TECHNICAL MANUAL

TWIN WIRE PRESS

MODEL	:	40 HP-SF-031 MS
CUSTOMER	:	ECOFIBRE INC.
PURCHASE ORDER	:	EL0999.002
PROJECT	:	SECONDARY FIBER PROJECT
HYMAC NO.	:	K-8704
MACHINE	:	7182

MARCH 1992

hymac

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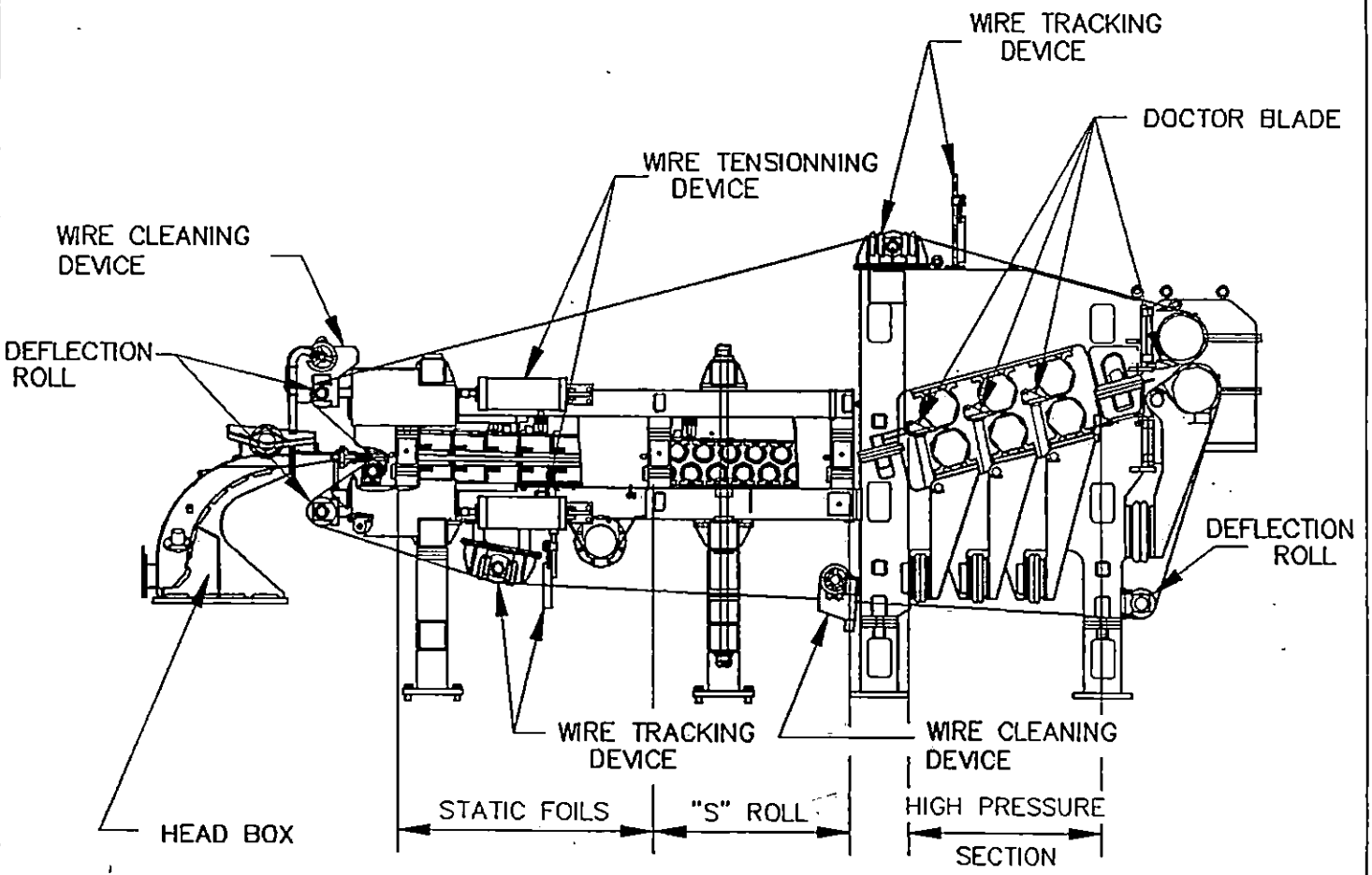
GENERAL DESCRIPTION

The Hymac Twin Wire Press thickens liquid pulp by driving it between two continuous feed wires. The liquid pulp is evenly distributed between the two wires by a pressurized headbox. In the first part of the press, the two wires are supported by static foils and sealed on each side by wedges. The upper static foils converge towards the lower and force water extraction. The section of the static foils is followed by "S" rolls positioned at progressive intervals that finish the low pressure extraction. After the "S" rolls, the pulp travels through a series of press rolls gradually increasing in pressure. To prevent the pulp reabsorbing the water, the press rolls are assembled at an angle. This permits the water to easily evacuate. The pulp thickens, exits the twin wire press and travels towards a secondary press, a cutter layboy or a "shredder" to shred the pulp.

