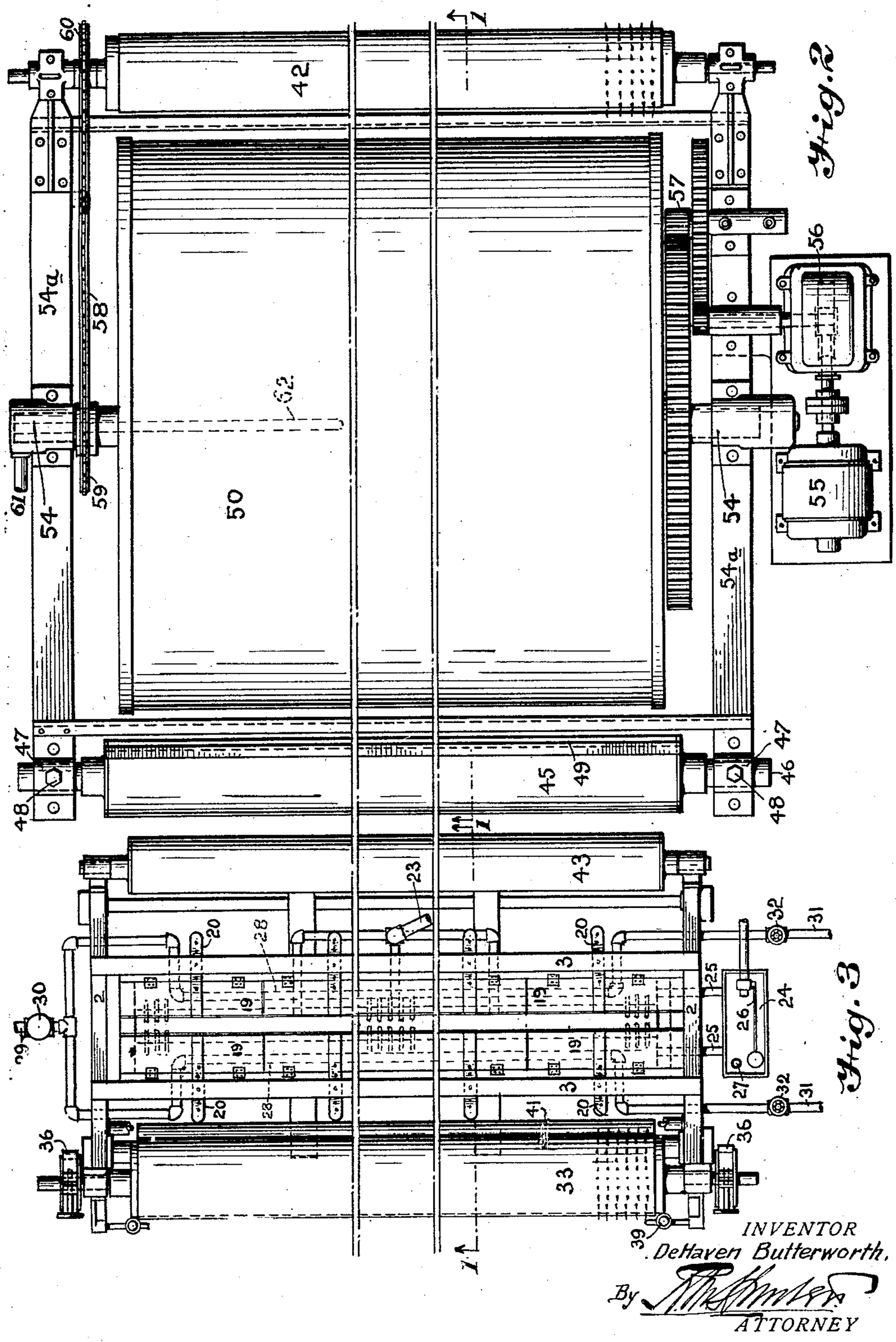

Fig. 2

Fig. 3

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Patented Oct. 7, 1930 1,777,393

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METHOD AND MEANS FOR TREATING CARPETS AND RUGS

Application filed September 16, 1927. Serial No. 219,866.

The object of my invention is to provide a method and means for subjecting carpets and rugs and other fabrics to a dampening treatment and thereafter to a pressing and drying treatment whereby the carpet or rug is flattened, and this is especially the case where the width of the fabric involves the necessity of seams in its make-up.

