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Milking machine development

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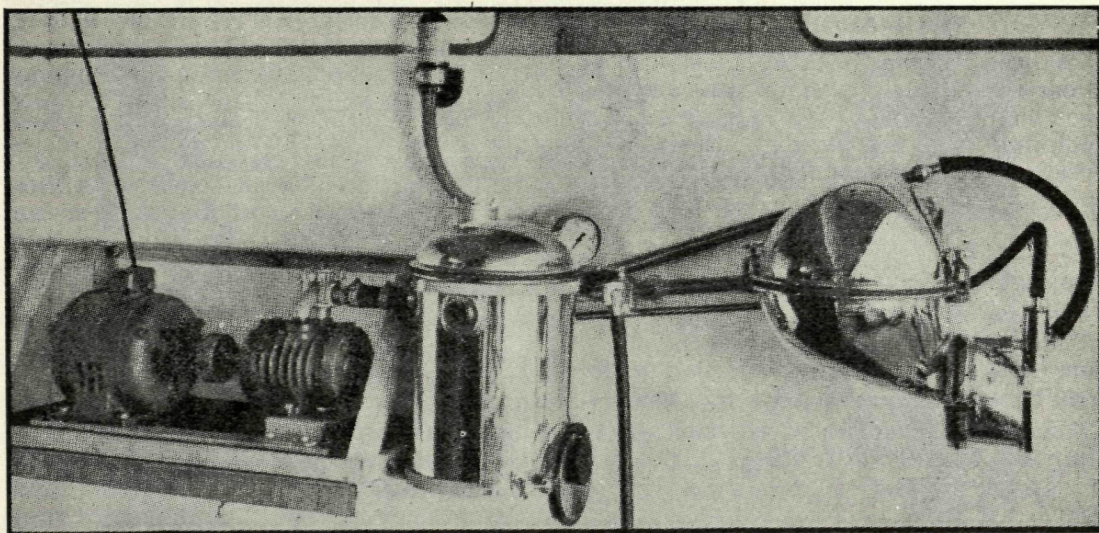


Fig. 1.—The machine in the releaser room. The whole assembly is mounted on two brackets. The releaser with its pulsator is on the right; the recycling valve and cleaner inlet can be seen between releaser and vacuum tank. The master pulsator is partly visible above the vacuum tank lid. The vacuum tank has a fitting to take the releaser spit-chamber for automatic cleaning.

MILKING MACHINE DEVELOPMENT

AT a recent conference at Ruakura in New Zealand, a milking machine embracing many new developments was on view and proved a great attraction. This machine is the outcome of 15 years' research by Dr. W. G. Whittlestone and Mr. D. S. Miller, both of the Ruakura Animal Research Station at Hamilton, New Zealand.

Dr. Whittlestone has an international reputation for milking machine theory and design. Mr. Miller is a leading physicist in New Zealand and has made many of the outstanding features of this machine possible. Never has so much time and research been put into any one machine of this type. From the inception of the project it became a major problem of engineering research.

The Ruakura milking machine has been designed to meet three important essential requirements in mechanical milking.

- (1) To provide a simple trouble-free mechanical system which requires little maintenance and very rarely gets out of adjustment.
- (2) To provide the stability of vacuum level and regularity of pulsator action necessary to the cow if "let down" response is to be consistently good.

- (3) To incorporate a cleaning system which can maintain the machine in a satisfactory state of hygiene at all times.

The machine as developed at Ruakura has several outstanding features. It has a new type of releaser, an improved milking claw which is streamlined and incorporates an automatic cut-off, leak-proof couplings and an automatic recirculating system which makes the machine virtually self-cleaning.

The latter idea will be appreciated by all dairy farmers because of the saving of time in cleansing the machine.

The machine is supplied to the farmer in such a way as to render the services of a qualified fitter unnecessary, the farmer being able to instal the machine in his own dairy, thereby saving in installation cost.

The machine of which we have advice is an electric motor driven model.

GENERAL DESIGN

The machine has been designed so that all parts requiring precision fitting are pre-assembled during manufacture. The machine is supplied to dairy farmers as a series of units premounted ready for installation.

Unit 1.

Consists of vacuum pump, motor, vacuum tank and master pulsator unit.

These are combined on a welded metal frame which is attached to the wall of the dairy by 6 bolts; no other fitting is needed.

This type uses direct drive coupled to pump as a safety advantage.

Unit 2.

Is the releaser and releaser pulsator unit.

This is again mounted on a single bracket bolted to the wall of the dairy.

The whole releaser is removable, top and bottom portions of the releaser are identical in shape thereby allowing for economy in manufacture.

Unit 3.

