OPERATING INSTRUCTIONS

FOR

UNIPLEX HEADBOX

CHAMPION PAPERS No. 2 P. M.

HAMILTON, OHIO

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Headbox Design Data:

Headbox Type--------------UNIPLEX

Deckle--------------------146 Inches

2008-2009
200-620 Ft/min

Minimum Speed------------300 Ft/Min

Maximum Speed------------750 Ft/Min

Grades--------------------Coated Raw Stock

28 - 42 Lb/3300 Sq. Ft.

40# - 210#

UNIPLEX

Description:

The stock flow coming from the approach piping enters the headbox manifold through a circular to rectangular transition which directs the stock flow into the tapered header of rectangular cross section. The stock flows across the machine through a tapered header designed to create a constant pressure at all points across the width of the machine. At the small end of the tapered header there is a recirculation outlet for control of the header pressure balance.

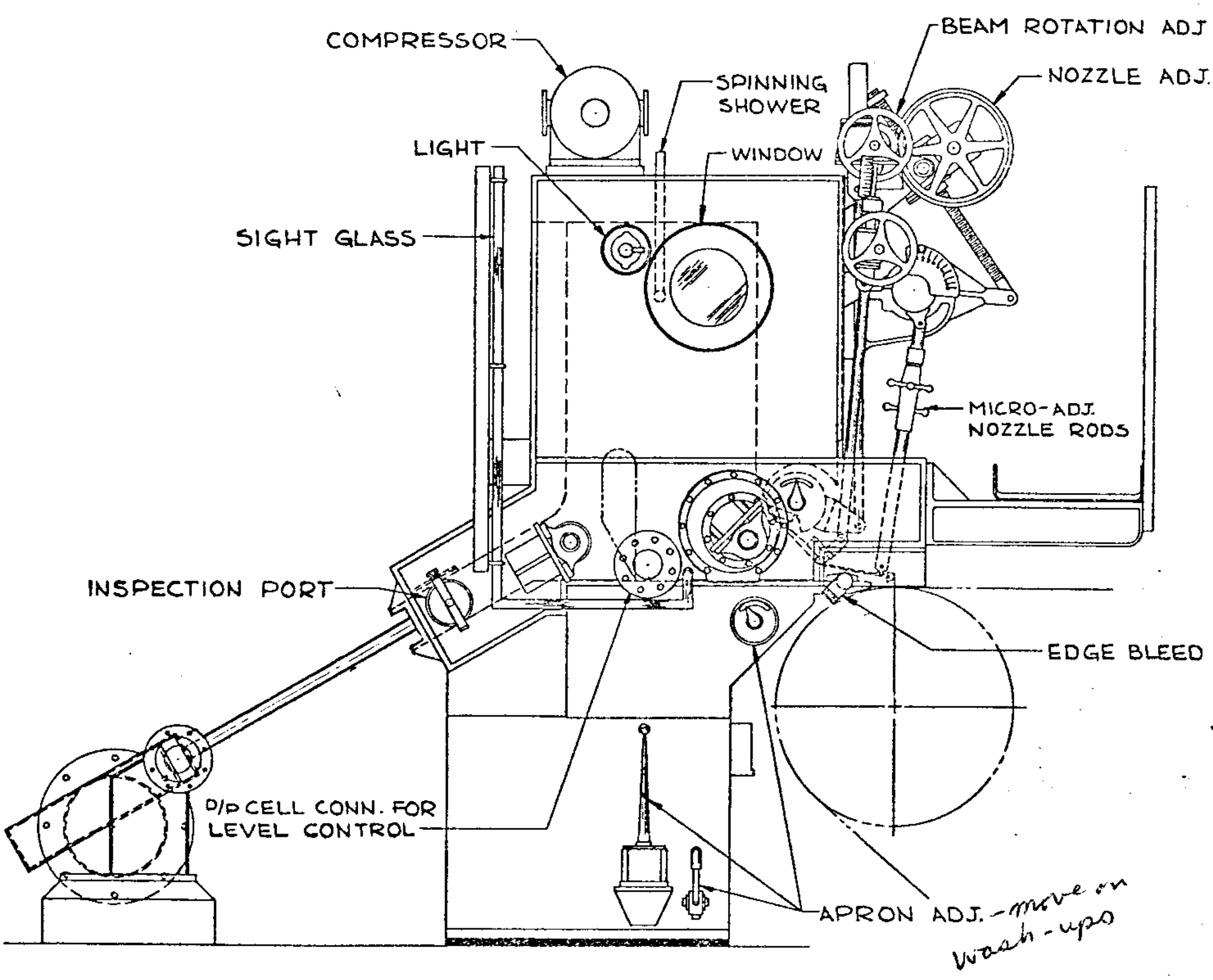
From the tapered header, the stock enters a tube-bank distributor where the flow is directed into the machine direction. The multiple tube distributor is a plurality of tubes of specific diameter, length, and number to give proper stock velocity and pressure drop through the manifold system.