TWIN WIRE PRESS

ECOFIBRE



PRESS CHARACTERISTICS

- The static foils eliminate moving parts in the formation zone, reducing maintenance by 50%.

- The "E" structure allows the wires to be changed within 4 hours, therefore minimizing non-productive stops. It also eliminates the need for cranes and the risk of lifting the rolls.

- The pre-assembled modules and alignment done in the plant reduce the assembly time to two weeks and permit a savings of 75% on the cost of erection.

- The fully automatic tracking and tensioning systems of the wires do not require supervision by the operator.

- The adjustment of the slice lip of the headbox controls the uniformity of the sheet and insures a better quality of finished product. An automatic shower system is available to clean the headbox.

- Any part that comes in contact with the process is manufactured of 316 stainless steel.

- The pressure rolls covered in rubber, independently controlled, apply a continuous mechanical pressure to the sheet of pulp. The pressure rate is determined by the imprint width of the rolls, therefore preventing fiber bundles/"fish eyes".

- The drive rolls are interconnected to a double-arm drive reducer that ensures equal drive power and minimum maintenance.

- A complete white water recovery system is installed in the press for all extracted white water.

- Two showers use pre-filtered white water to clean the two press wires.

- Two start showers remove the pulp sheet from the wires at the start-up of the press to simplify the operator's task (in option).

COMPONENTS

1- PULP FEEDER

A centrifugal pump feeds the main supply header. The control valve for the quantity of pulp is located just before the headbox. The valve opening is controlled to keep a constant pressure in the headbox. A pulp recirculation circuit returns 10% of the flow to the reservoir. This ensures that there is always enough pulp to feed the headbox when the speed of the press is increased.

2- HEADBOX

The main use of the headbox is to evenly distribute pulp to the opening of the press full width.

The headbox was designed according to paper machine principles, it is pressurized and made of stainless steel. Two deckle wedges are assembled to the headbox to ensure good sealing and a good sheet formation. Separately supported in order to facilitate the wire changes, the headbox has its own alignment screws and balancing screws to improve sealing and reduce the wear of the wires.

The quantity of pulp that passes through the press depends on the consistency of the pulp, the speed of the press and the pressure in the headbox. The pulp enters at the bottom of the headbox, flows through to the top and is evenly distributed between the wires by the pressure in the headbox.

The headbox is equipped with a pressure transmitter, inlets for a shower system and a wire grating at the entrance. The pressure transmitter is used to control the pulp feed valve and is also connected to a high pressure alarm. Cleaning of the headbox is activated manually by the operator if the headbox is plugged or at shut-down (over 10 minutes). A totally automatic system is offered in option The wire grating prevents foreign objects from passing between the wires which may cause damage.

COMPONENTS (cont'd)

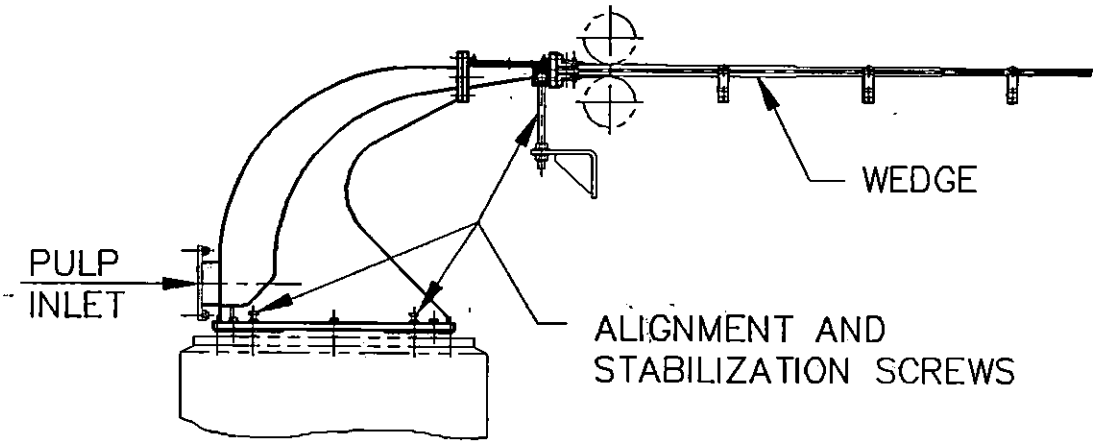
3- SEAL BETWEEN THE HEADBOX AND THE TABLE SECTION

