CONCLUSION

The scope of using increasing quantities of mixed hardwoods in the pulp and paper industry has been discussed in its totality in this paper and some of the measures which should be adopted both in the Industrial and Forestry Sectors to overcome difficulties and to facilitate the increasing use of hardwoods have been enumerated. The pulp and paper industry in India now seems to be poised for a major breakthrough and it can safely be predicted that in the next decade or two, apart from attaining self-sufficiency in the production of pulp and paper (and thereby cutting down the huge imports of pulp and newsprint), the country would be able to export a sizeable quantity of finished products.

The pulp and paper industry has passed through a difficult phase during the last decade, when it was plagued by price controls, rising costs and inelasticity of raw material supply. Thanks to the rapid technological advances made, and the existence of vast untapped hardwood resources still available in the country, the prospects for the future seem to be quite promising. What is needed now is to diversify production and to allocate raw material resources on the basis of their performance and suitability for each type of product. The scarce bamboo resources now need to be utilized judiciously.

Finally, in concluding, a word may be said on the question of royalties of raw material. Kothari[10] has pointed out that the solution lies in paying higher and better royalties for raw materials, as a measure for ensuring their perpetual and increasing supplies. Royalty plays such an insignificant part in the total break-up of cost figures (hardly 0.3%) that it seems unfair on the part of industry not to pay more for raw material. The area of improvement would lie in tackling other major items of cost, such as transportation of raw material, labour and staff, recovery of chemicals, etc.

REFERENCES

1. Guha, S. R. D., IPPTA, Vol. VI, No. S. 1969.
2. Seth, V. K., Commonwealth Forestry Review, Vol. 43 (4), No. 118. Dec. 1964.
3. Bamber, R. K. IPPTA, Vol. VI, No. S. 1969
4. Rydholm, S. A. and Gedda, L. F., (1967), Paper Technology 8 (217-27).
5. Editorial in IPPTA, Vol. VI, No. S. 1969.
6. Valkomies, P. J., Unasylva, Vol. 23 (3), Number 94, 1969.
7. Scaramuzzi, G. (1961), Second, World Eucalyptus Conference, F.A.O., Brazil, 1.289-94.
8. Bamber, R. K., IPPTA, Vol. VI, No. S. 1969.
9. Biswas, B., IPPTA, Vol. VI, No. S, 1969.
10. Kothari, P. S., "Royalty On Pulpwood", Economic Times, 7th Feb. 1971.

Instrumentation in Pandia Continuous Digester at SPB

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The detail of control instruments in Pandia Digester at SPB will be typical of any continuous digester of this type. An attempt is made to present salient features of such a control system from the point of view of its working principles, ability to safeguard the equipment, function in maintaining the quality of the product and economy of the operation.

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The advantages of continuous digesters over batch one's are too well known to be listed here. Pandia chemi-pulper is well recognised as a comparatively cheap piece of equipment capable of pulping such diversified raw materials like wood, bamboo and bagasse. The Pandia at SPB has two tubes 42" dia 39' length. It has a capacity of 3.5 tonnes of pulp/hour with bamboo and wood chips, consuming about 20-21 per cent Active Alkali as such on B.D. material. The success of this compact pulping unit depends upon the successful working of the different control instruments.

The various type of controls used in Pandia at SPB are shown in Fig. 1. They are:

(a) Chip feed control;
(b) Liquor feed control;
(c) Digester temperature and pressure control;
(d) Cook time control;
(e) Blow back valve control;
(f) Discharger control; and
(g) Safety devices for protection of the equipments.

(a) CHIP FEED CONTROL:

Uniformity of chip feed, apart from being very important in maintaining the uniformity of quality of the pulp is very essential for its operation also. Too large a quantity of chips will

