

strictly necessary, it is a great convenience and much easier than priming the pump with a bucket. The other tap on the extreme right is to allow air to escape while the pump is being primed. It serves another useful purpose, in that before and after dipping plain water can be circulated through the system, and a hose attached to this tap while the pump is running provides a high-pressure jet of water for cleaning down the draining pens, etc. The pump is covered by the low lean-to roof at the top of the picture.

Fig. 8 shows another advantage of the system. By disconnecting the pressure hose and starting the pump the dip is circulated at high speed and pressure through the pump, and the powerful stream quickly and thoroughly mixes the dip as shown in the picture. A 5 h.p. electric motor in the wool-shed serves the dual purpose of driving the shearing plant and grinder, and also the pump, by means of the belt shown in Fig. 8, which comes out through a slot cut in the wall. When the pump is shut off while the pen is being filled or emptied the easiest way of doing this is by shifting the belt on to the loose pulley, and this is done by a long extended handle marked X in Fig. 8.

Fig. 9 shows the two control valves. The one on the vertical pipe leads to the overhead sprays, and the horizontal one to the floor sprays. They may be turned on separately or together, as desired, and can both be shut off without stopping the pump. No damage results, as centrifugal pumps have this characteristic that although the outlet is completely shut off while the pump is running, pressure will not build up beyond a safe maximum.

Fig. 10 shows the floor sprays in operation. It will be noticed that the outermost ring of sprays is set inwards at an angle, while the rest point vertically. Very complete coverage is given by these sprays, and when the pen is properly filled with sheep they are thoroughly wetted from below, without much of the spray coming up high enough to get in their eyes and noses. As the nozzles project several inches above the floor, sheep do not tramp on them. In practice it was found most satisfactory to turn on the top and bottom sprays separately, as each set then received the full pressure and volume of dip. The sliding entrance gate, which is hung from grooved rollers running on the top ring of the framework, appears on the right of the picture.

Fig. 11 shows the top sprays working, and really gives an inadequate idea of the big volume of liquid which issues from the multiple nozzle at each end of the spray arm. It will be noticed, however, that complete coverage

is obtained—the cones of spray from the nozzles overlapping and also reaching the side walls of the pen. The small supplementary jets, one of which can be seen here, are set to give a relatively slow speed of rotation to the overhead sprays of about five revolutions per minute. This means that each sheep receives only a momentary deluge from above as the spray passes, and there is an ample breathing gap before the next lot arrives. There is no possibility of drowning, as in any of the standard dips, and the behaviour of the sheep seems to indicate that they don't object to the process to nearly the same degree.

Sheep don't, as a rule, display their feelings by facial expression, but when the bottom sprays are first turned on and they get sprayed with "rain" from the ground they certainly look as near to bewilderment as sheep can get.

Fig. 12 shows both sets of sprays operating at once, and the practice was adopted of turning on the bottom set again as well as the top set, just before the sheep went out, to give them a final all-over wetting.

Fig. 13 shows the dip in action, with the overhead sprays working. The man at the control valves is timing the spraying by his watch, and this practice was adopted throughout. A two-minute sandglass would be ideal for this purpose.

Fig. 14 shows the sheep leaving the dip. There is a spray nozzle on either side of the exit gate, which gives them a final squirt as they leave.

### *Trials at Ruakura*

It was mentioned previously that owing to unavoidable circumstances the tests with the dip had to be left almost to the end of the dipping season, and by this time the sheep on the property were carrying fully three months' growth of wool. In a way, this was an advantage, as it gave the new dip an unusually severe test for wetting and penetrating powers. Unfortunately, or perhaps fortunately for the farm manager, the sheep were carrying very few parasites, and to begin with it was impossible to demonstrate actual killing effects. It was realised that given a good dipping material effective killing of parasites would follow, **provided thorough penetration and wetting were accomplished.** At first sight it would seem easy by casual examination to determine if the sheep were wet to the skin, but in practice it was not an easy matter. The moment the wool was parted to see how the dip had penetrated, fluid ran in from the outside of the fleece along the parting, and in any case the hands were wet, and it was difficult to tell, with any certainty, how much, if any, dip had reached the skin. For this reason a more critical test was devised, and a powdered water-soluble dyestuff—methyl violet—was

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