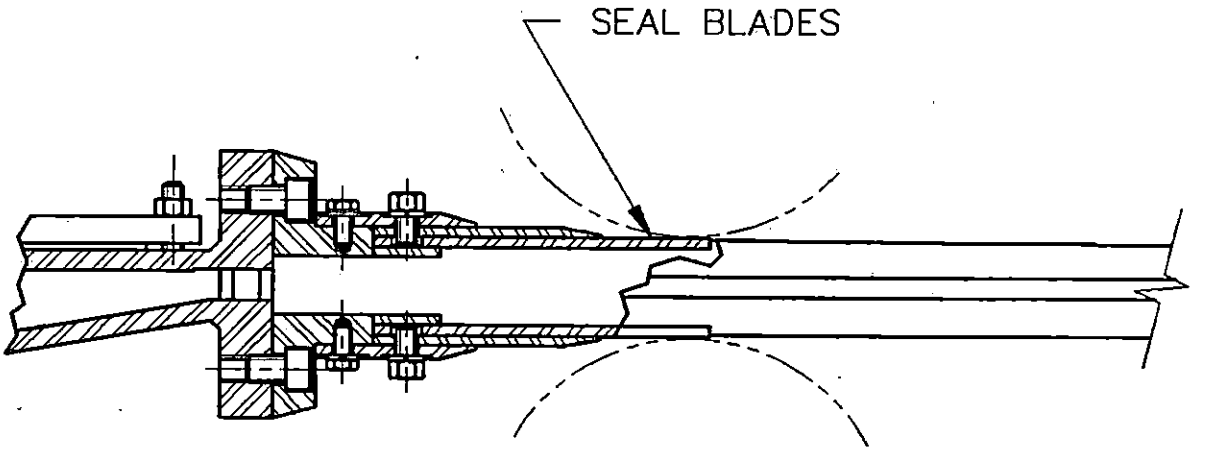
The seal between the headbox and the table section consists of two elements. Two deckle wedges made of stainless steel prevent the liquid pulp from leaking from the sides of the press and two Lexan blades prevent it from leaking between the headbox and the positioning rolls of the wire (see the drawing on the next page). The lexan has good resistance to wear and is flexible enough to brush the surface to be sealed.

4- TABLE SECTION

The table section consists of a static foil zone sealed by the wedges, followed by a series of de-phased interference rolls. These rolls are called "S" rolls. The static foil zone allows for a pulp sheet that is sufficiently stable to apply a mechanical pressure. However, because of the amount of water still present in the pulp, it is necessary to apply a gradual low pressure before traveling through the press rolls. This low pressure is obtained by the "S" rolls. All the water extracted is recovered in a basin located under the table section. The basin is connected to a reservoir under the press by a large diameter outlet.

HEADBOX AND SEALING





COMPONENTS (cont'd)

4.1 STATIC FOIL

The static foil zone is used to drain free water from the pulp.

The length and convergence angle of the zone were determined to take advantage of the natural characteristics for draining of the pulp. As the water is extracted from the pulp, the two wires converge one towards the other to decrease the available volume and therefore maintain a low pressure that helps the pulp drain. The convergence angle is determined on the sides by the shape of the deckle wedges and can be adjusted at the centre to improve drainage and the appearance of the sheet (straighten the deckle edge). Once past the static foils, the consistency of the pulp is approximately 10%.

The material selected for the construction of the static foil was chosen to minimize the friction between the wires and the static foils and to maximize longevity. The static foil zone consists of several panels to facilitate their installation during wire changes.

4.2 "S" ROLLS

The "S" rolls consist of a series of rolls placed in interference which force the wires to follow an undulating path in an "S" shape. The interference between the rolls allow pressure to be applied to the pulp and finish the low pressure extraction. The rolls are mounted on an adjustable support that permits optimizing the consistency of the pulp at the exit of the press as well as the appearance of the sheet. The rolls are manufactured of steel and covered with rubber. At the exit of the "S" rolls, the consistency of the pulp is approximately 15% to 20%.

COMPONENTS (cont'd)

5- HIGH PRESSURE SECTION

The high pressure section is the last step for draining of the pulp. The consistency of the pulp changes from approximately 15% - 20% at the end of the "S" rolls, to more than 45% - 50% after the drive rolls. The section consists of three pairs of press rolls and one pair of drive rolls. The pressure between each pair of rolls is generated by the lower roll using a lever arm and an air bellows located on each end of the roll. The pressure on each air bellows is adjustable, which allows a progressively greater applied pressure on the pulp and maximization of the water extraction depending on the type of pulp. The rolls are covered with polyurethane to distribute the applied pressure and decreases wire deterioration. To maintain an equal pressure on the entire width of the rolls, they are crowned allowing for compensation of the deflection caused by large loads.