The discharge from the tube distributor flows into a mixing chamber where the individual stock streams are blended uniformly across the width of the machine.

The flow out of the mixing chamber and into the Headbox vat portion takes place at the turning distributing roll. Here the stock flowing out of the sloped mixing chamber is turned to the horizontal and directed into the vat. The turning distributing roll is designed with proper hole size and percent open area to provide uniform stock distribution and stability as the flow changes direction. After the turning roll, an auxiliary slice baffle can be adjusted into the stock flow for further flow evening control.

From the vat section, the stock flows through a slice distributing roll designed with proper hole size and percent open area to provide the desired fiber distribution and flow evening just prior to discharge onto the wire.

Immediately downstream of the slice distributing roll, the flow enters the fully adjustable VALLEY slice. This includes a rotating nozzle positioning beam, CONTROFORM upper nozzle blade, and bottom apron blade. These are all adjustable during operation to create optimum flow conditions to the wire for superior quality end product.



UNIPLEX WITH CONTROFORM SLICE

Start-up Procedures:

Procedure for start-up of the VALLEY Headbox is as follows:

1. Turn on fresh water to all distributing roll bushings. It is recommended that a single valve in the supply header be used for this purpose. Independent and permanent adjustment of water to each bushing can be provided with a small local purge rotameter. Initially set the purge meters for a high rate of flow. After the Headbox is started, this rate will decrease because of the pressure inside the Headbox. Reset the flow rate to 1/3 gpm to each bushing.

2. Turn on instrument air to control valves, d/p cells, and level controller.

3. Set the stock level for approximately 6 5/8 inches of stock above the apron board. After the headbox is started, reset the stock level so that the top of the slice roll is projecting out of the stock about 1/2 inch.

4. Start the distributing roll drives.

5. Check to see that all hatches and access ports are carefully secured.

6. Turn on the Headbox compressor seal water.

7. Start the Headbox compressor.

8. Check the stock supply valve position and make certain the slice opening is adequate to prevent hydraulic shock to the Headbox when starting the fan pump.

9. Start the stock supply system.

10. Start the Headbox manifold recirculation pump.

11. Set the Headbox manifold recirculation rate to a point where there is zero (0) pressure difference between the entry and recirculation ends of the header.

Care of VALLEY Headboxes:

The headbox introduces paper stock to the paper machine and should receive the best of housekeeping and maintenance practices. Dirty stock entrance equipment very often indicates what quality of product to expect at the dry end of the machine.

All VALLEY headboxes are manufactured with highly polished interior surfaces. No one should be allowed into the headbox with shoes on or sharp objects protruding from pockets. The ordinary dirt usually clinging to the soles of shoes will scratch the polished surfaces and can cause stringing or stock hang-up. - shoes off

Never stand on a distributing roll. The open area of all rolls creates an inherent weakness and the rolls can easily deform if made to support an unsual load.

Never clean any internal stock area with abrasive material or a scraper knife. If extensive cleaning is required, chemicals and liquid commercial cleaners should be used. In the event some actual hand cleaning is required, use a nylon mesh material of the non-abrasive type. If a chemical "boil-out" is used, avoid rinsing immediately with cold water, so as not to impart a thermal shock to the headbox.

Glass in port holes should be kept clean with a good glass cleaner so that action inside the headbox can be readily observed.

Protect the apron blade and profile bar delivery edges when the machine is down for wire changes or maintenance. The importance of keeping these edges free of nicks should be stressed to maintenance and machine personnel. These edges can be protected with a notched board or split hose.