Large carpet rugs are in most cases made up of woven strips having different portions of the design thereon and which, when the strips are united by being sewn together, form seams which have a tendency to form objectionable creases where they occur, and these must be pressed out and the carpet generally finished so as to lie perfectly flat upon the floor. To secure these results, I have found that it is necessary to moisten or dampen the back portion of the rug, and thereafter subject the rug to a drying temperature while the back of the rug is in contact with the heat supplying means, keeping the pile of the carpet at all times clear of the moisening atmosphere and from direct contact with the heated drying surface.

In carrying out my invention, the following procedures is had: The fabric is kept under tension throughout its treatment and while under such tension, it is caused to pass over a dampening machine provided with vaporizing or spraying nozzles which project the vapor or fine mist upon the back of the carpet so that it is uniformly moistened upon that side while, at the same time, the pile of the fabric is shielded against direct action of the spray or vapor.

The fabric in its moistened condition is next passed about guide rolls and thence about a steam heated drying cylinder and is caused to travel with its back portion in contact therewith. The carpet is caused to be positively fed at the discharge end of the apparatus, so as to insure a considerable pressure upon the surface of the drying cylinder to secure thereby an ironing effect which is sufficient to press out the seams and cause the carpet to retain a flattened condition after it leaves the cylinder; and the amount of tension which is put upon the carpet in passing about the cylinder is varied according to the stiffness of the same and extent to which it must be stretched to insure a flattened condition, said tension being applied by means which will increase the drag or resistance to being fed to the cylinder and applied to the carpet between the drying cylinder and the moistening means, or before passing to the moistening means, or both, as desired, all of which is more fully described hereinafter when referring to the drawings.

With the above and other objects in view, the nature of which will be more fully understood from the description hereinafter, the invention consists in the novel construction of method and means for treating carpets and rugs, as hereinafter more fully described and defined in the claims.

Referring to the drawings: Fig. 1 is a vertical section lengthwise through the apparatus and taken in the direction of the lines 1—1 in Figs. 2 and 3; Fig. 2 is a plan view of that portion of the machine for ironing and drying the carpet; Fig. 3 is a plan view of that portion of the machine by which the back of the carpet is dampened; Fig. 4 is an enlarged view of a portion of the spraying or dampening means; Fig. 5 is an enlarged end view of the means for applying drag upon the carpet to insure the proper stretching thereof during the treatment of the carpet; Fig. 6 is a transverse section of a portion of the means for adjusting the tension upon the fabric during the ironing and drying treatment thereof; and Fig. 7 is a sectional view of a detail shown in Fig. 1.

A represents the dampening or moistening means by which the back of the carpet is moistened with water and B represents the drying and pressing means, these being arranged in associate relation so that the moistened carpet may at once be dried and pressed before delivery.

Referring more particularly to the dampening means A, the same comprises the following instrumentalities: 2 is a frame provided at the top with two transverse bars of wood or other material 3, 3, spaced apart to provide a passage 4 between them. Arranged below the said passage 4 is a tray 5 surmounted by a tank 6 preferably having water compart-

ments or tanks 7, 7, each of which is provided with an L shaped water nozzle 8, 8, having a vertical leg 9 dipping down into the water of the respective tanks, and also with a cone-shaped nipple 10, 10, the said nipples pointing toward each other immediately below the passage 4. Between the tank portions 7, 7, is a space 11 in which is arranged a transverse tubular air chamber 12 having at its upper portion blast nozzles 13, 13, formed with cone-shaped nipples 14, 14, respectively at right angles to the nipples of the water nozzles, so that a blast of air may be projected upwardly through the passage 4 and, at the same time, cause water from the nipples 10 to be sprayed in the form of vapor. The nozzles 8 and 13 are screw threaded and are connected by L shaped frames 15 having adjusting nuts 16 and 17 which are respectively screwed upon one of the nozzles 8 and one of the nozzles 13, and in this manner provide capacity for adjustment of said nozzles in pairs to control the degree of vaporization of the water supplied by the nozzles 8 and vaporized by the air blast from the nozzles 13. A stuffing box 18 may be provided for each of the nozzles 8 where they pass through the wall of the tanks 7, 7, to permit slight relative adjustment of the said nozzles. This construction of spraying or vaporizing means for the water is found to be well adapted to the purpose of the invention, but I do not limit myself to the particular details of this spraying or vaporizing means.