COMPONENTS (cont'd)

6- DRIVE

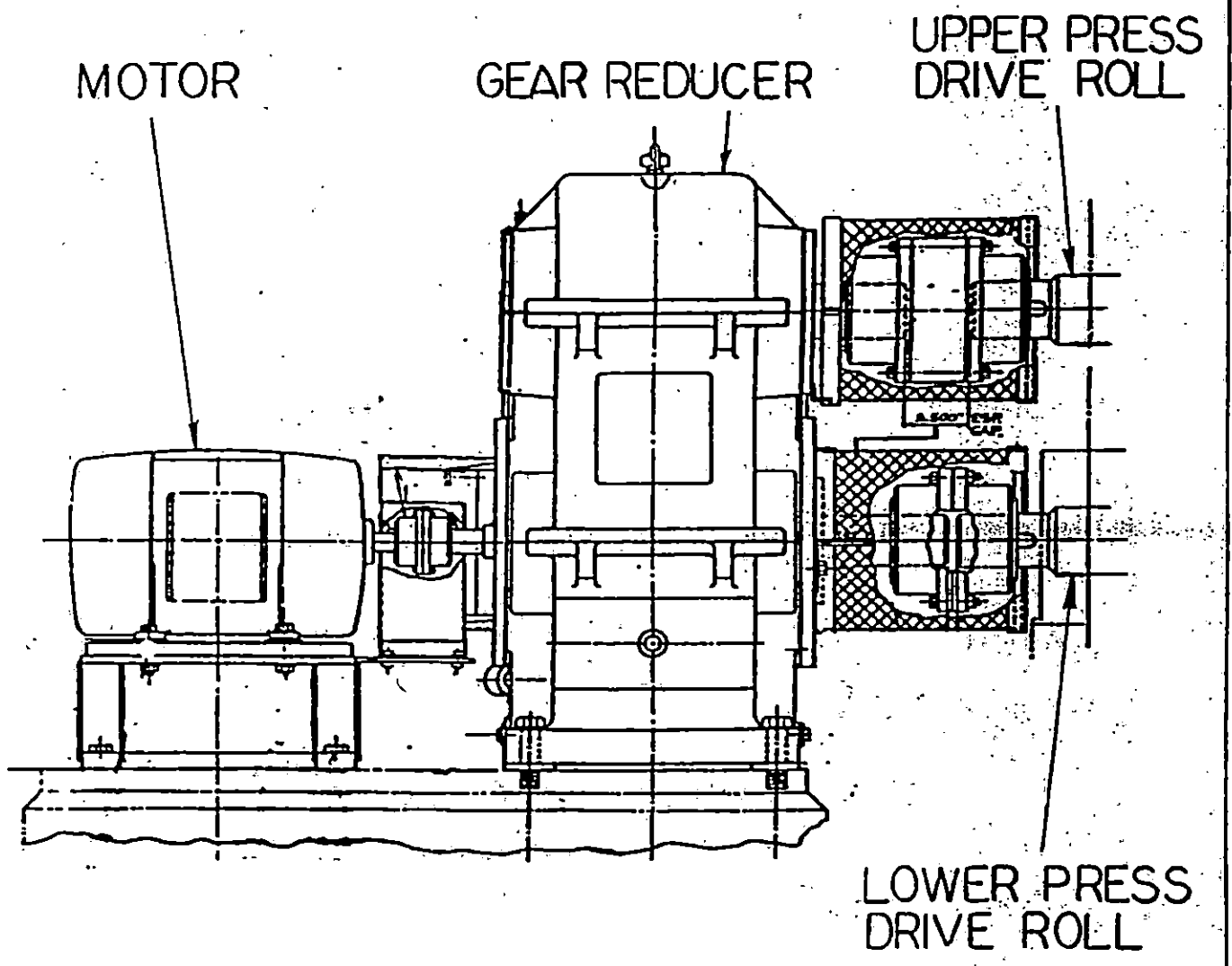
The press drive consists of four main elements:

- Variable frequency modulator
- Motor
- Reducer

The modulator permits variation of the press speed while keeping a constant torque. The motor speed is proportional to the frequency of the modulator signal. To have a constant torque, the Volts/Hertz relation must be constant. When the frequency increases, the voltage must also increase. In order to operate at low speeds, the chosen motor has a rotation speed of 1200 RPM instead of 1800 RPM. (The 1200 RPM motor cools better at low speed.) The modulator permits motor rotation of 1200 RPM to 1800 RPM without damage.

The Hamilton reducer has two output shafts (one for each drive roll). As the lower drive roll moves when the air bellows are inflated, the lower shaft must be able to accomodate a certain displacement. The use of two shafts permits this to be done. The first one is a hollow shaft and the second one is solid and passes inside the hollow one. The hollow shaft receives the torque transmitted by the reducer or motor and transfers it to the solid one by a coupling installed at the rear of the reducer. The solid one is connected to the lower drive roll on the front of the reducer. When the drive roll moves, the two couplings and the solid shaft transform the displacement in an angular displacement. The reducer is equipped with its own lubrication system.