Bail mountings. These consist of a sliding mount in each bail mounted on an adjustable steel cross bar. All pipes and pulsators slide into position in these mountings and require no fitting.

The same mounting fits left or right hand sheds.

Unit 4.

Stainless steel pipe is used with a new type of leak proof coupling in each bail length. This ensures an efficient and hygienic vacuum seal. Couplings are supplied fitted to one end of the pipe length, the free end being available for cutting to precise length as required for each shed.

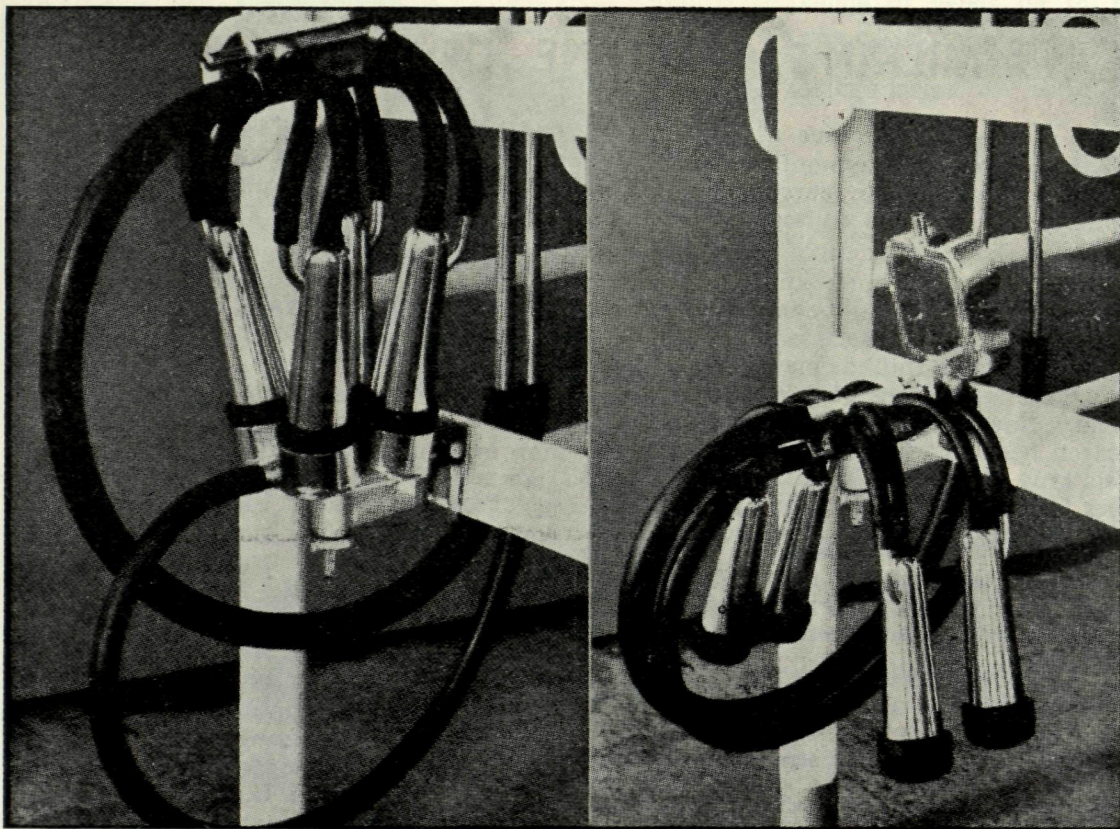


Fig. 2.—Left: The teat-cups fitted into the jetting device so that detergent solution passing down the pulsator dropper will flow through the cups and claws in its circulation throughout the plant. Right: The teat-cups hung up in the automatic cut-off position on the claw-hook which is available when the jetting device is pushed to the vertical position. The improved claw and teat-cup design can also be seen.



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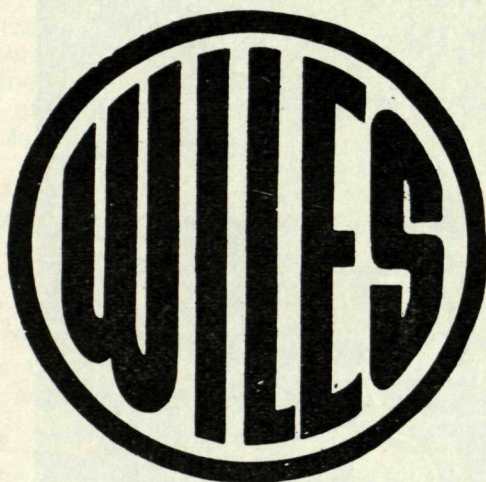
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Milk nozzles and pulsator are mounted during manufacture so that the only shed fitting needed is the cutting to length of the pipes to fit the bails.