The passage 4 is provided with two transversely arranged doors 19, 19, which fold toward each other to control the opening between the spraying means proper and the space 4 immediately below the carpet C which travels horizontally over and is supported by the transverse bars 3, 3. The said doors 19 may be adjusted by straps 20 having holes along their length and fitting over pins 21 on the transverse bars 3, as more clearly shown in Fig. 7. By means of these doors 19, 19, the vapor from the spraying nozzles may be directed centrally upward through the passage 4 and transversely upon the under or back portion of the carpet C, and thereby concentrate to the degree desired the moisture upon the carpet as it passes uniformly along in the direction of its length and while drawn taut upon the transverse bars 3, 3. The air blast is supplied to the tubular chamber 12 by a pressure blower 22 and piping 23.

The arrangement of the nozzles for providing the aqueous vapor is shown more particularly in Figs. 1 and 4, but by an examination of Fig. 3, it will be seen that these nozzles are arranged in large numbers side by side and extending transversely across the width of the machine, so that the vapor or dampening moisture is supplied to the carpet throughout its entire width in a uniform manner. The tanks 7, 7, receive the water supply from a regulating tank 24 through pipes 25 and the supply to said regulating tank is controlled by a float valve 26 and may be provided with an overflow 27 to maintain a definite water level within said tanks 7, 7. The tanks 7, 7, are also provided with steam heating pipes 28 which may receive steam from a supply pipe 29 under control of a hand valve 30, and said steam pipes 28 may have their discharge ends 31 provided with return traps 32 of the type which permits the passage of air and water but restricts the passage of steam, such traps being commonly employed in heating systems and known as thermostatic traps.

I do not restrict myself to the details in respect to the heating means for the water in the tanks, but it is desirable that the water shall be heated before being sprayed so that the back of the carpet will be more readily dampened and subsequently dried when passing about the drying means B. This will insure a better moistening of the carpet back with a minimum consumption of water and also enable the subsequent heating of the carpet by the heated drying cylinder to cause the passage of vapor through the carpet to affect the pile thereof, with the result that the color of said pile is set and brightened.

The carpet is fed to the machine at D and leaves it at E, in Fig. 1, and during its travel through the machine a drag is put upon the carpet in passing about the roller 33 which has on its surface pins to take firm hold on the carpet. This roller 33 has a braking device shown more fully in Fig. 5 which creates a resistance to its being rotated. This braking device comprises a brake disk 34 on the shaft 35 of the roller 33 and encircled by the two semi-circular brake bands 36 and 36ª and the clamping screw 37, the brake bands being held at 38 to the main frame 2 and clamped with the desired friction upon the brake disk 34 by adjusting the clamping screws 37. As shown in Fig. 3, there is one of these braking devices at each end of the shaft of the roller 33, which is desirable where the length of the roller is very great, as it insures a more uniform drag on the carpet throughout its whole width. The carpet is guided to the drag roller 33 by first being centralized between two pins 39 while passing over a tubular roll 40, and thence under and about a guide roller 41.

Keeping in mind that the carpet is being continually pulled by the feed roll 42 (also having pins for engaging the back of the carpet) at the discharge end E, the carpet will be pulled taut over the transverse guide bars 3, 3, above the moistening chamber 4 whereas the back of the carpet is supplied with the upwardly projected aqueous vapor. The carpet next passes about guide cylinders 43 and 44, and thence about a drag cylinder 45 whose shaft 46 is held stationary in bearings 47 by clamping screws 48. This cylinder 45 is also

provided with a V shaped transverse projection 49 over which the carpet is drawn, said cylinder and its V shaped projection creating an additional drag upon the carpet while at the same time smoothing or pressing out the seams into flattened condition, and whereby the tension of the fabric may be greater when passing about the drying cylinder 50 than when passing over the dampening devices. The object of increasing the tension is to enable the dampening effect to be first produced without any greater tension than is necessary to flatten the carpet in passing over the guide bars 3, 3, at which time the carpet is in its driest condition, and then increasing this tension materially when performing the steaming and ironing operation when the carpet is passing about the drying cylinder and at which time it is drawn as tightly to the surface of the cylinder as possible. This increased tension is for a dual purpose of increasing the steaming effect and finally drying the carpet with the seams flattened to the greatest possible extent.