DRIVE UNIT


MOTOR
GEAR REDUCER
UPPER PRESS DRIVE ROLL
LOWER PRESS DRIVE ROLL

COMPONENTS (cont'd)

7- SHOWERS

7.1 CLEANING SHOWERS

The efficiency of a twin wire press largely depends on its capacity for wire drainage. These require a constant cleaning to remove fibres and contaminants that are encrusted from the headbox to the end of the press. To do this, the press has two showers (one per wire) made of stainless steel.

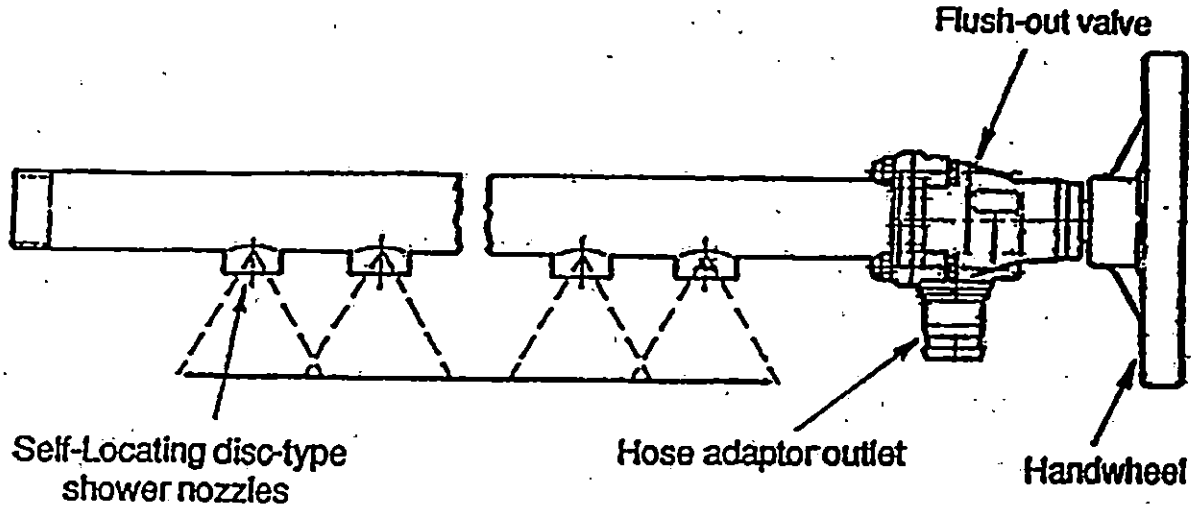
The showers are fed fresh or strained water at 140 psi and are located on the return path of the wire. The shower jets, with the help of brushes, retain the particles deposited on the wires. The showers are placed to take advantage of gravity assist to remove the fibers loosened from the wire.

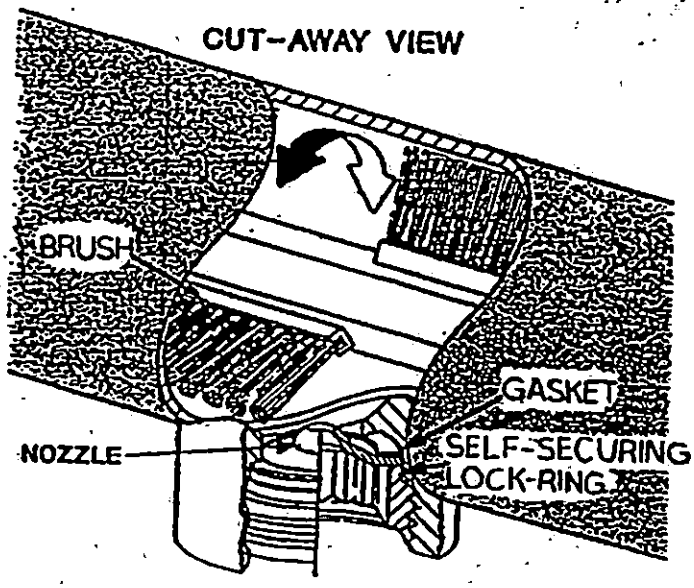
The showers are equipped with a cleaning brush activated with a hand wheel. They eliminate all debris or fibres that might be found in the shower.

7.2 START-UP SHOWERS (IN OPTION)

To simplify the operation of the press, two start-up showers are installed on the drive rolls. These showers are activated at the start-up of the press. They unstick the pulp sheet from the wires and prevent the pulp from staying on the wires. As soon as the sheet is completely unstuck and is stable, the operator simply stops the start-up showers.

SHOWERING SYSTEM





COMPONENTS (cont'd)

8- WIRE SCRAPERS

Scraper assemblies were designed to remove surplus water from the wires. They are located in front of each of the three press rolls and of the drive roll.

Accumulated water escapes through two drains located on each end of the scrapers. The main component of each scraper is a bevelled blade made of stainless steel. The scrapers are installed so that their edge lightly touches the outside surface of the wire.