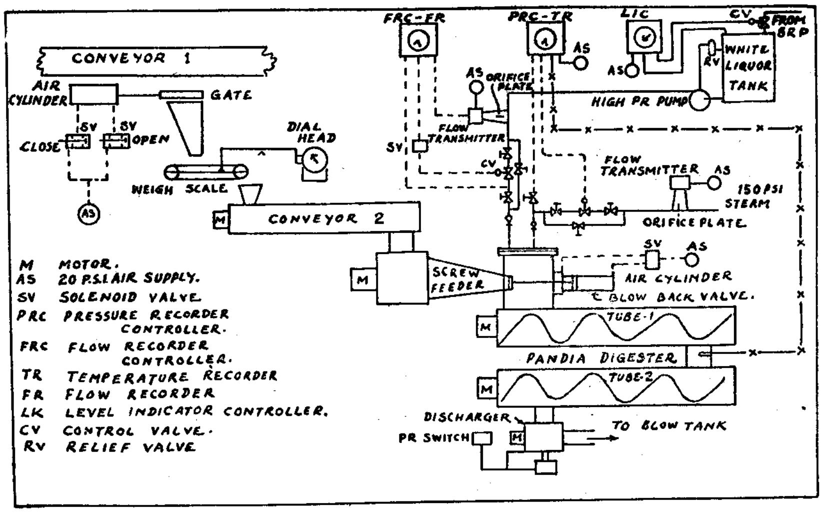

Fig. 1. **Pandia digester, schematic arrangement**

overload the screw and too small a quantity will allow blow back. The pressure in the Digester is maintained by a compact plug of chips kept moving by the Screw Conveyor. The correct control of chip feed to the Pandia is maintained by a system consisting of a pneumatically operated gate, two solenoid valves, switches and a weigh scale **Fig. 2.** Moisture free compressed air is connected to either side of a pneumatic cylinder through two solenoid valves. The switches for energising these are installed in the control room. By pressing one of them the gate can be opened and by pressing the other, it is closed. The solenoid valve allows compressed air to the cylinder when energised and allows air from the cylinder to exhaust when de-energised. By this the gate can be kept in any position.

The weight scale shown in **Fig. 2** indicates the rate of feed of chips in tonnes/hour. The weighing platform is a suspended 6 ft. long belt conveyor which is connected through levers and pivots to the dial head of the weigh scale. The dial head of the weigh scale can be seen from the operating room, so that the operator can adjust the chip feed gate. A totalising counter attached to the dial head indicates the total consumption of chips.

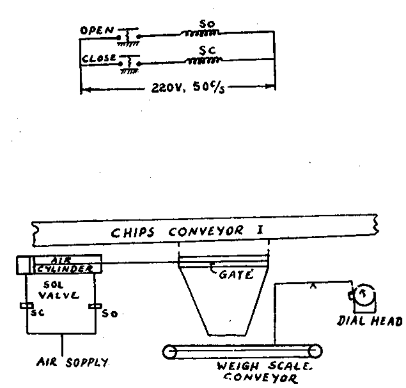

Fig. 2. Chips feed Control, schematic diagram and electrical wiring.

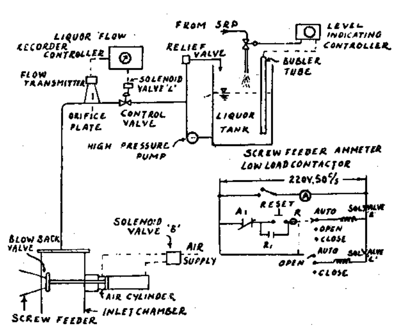

Fig. 3. Liquor feed and blow back valve control, schematic diagram and electrical wiring.

(b) LIQUOR FEED CONTROL:

This consists of a level indicating controller for the liquor tank for maintaining a constant suction head for the high pressure liquor pump and a flow recorder controller in the liquor line to Pandia. **Fig. 3.** A relief valve is provided in a return line to the liquor tank for releasing any excess pressure built up in the line.

The level controller consists of an indicating controller with a bubbler type of level sensing element.

A pneumatic control valve in the inlet line to the tank from Soda Recovery works in conjunction with the controller. The flow meter consists of a differential type instrument which has an orifice plate sensing element. A recorder controller in the panel automatically actuates a pneumatic control valve in the liquor line to maintain the flow at the set quantity. When the control valve is closed, the pressure in the line builds up opening the relief valve to recirculate the liquor back into the tank.