To insure the entire surface of the cylinder acting as a steamer and drier, the carpet, after leaving the drag cylinder 45, is fed about a guide roll 51 at the bottom of the cylinder, thence around the drying cylinder to a second guide roll 52 close to the guide roll 51, thence rearwardly and about the guide roll 53, and finally upward and about the feed pin roll 42 to place of discharge. The drag cylinder 45 may be circumferentially adjusted in its supporting bearings and in that manner the transverse projection 49 may be adjusted up or down about the axis of the cylinder, as may be desired, to increase or decrease the extent of tension to suit the character of the goods being treated. Where the goods are heavy, as in the case of carpets and rugs, the drag which is put upon them should be considerably more then where lighter fabrics are being treated, and this provision for adjustment permits the drag to be made anything which may be advisable. It will be understood, however, that the drag by the roller 33 should be adjusted accordingly, as in no case is it desirable that the drag by said roller be equal to the drag put upon the fabric when delivered to the drying cylinder.

The drying cylinder is journaled in suitable bearings 54 and is rotated by an electric motor 55 through suitable gearing 56 and 57, or it may be rotated in any other suitable manner, as I do not restrict myself in this respect.

The feed roller 42 is driven by a sprocket chain 58 passing about a sprocket wheel 59 on the cylinder shaft and driving a sprocket wheel 60 on the shaft of the feed roller 42. In this manner, the feed roller 42 is the real means governing the speed of travel of the carpet or rug through the machine, and the surface speed of this roller is less than the surface speed of the drying cylinder 50, with the result that the drying cylinder is caused to rotate at a faster surface speed than the carpet or rug which is being fed in contact with its outer surface and, therefore, the heated drying cylinder produces an ironing effect by direct contact supplemented by a movement of the metallic surface against the back of the carpet or rug. I do not, however, limit myself to the difference in surface speeds between the drying cylinder 50 and the feeding pin roll 42, as the amount of ironing effect may be different in different fabrics, and the extent of difference between the surface speeds is only a matter of varying the relative diameters of the sprocket wheels 59 and 60.

The drying cylinder 50 may be heated by steam in the same manner as is customary in heating drying cylinders as used in textile mills, paper making machines, etc., the steam being fed into the cylinder by a pipe 61 and the water of condensation removed by a siphon pipe 62, or in any other manner desired, and I do not limit myself in this respect.

It will be understood that the rugs to be treated are mechanically and temporarily fastened end to end so that they travel in series through the machine, just the same as if they were all in one woven web. In the case of the use of the machine and method in treating long lengths of fabrics, the treatment may be imparted to the fabrics in single lengths. For example, assuming that carpet strips for long corridors were required to be made of two or more strips sewn together. In such event, the carpet and seams would be treated for a single run with preliminary webs at the opposite ends to maintain the tension on the entire length of carpet while being subjected to the dampening and drying space. If, in the case of large hotels, a series of these long corridor strips are required, they may be connected end to end, as in the case of shorter rugs, and all treated as a continuous operation. Aside from the treatment when intended more particularly for the flattening of the seams, the fabric may be subjected to treatment for the purpose of setting the color and improving the appearance. In the case of the treatment of pile fabrics, such as rugs and carpets, the steaming produced by the heating of the dampened fabric causes the moisture in heated form to act upon the starch or size that is in the yarns, causing it to be softened and then set at the same time that the carpet back is dried and ironed; and in doing this, the heated vapor passing through the carpet back and acting upon the pile thereof, sets the color therein at the same time that the back is being dried upon the drying cylinder.

In light pile fabric, such as velours and velvets which have a very much lighter body than rugs, the surface speed of the feed roller

42 and of the drying cylinder 50 may more fully approximate each other and may, if desired, be equal, so that there is no slippage of the surface of the dryer 50 upon the fabric which is being fed about it.