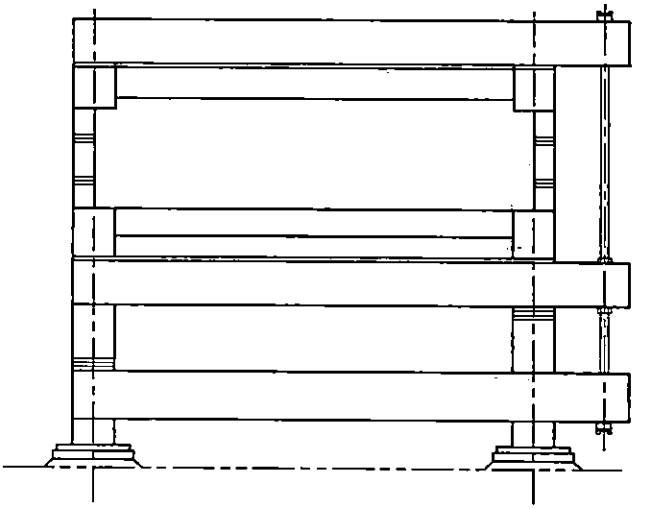
9- OUTLET SCRAPER

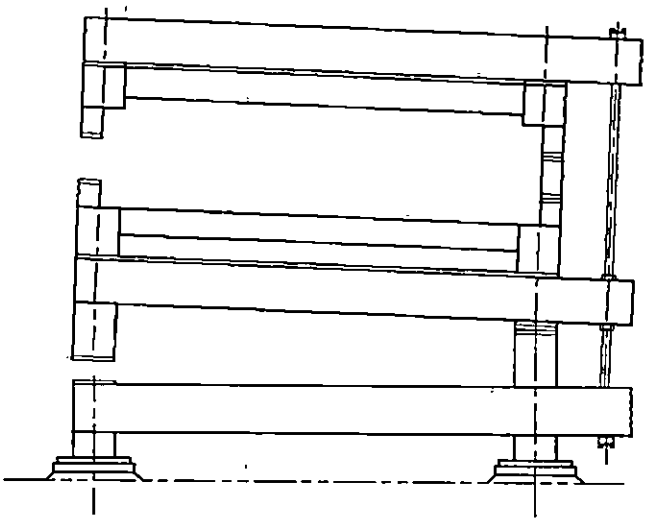
For presses equipped with a shredder, a scraper is installed on the lower drive roll to bare the sheet in the shredder.

10- "E" FRAME

The "E" structure of the Hymac twin wire press simplifies and accelerates the wire replacement. The structure allows the opening of one side of the press in order to have access to the wires. To open one side of the press, the lever arm principle is used. Using pre-tensioned rods, a force is applied on the lever arm at the back of the press. Once the press is open, this force compensates the weight of the press and allows an equilibrium around points "A" (see the drawing of the next page).

"E" FRAME





COMPONENTS (cont'd)

11- TAIL-CUTTER

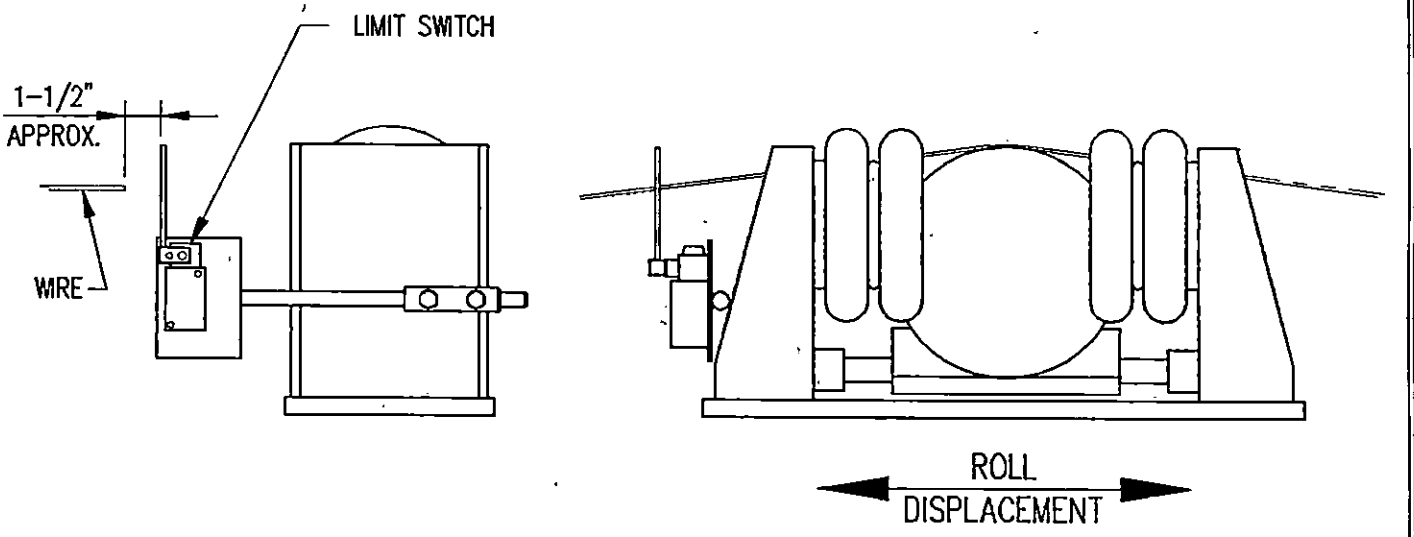
The tail-cutter consists of two jets of water at high pressure (1000 psi) that cut the sheet of pulp. One of the jets is fixed and the other can be moved across the width of the press using an air cylinder. The fixed jet is located on the free side of the twin wire press and it's position is adjustable. The tail-cutter is mainly used at the start-up of the press. When the pulp sheet exits the drive rolls, the operator activates the tail cutter and it cuts the sheet to approximately 10" width. The operator takes this strip and passes it to the cutter layboy. Once the strip entered the cutter layboy, the operator activates the full width button . The air cylinder then advances the tail cutter jet across the sheet until the full machine width is obtained. During the operation of the twin wire press, the tail-cutter may be used to cut the side of the sheet to make it more uniform.

