

Many improvements have been effected in the mechanical methods and appliances for practically carrying out this process, the aim of all the engineers being to separate the softened water from the precipitated impurities in a quicker, yet as efficient, manner than is accomplished by tank treatment. The various methods now used in softening plant to remove the sludge may be divided into three classes; those that employ a filter press, filtration through media, or grating, which will hold some of the deposited matter and form a filtering bed, and methods which depend upon causing the deposited bodies to assume such a physical form or density that they will quickly settle to the bottom of any vessel, leaving the water above perfectly clear. We will describe one form of each type, and in doing so will mention those principally employed at the present time on a large scale. Porter & Sons make several forms of water softening machines, all of which are constructed upon the filtration system. In one form a portion of the water from the reservoir is run through a small cylinder containing lime, and it thus becomes nearly saturated with lime. The lime-water so obtained is allowed to flow into a large cylinder filled with the water, with which it is thoroughly mixed, and the milky water so produced is then run through a filter press, which separates the solid particles and delivers the water perfectly clear and softened. The volume of lime-water allowed to flow into the larger cylinder is regulated according to the hardness of the water that is being treated, and valves are placed in suitable positions so that perfect control can be had over the whole process. The process is thus practically a continuous one, and does not require the attention of skilled labor after the trials to regulate the quantity of lime water needed for any particular water. In another pattern of purifier, by the same makers, the lime is mixed with some of the water in a small tank, and predetermined volumes of this solution are mixed with some more of the water in a larger tank, perfect admixture being attained by the use of mechanical agitators. The water after mixing with the softening agents then flows into a longer tank which is fitted throughout its length with vertically arranged filtering cloths, so that by the time the water arrives at the far end of the tank it has been thoroughly filtered and is fit to be used in the works. The filtering mats are made of cocoanut fibre covered with cloth; the vertical arrangement of these filter mats having the advantage that they can easily be cleaned out, and it is obvious that if they are cleaned one at a time it would not be necessary to stop the machine while this was being done, in addition the process is continuous in its action.

BACKING WOOLEN GOODS.

To successfully put a back on a woolen cloth so as to please all concerned, and do it at a profit, is one of the most difficult things the manufacturer is ever called on to do. All who have to handle a cloth come sooner or later to have a fling at the back. It really comes to be a fact that the back of the fabric is at times almost as important as the face. How often we find goods not selling because the back is wrong. The salesman finds that in some way or other there is disharmony between the back and face, and the goods cannot be disposed of at a profit. Sometimes backs are changed, when little or no change is made in the face, and this is done in the hope that goods will sell better after the change than before. In every case the important and all-essential thing is to get such a back on the piece as will add to the general effect of the goods without adding unduly to the price.

The most satisfactory and perfect back that can be made on a cloth is the one which obtains where the goods are made, through and through, double cloth, says a writer in a con-

temporary. In this case the back of the piece is exactly the same as the face, the design of the back is just like the design of the face, and the twill, if it is a twilled cloth will run in the opposite direction. So far as the pattern of backs is concerned, the choice is undoubtedly with the designer, and it rests almost entirely with that individual just what the back will be, so long as it harmonizes with the rest of the cloth and carries out the general effect intended and desired. In binding all such backed goods, by far the most certain and satisfactory way to proceed is to bind the face to the back, and not the back to the face. When the back is bound to the face of the goods, and the finishing is complete, it will be seen that the surface and effect on the face of the cloth is much rougher and more uneven than when the face is bound to the back. The latter procedure leaves a face unaffected entirely by the back, a face smooth, even and uniform, because there does not need to be any looping of the filling in the face of the cloth. Next to this way of binding the goods is the plan of binding face and back alternately. Next to this is the doeskin back, which is, in fact, a warp back, and answers fairly well on the worsted variety of goods. This sort of a back on woolen cloths is not a success. The fabric has a rough, coarse look on the back, owing to the fact that the floats are so far apart, and, while the face may appear all right, the loose, raw and ragged look of the back destroys the general attractiveness of the goods. On worsteds, however, the doeskin back looks all right, it has a rich, full appearance, and shows a good value, so far as stock and finish are concerned. In making the doeskin back to the worsted, the procedure is to allow one thread of face to one thread of backing in the warp. The filling is "two" and "one;" that is, two threads of filling on the face to one thread of filling on the back. This arrangement will make the doeskin back on the worsted solid and firm.

Some worsteds are made, like woolens, without any backing pick, and the weight is attained by depending upon the combination of the weight of the warp yarn and the filling, which is sufficient without any backing pick. Another back which is employed on worsteds is a plain back, or a two and one warp and filling. On worsteds this back will call for a twenty-four harness to make it with satisfaction and success, and then the goods will come out with a face that is absolutely all right as to smoothness and beauty of face appearance. It is on account of the binding, as explained above, that harness of this number is required. If the backing is for woolen goods, twelve harness will be quite enough, since binding on woolen face is not as plainly noticeable as upon the face of the worsted.

In all that has gone before, it is implied that the face weave is what is commonly called the cassimere twill. But even though the face weave may be different, the backs described may be handled, if all other things are equal.

In making a back, two considerations, at least, must enter into the question: First, the quality of the goods; and, second, the price which the maker gets for them. These two points, of course, are generally interdependent, but, in handling the goods and the backing to be determined upon, both must be taken into account. On cheap goods a very fine back is, of course, out of place, and there must always be some kind of harmony between face and back. In a fine face cloth a good back adds very materially to its selling qualities, but the back must always be so arranged and so constructed that the face is in no wise disturbed. The idea is that the piece with the back shall have exactly the same face appearance as it would have had it no backing at all. Thus, the face of the double cloth will look exactly as if it were a single cloth. This is the height of the designer's ambition and, with care and study, it can be done, at least it can in most cases.

One of the most important considerations is the size of