half an hour's crutching 24 deg. salt water or potash lye is *crutched in, in weight equal to the lye, and the mixture is* allowed to stand. Another is to melt the tallow with one fifth of its weight of water, and when at the boil add a weight of alum or salt equal to 1 per cent of the weight of the tallow. After boiling about five minutes after this, remove from the fire, crutch in cold water to stop the boiling, and allow to stand till the tallow has set on the top of the water, which will contain the dirt and the neutralized acids. If such large quantities of tallow are treated that this purificatory process is not resorted to, the lye used for saponification should contain more carbonate than usual to neutralize the free fatty acids. Any other fat used should be purified by one of the above methods.

The chief liquid fats used in the manufacture of natural grain soap are oleine, alone or mixed with cottonseed oil. These are better for soap to be used for textile purposes than linseed oil, which resinifies too readily. Even when linseed oil is used, as is the case for soaps for certain purposes, a good deal of cottonseed oil is put with it, especially in summer. Cottonseed oil is put with it, especially in summer. Cottonseed oil must, however, always be used with caution in making natural grain soap, although it is cheaper than oleine. With it the best lye must be used, as even a trace of soda makes it give bad results. Besides the cottonseed oil itself is apt to contain soda, as strong caustic soda is used to purify and bleach the raw oil. It is true that this is not the case with the extra pale American oil from husked seed, but that is rather dear. If a little of the bleaching soda is left with the oil by carelessness it may have very disastrous consequences when the fat is made into soap. The presence of soda makes the grain soft and feathery, and cottonseed oil has the same effect, especially in winter. At low temperatures a natural grain soap made with the use of cottonseed oil readily sprouts, and it may lose its grain altogether in hot weather. A good soap made with tallow keeps its grain well. But now that linseed oil, oleine, and tallow, are all dear, we cannot afford to reject cottonseed oil altogether, especially during spring and autumn. In summer it cannot be trusted to grain, and in winter it is best avoided.

The fats must be added in such a way that those which require the strongest lye for saponification come last, otherwise the process will be slow and troublesome. Direct boiling seldom gives favorable results, and a preliminary boiling to grain is necessary. The old and well-known fact that mixed fats boil better and more easily to grain soaps, comes here to the front, but the fats must be so chosen that the finished soap is solid and cuts satisfactorily. Fats must not be used which will not produce closed soap, and in soaps for textile industries tallow must always be present. Oleine is added even to soft soaps, and the higher the percentage is the more valuable are the soaps. Soaps which are boiled clear on a sub-lye and are used as household soap only distinguish themselves as a rule by the color. The tallow soaps must be as white as possible, and therefore only pale and fresh fats must be used. A good recipe is 600 lbs tallow, 500 lbs lard, 200 lbs cocoanut oil and 100 lbs. white cottonseed oil. Darker soaps extremely solid and economical in use can be prepared by the use of 700 lbs tallow, 700 lbs bone grease and 200 lbs palmseed oil. These soaps are made in great quantities, but only those factories which stick to the old methods have any reputation for them. Ordinary tallow melted partly with acid, partly dry, and bone grease obtained by boiling with steam or water, are fats which are particularly suitable. If bleached palm oil is also used, as often happens, the soap acquires an agreeable odor. Fats which are difficult of saponification have always a tendency to produce soap apt to turn rancid. The grain soaps boiled on a precipitated paste are much prized for their purity and good appearance, and imperfections are usually due to imperfect saponification and to premature discharge. Like the grain soaps boiled on a sub-lye, they should be made neutral by adding fat in proportion to the excess of alkali. These grain soaps can be made in a few hours if steam is used, but it is always better to leave over night and to take advantage of the spontaneous heating. A neutral white grain soap can be excellently made for textile purposes from tallow and lard only by boiling on a precipitate of paste. Tallow is at present cheaper than cocoanut oil, and in some places than palmseed oil. It is therefore advantageous to dispense with cocoanut oil as much as possible, and its omission makes very little difference in the appearance of the soap. If an easily lathering soap is insisted on, cocoanut oil must be used, but it need not form more than one-sixth of the total fat. It is better to clarify the tallow or hard fat used if necessary, and to boil with two waters. With the first the soap is saponified with 15 deg. lye, and it is scarcely possible to go wrong at this stage if we boil in paste until all froth disappears, and a sample becomes fairly solid when cold. We then relarge with salt to a clear sub-lye. The sub-lye separates very quickly with such soap, and can be drawn off after an hour's standing, and in boiling with steam even sooner. If steam is used it is advisable not to run off all the sub-lye, but to leave a little to help the second boiling, strengthening it if necessary with fresh 15 deg. lye. As soon as a swollen grain is produced in the second boiling the soap is ground, keeping the boiling uninterrupted. At first hot water is sprinkled over the soap and allowed to penetrate it, care being taken that the soap does not form a paste. If it does, 24 deg. salt water or dry salt is added. This operation may be regarded as complete when roses form and the soap boils lumpy. The soap is now tested for pressure, and when dry it should flake between the fingers. If it smears more lye is wanted. The special signs of completion are that the grain is uniformly dissolved. As long as grain is visible on the spatula weak lye or water must still be added. Another and very important sign is that the sub-lye ceases to be clear and becomes whitish and inclined to be thick. When the steam is shut off the pan must be well-covered up and left for thirty-six hours for the soap to settle. When an open fire is used the hot water sprinkled on the soap must be crutched in. When the grinding is finished some cold salt water is added and the fire is drawn and the fire-door left open. After removal of the froth and moulding the soap is crutched in the mould to make it uniform and then covered up.

Olive oil also answers well for making neutral soap, but the pure article is only available for those who live at the places of production or can get it thence direct. Olive oil supplied for soapmaking is usually inferior and older oil which is not suitable for table use. They saponify very easily and require comparatively small quantities of lye. The clear boiling follows as with any other grain soap. Olive oil soaps will not give a yield exceeding that of an ordinary pure grain soap, namely about 154 lbs. If the olive oil is adulterated with cottonseed oil, pure caustic soda must be used, as that alone will saponify the cottonseed oil properly, and the best strength is about 25 or 26 deg. B. In this case the first boiling to paste is the most important part of the process. This should be done with 20 deg. lye, adding later 25 deg. lye, until a clear, solid paste lies in the pan. Care must be taken not to recharge too soon. Such adulterated oil will only give rather less than 150 lbs. of yield.

RECENT TEXTILE PATENTS.

No. 65,072.—Embroidery making machine; James T. Roberts, Anderson, N.C., U.S.A.

No. 65,108.—Thread twisting machine; Albert Kryszat & Co., Berlin, Germany.