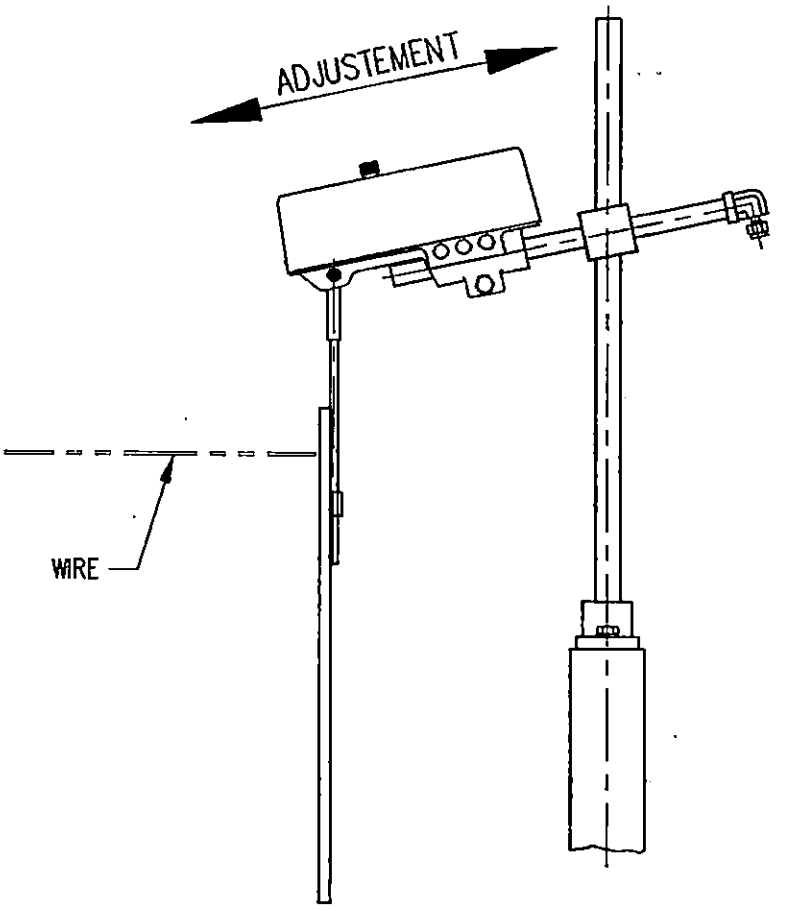
12- WIRE TRACKING

Wire alignment is maintained automatically by a pneumatic system. This system is composed of two actuators mounted on each side of the tracking roll bearing housing. When the wire is misaligned, it displaces a lever. The latter, depending on the wire displacement, inflates or deflates one of the two actuators to interrupt the pressure equilibrium. Therefore, the tracking roll displaces laterally and forces the wire to centrally reposition.

Each system is protected by limit switches located at the maximum misalignment position on each wire. They are located on adjustable supports on each side of the machine.

WIRE TRACKING DEVICE





COMPONENTS (cont'd)

13- TENSIONING SYSTEM

The tension of each wire (upper and lower) is controlled independently by tension rolls positioned at the extremity of two pneumatic cylinders. Parallelism of the rolls is ensured by a transmission shaft mounted on a rack and pinion system on each side of the press. The tension of each wire can be controlled to an approximate value of 35 pounds per linear inch with the help of a regulator. All the parts of the tension system are of stainless steel, except the air cylinders.