PULSATOR SYSTEM

The pulsator system operates entirely from the vacuum system employing no mechanical drives. It is controlled by a vacuum-operated automatic master pulsator which provides operating force for the releaser and bail pulsators.

The use of this vacuum system eliminates the possibility of mis-alignment and loss of adjustment in pulsators due to movement of supporting members in the shed, also the chance of faulty installation is minimised by this system.

Master Pulsator.

This is a self-contained unit and is isolated from the rest of the system to eliminate contamination by milk or water.

The master pulsator is a timing pulsator and its function is to provide accurate rate and ratio for the operation of the bail pulsators and releaser.

This is a key feature because all pulsators of the plant maintain identical performance under master pulsator control.

The unit requires no oiling or maintenance.

Air filtration is also a feature of the machine enabling the machine to operate on screened air free from dust, etc.

Releaser Pulsator.

This is a small sleeve-type pulsator in which the plunger is made to operate in both directions by the master pulsator. The metal plunger is the only part that moves and requires no lubrication. It is mounted directly on the releaser spit chamber so that all air flow paths are as short as possible. This gives optimum

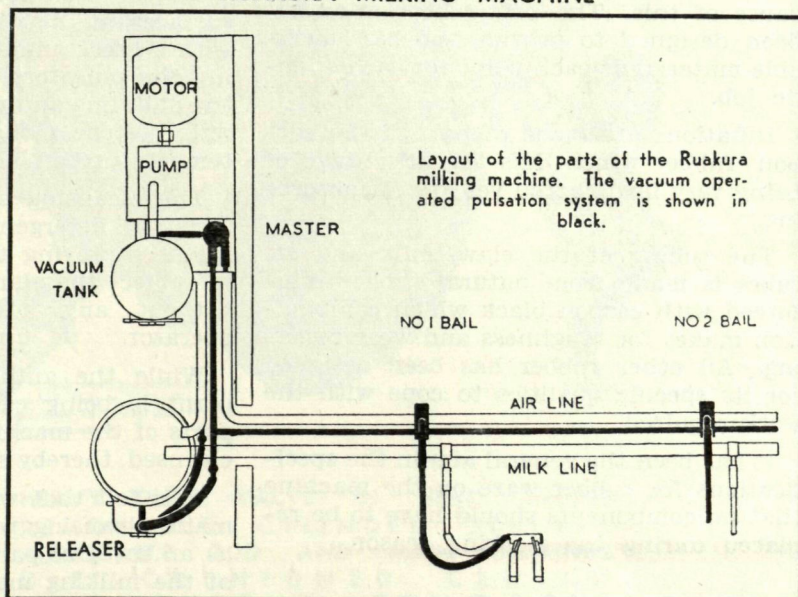
condition for the operation of the releaser and eliminates releaser flooding which makes for poor milking and contamination of the air line with milk. In addition the use of the releaser pulsator enables the releaser to work at greater milk capacity than is normally possible.

Bail Pulsators.

These are almost identical with the releaser pulsator. No lubrication is necessary.

As in the case of the releaser pulsator, the vacuum system of operation makes it possible for cleaning solutions to be passed through it so that complete circulation of cleaning solutions throughout the machine is possible.

RUAKURA MILKING MACHINE



Special Features.

The claw has been designed with as few cavities and corners as possible. Nozzles are arranged so that all claw tubes butt against a metal surface leaving no corners for the collection of dirt and fat.

The claw has also been designed with an automatic cut-off so that folding over of the claw tubes is unnecessary when cups are being placed on the teats. The cut-off eliminates the loss of vacuum should one or all of the teat cups fall off the cow.

Sight Glasses.

Incorporated in the system at each bail is the Ruakura milk flow indicator which shows definite milk-out time and which is used to time the milking process of individual cows.

Vacuum Control.

The Ruakura vacuum regulator is used to provide efficient vacuum control.

This is a device which has become almost standard on all New Zealand milking machines.

Rubber Ware.

All parts of the plant are subjected to differing conditions during the process of milking and in this machine the rubber ware has been given special attention because of this. The new rubber ware has been designed to provide the best available material at each point for each specific job.

Inflations are made of part nitrile carbon rubber which has the advantage of being very flexible and yet low fat absorbing.

The tubing of the claw, milk and air tubes is made from natural rubber reinforced with carbon black which combination makes for toughness and wear resisting. All other rubber has been designed for its specific qualities to cope with the work required.

It has been the general aim in the specifications for rubber ware on the machine that no components should have to be replaced during the working season.

Cleaning System.

An automatic cleaning system is one of the high lights of the machine.

This is made possible by the use of vacuum pulsation and the installation of a recirculating valve of special design which enables the recirculation of cleaning liquids to occur.