Referring again to the cylinder 45, it is pointed out that when the fabric is formed of a plurality of webs sewn together to give the proper width of the rug or carpet strip, the seams which ordinarily have a tendency to project outwardly from the back are brought into contact with the V-shaped transverse bar 49 and by such contact they are pressed into alinement with the main body of the carpet, this operation being facilitated by the fact that the back of the carpet is dampened. Having once been pressed into such flattened condition by the said bar 49, as a preliminary act of ironing, the seams so modified are then set permanently by the steaming and drying process which immediately follows as the materials pass about the hot drying cylinder 50, and it may be said, therefore, that the stationary parts 45 and 49 cooperate in the full ironing process to which the fabric is subjected before it leaves the machine.

It will be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that I do not restrict myself to the details, as the same are susceptible of modification in various particulars without departing from the spirit or scope of the invention.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. The herein described method of treating a pile fabric to a steaming and ironing process, which consists in causing the fabric to be positively fed in a continuous manner under tension at both ends, projecting a finely divided aqueous spray upon the back of the fabric while under tension and in a stretched condition, thereafter causing said moistened back of the fabric to be brought into contact with a highly heated surface moving at a surface speed greater than the fabric for converting the moisture contained in the back of the fabric into steam and causing the same to pass outwardly through the pile surface of the fabric to affect the size and improve the brilliancy of the color of said pile surface and at the same time to dry and iron the back of the fabric while it is maintained under tension, and, wherein further, the fabric has its tension increased during the drying and steaming process over the tension employed during the moistening process, and adjusting the extent of the tension of the fabric in connection with the drying process whereby the tension is increased or decreased according as the weight of the fabric is greater or less.

2. In a machine for treating fabrics, including rugs and carpets, the combination of a moisture spraying means, guides for guiding the rug or other fabric so that one side thereof is subjected to a direct spray to provide a moistening action and for maintaining the fabric in spread condition during its passage over the spraying means, a drying cylinder internally heated and about which the moistening fabric is caused to pass, guiding means for guiding the fabric from the moistening means about the driving cylinder, and means for positively causing the fabric to pass over the guiding and moistening means and thence about the drying cylinder for maintaining it continuously under tension during the passage of the same through the machine, and, wherein further, said feeding means comprises means to yieldingly resist the forward travel of the fabric at the intake end of the machine, and a positive feeding means at the delivery end of the machine for drawing the fabric through the machine with a force sufficient to overcome the resistance of the means which yieldingly resist the travel of the fabric at the intake end of the machine, and means interposed between the moistening means and the drying cylinder for increasing the yielding resistance to the feeding of the fabric, whereby there is greater tension upon the fabric when passing about the drying cylinder than when passing over the moistening means.

3. In a machine for treating fabrics, including rugs and carpets, the combination of a moisture spraying means, guides for guiding the rug or other fabric so that one side thereof is subjected to a direct spray to provide a moistening action and for maintaining the fabric in spread condition during its passage over the spraying means, a drying cylinder internally heated and about which the moistening fabric is caused to pass, guiding means for guiding the fabric from the moistening means about the drying cylinder, and means for positively causing the fabric to pass over the guiding and moistening means and thence about the drying cylinder for maintaining it continuously under tension during the passage of the same through the machine, and, wherein further, there is provided at the intake end of the machine a pin roller over which the fabric passes and a friction device to yieldingly resist the rotation of the roller, and an additional resistance creating means interposed between the moistening means and the drying cylinder and comprising a cylindrical surface about which the fabric is guided, having a transverse bar presenting a friction edge over which the fabric is dragged and for opening out into flat condi-

tion any sewn seams along the length of the fabric, said parts adjustable for varying the amount of friction applied to the fabric.

4. In a machine of the character stated, the combination of moistening means comprising guides over which the fabric is stretched in open spread condition and closely positioned spraying nozzles arranged entirely across the guiding means for projecting spray jets at substantially right angles upon and entirely across the fabric whereby it is uniformly moistened throughout its entire width, a rotating drying cylinder, a rotating feeding and delivery roller, means for guiding the fabric past the moistening means and thence about the drying cylinder and to the delivery roller, means to apply a drag upon the fabric before passing to the moistening means, and mechanical means for positively driving both the drying cylinder and the feeding and delivery roller at different surface speeds, whereby the surface speed of the cylinder is greater than the surface speed of the feeding and delivery roller and the fabric moved thereby.

In testimony of which invention, I hereunto set my hand.

DE HAVEN BUTTERWORTH.