Sight flow indicators in the water lines for distributing roll stuffing box lubrication should be periodically cleaned and adjusted to insure proper flow. Loss of water to the stuffing boxes will cause premature wear to bushings and journals.

UNIPLEX CLEANOUT LOCATIONS

Cleanouts are provided at important locations on the headbox to allow washup and cleaning during shutdown.

Cleanouts are at the following locations:

1. Tapered header entry end
2. Mixing chamber rear panel
3. Mixing chamber tending side panel
4. In addition the access ports can be used for cleaning the headbox vat area

During manufacture all cleanout covers are fitted in place, ground, and polished with the surrounding area. Care must be taken to replace these covers in the same openings from which they were removed and in the same position. Changing locations or rotating 180° can result in a slight projection causing stock hang-up.

Cleanout covers should never be set face down on the floor or any other location that could cause surface scratches. It is wise to set the cleanout cover face down on a clean piece of wet felt to prevent damage.

Assembly Drawing List:

Should maintenance or replacement of worn or damaged parts become necessary the following list of assembly drawings and bills of material are on file in your Engineering Department and will aid in proper identification of these parts.

Install. Arrgt. Dwg.	20-500-021-433
Install. Arrgt. B/M	20-100-021-633
Hydr. Apron Adj. Dwg.	20-224-390-427
Hydr. Apron Adj. B/M	20-125-500-577
Aux. Slice Dwg.	20-413-156-417
Aux. Slice B/M	20-114-450-567
Dist. Roll Drive Dwg.	20-413-332-448
Dist. Roll Drive B/M	20-127-945-555
Slice Roll & Brg. Dwg.	20-322-075-405
Slice Roll & Brg. B/M	20-126-615-557
Mix Roll & Brg. Dwg.	20-213-183-419
Mix Roll & Brg. B/M	20-128-573-553
General Panel Dwg.	20-313-127-448
General Panel B/M	20-113-127-598
Nozzle Adj. Dwg.	20-313-055-427
Nozzle Adj. B/M	20-126-965-572
Nozzle Rod Dwg.	20-213-060-469
Nozzle Rod Dwg.	20-216-262-571
Nozzle Rod Dwg.	20-213-060-470
Nozzle Rod B/M	20-126-262-572

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<u>Assembly Drawing List</u> (Cont'd)

Nozzle Position Dwg.	20-422-158-408
Nozzle Position B/M	20-127-420-558
Nozzle Alarm Dwg.	20-322-353-406
Nozzle Alarm B/M	20-127-411-556
Level Control Dwg.	20-213-506-444
Level Control B/M	20-121-036-594
Headbox Water Piping Dwg.	20-213-503-471
Headbox Water Piping B/M	20-126-459-572
Gauge Glass Dwg.	20-313-676-475
Gauge Glass B/M	20-128-274-558
Shower Assembly Dwg.	20-224-700-422
Shower Assembly B/M	20-126-520-572
Flowbox and Tube Dwg.	20-313-498-424
Flowbox and Tube B/M	20-114-517-574
Walkway Assembly Dwg.	20-413-401-450
Walkway Assembly B/M	20-128-480-551
Soleplate Assembly Dwg.	20-300-021-431
Soleplate Assembly B/M	20-121-156-568

Function:

The apron blade defines the bottom surface of the slice nozzle. The blade can be adjusted during operation to change its horizontal position in relation to the breast roll centerline. The apron setting, in relation to the upper nozzle blade, determines jet impingement on the wire and can be used to control velocity or pressure formation.

The setting of the apron blade will also determine the amount of breast roll discharge, if any, on any given sheet. However, the best forming results seem to be obtained with no breast roll discharge or drainage. Usually the apron blade is moved out until the stock jet falls approximately on the first blade of the forming board.