(c) DIGESTER TEMPERATURE AND PRESSURE CONTROL:

The temperature of the digester is the temperature of the saturated steam inside it. By controlling the steam pressure, the temperature of the digester is controlled. For this, a steam pressure recorder controller and a temperature recorder are used as shown in **Fig. 1.** The pressure tapping taken near the Inlet Chamber is connected to the pressure recorder controller, which automatically adjusts a pneumatically operated valve in the steam line for maintaining a set pressure in the digester. A mercury in steel bulb theremometer is installed in between tube No. 1 and Tube No. 2 as shown in **Fig. 1.** This bulb is connected to the recorder in the panel room by a capillary tube filled with mercury.

(d) COOKING TIME CONTROL:

The drive motors for the screw in Tube No. I and II of the Pandia are of variable speed type and the speed can be changed within a small limit from the panel by means of remote operating switches. The speed of the motors can be varied only within a certain range as limit switches in the vari-drive mechanism limits this adjustment. A tachometer in the central control panel indicates the speed of the screws.

(e) BLOW BACK VALVE CONTROL:

A pressure of about 8 to 9 atmospheres inside the digester is sealed by the chips forming a tight plug in the Screw Feeder before entering the inlet chamber. If the plug is not very tight due to insufficient quantity of chips, the pressure inside the digester releases into the atmosphere and this phenomena is known as blow back. In actual operation, this is prevented by a blow back valve, which consists of a disc, at the end of 4' long shaft. The disc has a seating at the entrance of the inlet chamber from the Screw feeder. In case of blow back, the shaft will be pushed in the closing position as quick as possible. This is done by a solenoid valve operated aircylinder. The aircylinder is connected to the shaft of the blow back valve. Compressed air connection is given to either side of the aircylinder through a 4-way solenoid valve 'B' as sown in **Fig. 3.** When the solenoid valve is energised, the Blow Back valve opens and when de-energised it closes.

The Screw feeder motor Ammeter has low and high load contacts. When chips fed into the Screw feeder gets less, the screw feeder motor load drops and the pointer makes contact with the low load contactor. This actuates the solenoid valve thereby closing the blow back valve. A reset button when pushed opens the valve again.

Whenever chip feeding is stopped, this blow back valve is closed and liquor also has to be stopped. This is accomplished by another solenoid valve 'L' connected in parallel (electrically) to the blow back solenoid valve in the air connection to the pneumatic liquor control valve. This de-energises whenever the blow back valve closes thereby closing the liquor valve.

(f) DISCHARGER CONTROL:

The discharger with an orifice valve restricts the steam flow and adjusts the continuous blow from the digester. Since pulp passes through a small opening in the orifice valve, there is likelihood of jamming. The Steam flow meter installed in the Main steam line to Pandia will give an indication as to how the orifice is functioning and this recorder is mounted in the central control panel. If the steam flow drops down, there is jamming in the discharger.

(g) SAFETY DEVICES:

The discharger is driven through a clutch with a shear pin. In case the discharger load goes high, the shear pin breaks. A small oil pump mounted on the same shaft as the discharger for circulating oil to the gears stops when the shear pin breaks. A pressure switch fitted in the oil line opens its contact. This trips the discharger motor. Tripping of this motor trips in turn tube 2 motor, tube 1 motor and conveyor II. The principle of the electrical circuit for the above is shown in **fig. 4.** A sequence control system prevents overloading of motor and jamming of pulp in the system.

The Pandia instrumentation has not posed us any serious maintenance problems. The periodic checks have been sufficient for the smooth operation of these instruments. The blow back valve shaft occasionally gets bent as it has got a stroke of 3'. A spare blow back valve is ready and kept assembled. The replacements for this shaft are made in our own workshop and this is replaced once in 4 months. Quite a number of modifications and additions were made from the original design to suit our operating conditions in the light of the experience we have gained during the operation of Pandia for the last seven years.

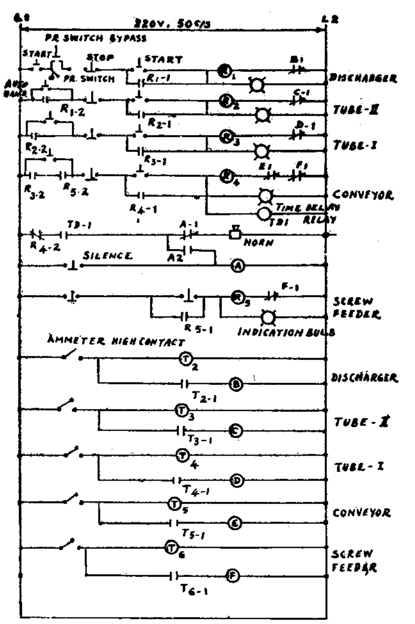

Fig. 4. Sequence Control circuit.

