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THISTLE MECHANICAL MILKING MACHINE COMPANY, LIMITED.

BY W. B. DICK.

DR. SHIELDS' Patent Pulsating Mechanical Milking Machine has been awarded the silver medal at the Royal Society of England Show, Darlington, and the Royal Lancashire Show, Preston. One of these machines has been fitted up by the Fresh Food and Supply Company at Mr. Mackenzie's Waverley Dairy, Bondi, and can be seen in operation any afternoon at 3 o'clock. Previous efforts have been made to extract the milk from a cow's udder by suction, and to a certain extent some of these were successful; but, as may be readily conceived, many of these mechanical arrangements failed through the inventors not having sufficient perseverance to master the details. The machine as fitted up at Bondi differs from its predecessors in providing an intermittent suction, imitating as far as possible the action of a calf's mouth. The cows are baled up in two rows, ten on each side, and one of the hind legs are fastened with a leg-rope. The cows are feeding while the process of milking is going on, and it is curious to note the quiet behaviour of the animals, who keep feeding with perfect indifference to what is going on around them. Of course, these animals are not picked and trained, and cannot be looked upon as a fair trial. The twenty cows averaged 5 quarts of milk each, with but two pints strippings.

ENGINE.—The engine used at Bondi is portable, but any style of engine will do for driving the pump, and about $2\frac{1}{2}$ H.P. is required. The pump is of the single action vertical type erected on a cast-iron base. The foot-valve is of brass with leather seat fastened into the bed-plate with set pins (Plate XI.)

CYLINDER.—The cylinder is a plain casting 15" diameter with a 12" stroke fixed on to the bed-plate with four $\frac{3}{4}$ " studs.

BUCKET.—The bucket is a casting with two guides turned up to the diameter of the pump barrel. The bucket valve is made of brass fitted with a spring, and the seat is of leather, forming a complete air-tight joint. The bucket is packed with a cup leather and fastened with a cast-iron ring.

PULSATING VALVE.—Two pulsating valves are fitted to the pump. These valves are of the equilibrium type, actuated by gearing making one revolution for $1\frac{1}{2}$ revolutions of the pump, the pulsating valves being worked with eccentrics and levers.

The special feature of the machine is the means by which the intermittent suction action is obtained. In order to effect this, the two equilibrium valves are fitted on to the communicating pipes from the vacuum container, each valve alternately actuated by the gearing connected to the crank shaft of the air-pump. One valve when open establishes a vacuum connection between the container and the milking apparatus, and the other opens a free air inlet to the pipes between it and the milking apparatus, thereby partly destroying the vacuum in that part of the machine, and producing a vacuum from $4\frac{1}{2}$ inches to 15 inches.

CANS.—Each can has two compartments, into the upper of which the various pipes lead from the teat cups, and from which the milk flows from the glass sight-cup through a three-quarter inch hole in the bottom into the tin pail. The small hole in glass sight-cup is closed by an india-rubber ball 2" diameter. This ball forms a ball-valve, which opens and shuts at each pulsation, and allows the milk to flow into the lower part of the can. When the engine is started, the air is exhausted from the pipes and the vacuum-container. The pipes are fitted up in two rows, 10 each side; each connection has a small cock fitted. The udder is cleaned and moistened, and the teat cups put in place. Immediately they attach themselves to the udder the milk begins to flow in an intermittent stream,

caused by the pulsating action of the teat cups contracting and expanding under the influence of the air pump. These teat-cups are made of stout red india-rubber reduced in thickness on each side, also at the upper part, with a small tongue or lip inside. This lip clings round the teat, forming a complete air-tight joint. The lower vacuum of $4\frac{1}{2}$ in. is sufficient to keep the cup from falling off the udder, while the thicker portion of the cup expands, to be in turn compressed during the period of increased vacuum. And as this action causes a downward motion, the milk can be seen flowing through the side cup.

Each cow was milked in from 4 to 5 minutes. The time taken to milk the 20 cows was about 23 minutes. It requires one man putting on the teat cups and looking after the milk cans. The glass cup on the top of the can enables the man to see when the cow is done milking, and then, by simply turning off the stop-cock and pulling the small plug out of the can, the teat cup falls off, and can be removed, the milk emptied out, and the teat cups are ready for putting on another cow. At the trial at Bondi the teat cups were left on for some time after the milk had ceased to flow, and this had no bad effect upon the cows. The same Company has invented a Telepulsating machine, suitable for milking one cow at a time. Any good vacuum pump may be used to create a vacuum for working this machine.