The Cleaning System is made up of.

- (a) A special two way valve in the air line to the vacuum tank.
- (b) An attachment on the vacuum tank to which the Spit Chamber

of the Releaser is attached during recirculation of liquid for cleansing.

- (c) A jetting device in each bail to which the teat cups are attached to permit complete recirculation cleansing.

Method of Operation.

First the normal method of rinsing through the plant is carried out at the completion of milking. The teat cups are then connected to the jetting device. The Releaser Spit Chamber is then transferred to the vacuum tank connection. A bucket of hot cleaning solution is drawn into the machine through a tube attached to the recirculation valve when this is placed in the operating position.

The hot solution reaches the teat cup surfaces at maximum temperature and with a great amount of turbulence, cleaning the pulsators as it goes. It then fills the milk line and releaser giving the whole milk system a thorough soaking at high temperature.

The cleansing system being automatic, once the detergent is placed in the container supplying the plant it is practical to subject the plant to prolonged cleaning without any additional work by the operator.

While the automatic cleansing of the plant is being carried out, the external parts of the machine can be scrubbed and cleansed, thereby saving considerable time.

It is felt that with the system of automatic cleansing which has been designed as an integral part of the machine many of the milking machine defects in cream and milk will be done away with and it will lead to lower bacteria counts in these products, to the benefit of the dairy farmer and the community generally.

It is understood that no patents have been taken out on this machine nor is it intended to do so, so there is no restriction on its being manufactured in Australia and it may appear on the market shortly.

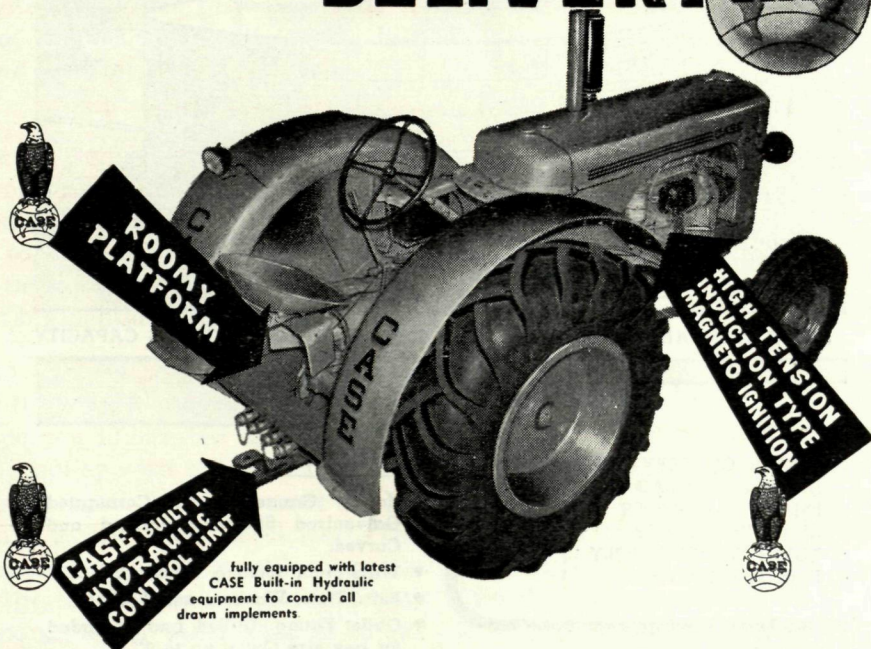
The designer and those who carried out the research work in New Zealand are to be commended on their effort.

(Summary prepared by H. M. Lister.)

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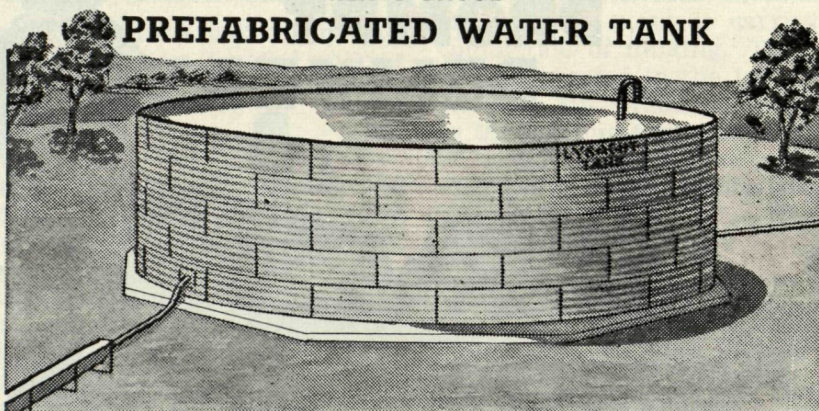
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