14- DEFLECTION ROLLS

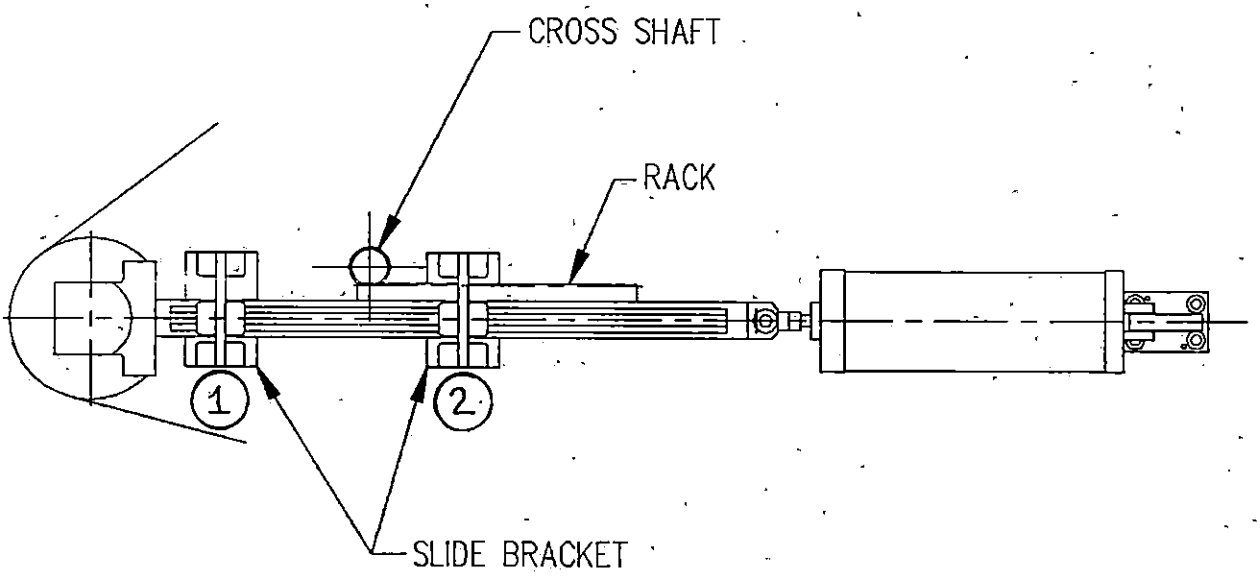
Deflection rolls are used to prevent the wires from rubbing against the press. They are covered in synthetic rubber and are interchangeable to minimize the number of spare parts.

15- CONSOLE AND INSTRUMENTATION

A stainless steel console contains all the pneumatic instruments. The pressures of the three press rolls, the drive roll, the tension system and the tracking system are adjustable from this console or from the control room (in option). Gauges are located on the upper panel of the console indicating the different pressures. All the electrical wiring is contained in two junction boxes located on the twin wire press. The boxes are connected to the console and after to the PLC (programmable logic controler). To simplify the start-up of the twin wire press, a local panel is installed between the press and the cutter layboy. After the feed of the press has been activated with the PLC, the operator can perform all the starting sequences from this panel.

A list of the instruments is supplied in section VI-J.

WIRE TENSIONNING DEVICE



AUXILIARY EQUIPMENT

1- WIRES

The wires must have two main characteristics:

- Good draining capacity
- Longevity

The wires are woven from polyester monofilaments. Both extremities are joined to make them endless. The holes in the material allow water to drain while retaining the fibres.

A variety of materials and weaves are available on the market, Hymac can advise of the best model for your specific application.

2- MAINTENANCE SYSTEM FOR THE PRESS ROLLS

For easier maintenance of the press rolls, a hand hoist system can be installed inside the twin wire press. It can be placed over each of the six press rolls and allows removal of the press rolls without the use of a roof hoist. All the components needed for it's installation are assembled in our shop. The system can be installed after the installation of the press.

3- ACCESS WALKWAYS

Movable access walkways can be installed on each side of the press to facilitate operation and maintenance. These footbridges are made of painted mild steel with a stainless steel floor. They are movable to ease the maintenance of the twin wire press.

4- TOOLS FOR THE INSTALLATION OF THE WIRES

An assembly of poles ease the installation of the wires.

AUXILIARY EQUIPMENT (cont'd)

5- TOOLS FOR THE BEARING REPLACEMENT

These tools are needed to change the bearings.

These tools are strongly recommended (see spare parts).

C-20124 Tightening tool for nut SKF # KM38
C-20120 Tightening tool for nut SKF # KM28
C-XXXXX Tightening tool for nut SKF # KM18
B-19341 Tightening tool for nut SKF # KM11
B-19342 Tightening tool for nut SKF # KM09

NOTE: The use of each tool is described in the bearings replacement procedures in section III.