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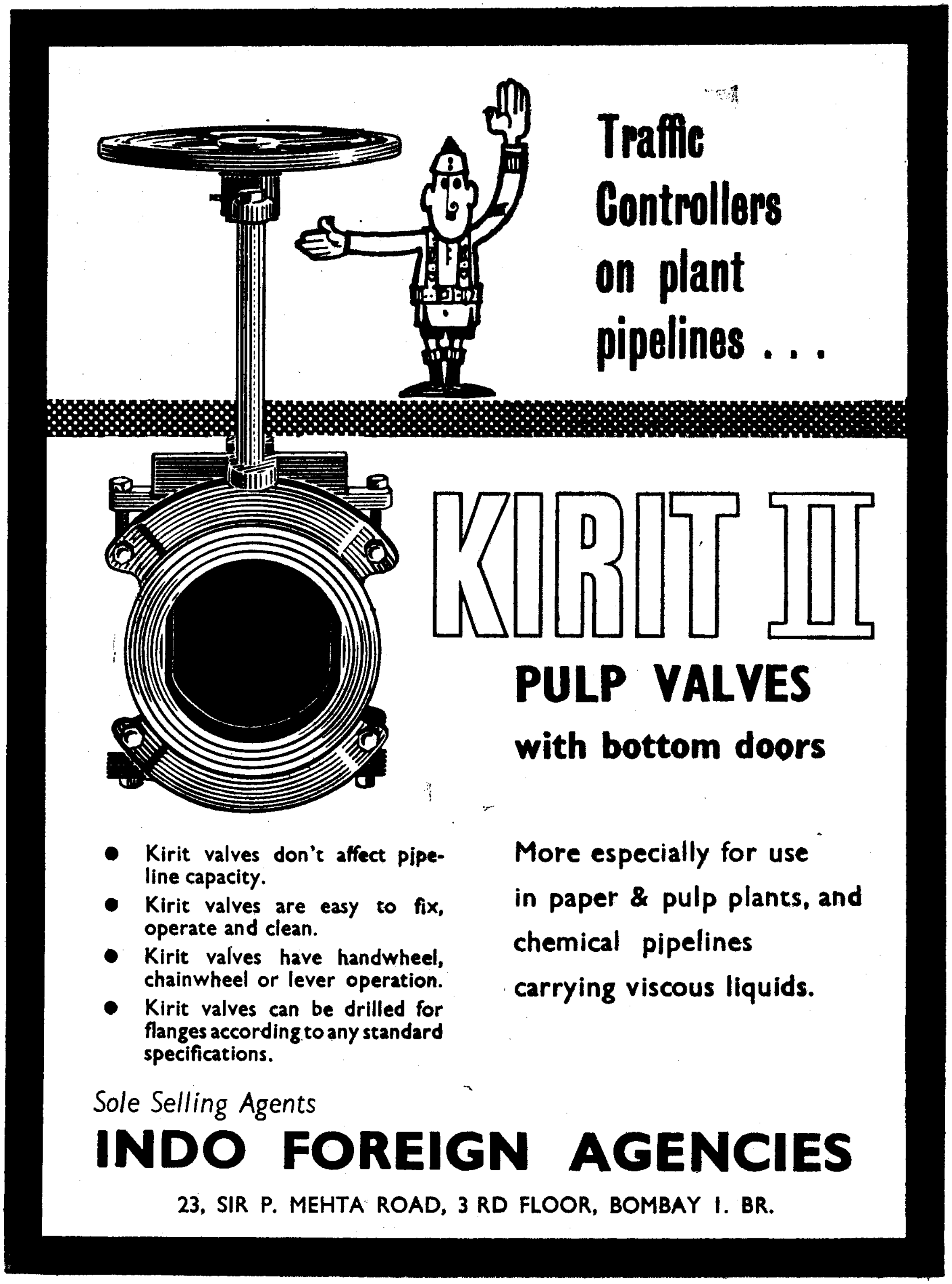
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