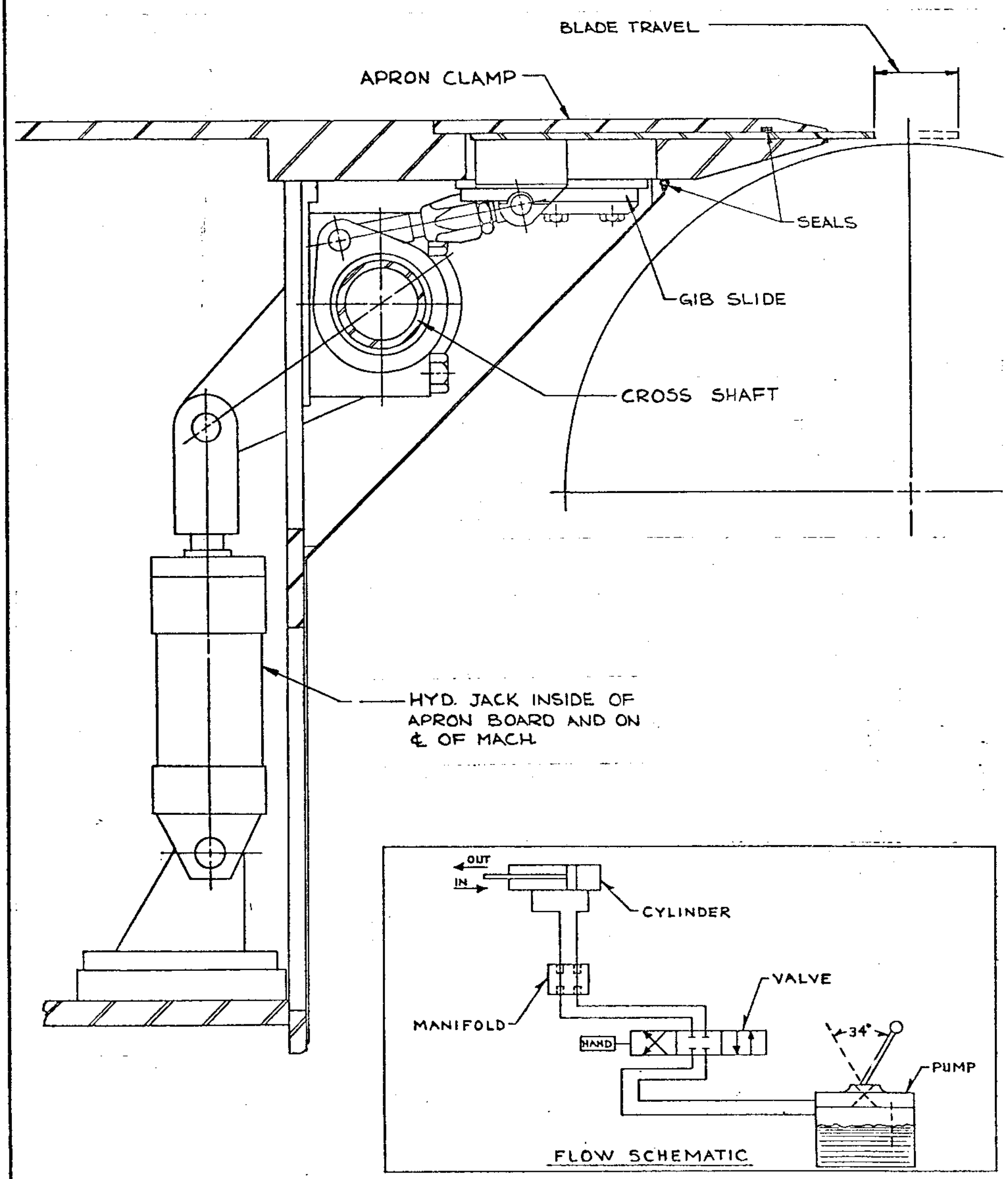
It is suggested that the optimum position of the apron blade be logged for each speed and grade so that it can be reset immediately on grade changes.

Description:

The apron blade is adjusted in and out horizontally in relation to the centerline of the breast roll, by means of a hydraulic positioner mounted on the front, or tending, side of the apron board support. A valve on the pump body must first be closed to allow the unit to operate. A second valve located near the pump must be placed in proper position for moving the apron blade in the desired direction. Setting the valve handle toward the breast roll will allow the apron blade to extend downstream in the machine direction. Setting the handle away from the breast roll will allow the blade to retract upstream.

A circular indicator is provided on the tending side of the headbox near the apron blade to show actual position of the apron blade.

At installation of the headbox on the paper machine the apron blade indicator was set at zero and then the headbox lined up so the forward edge of the blade is exactly on the centerline of the breast roll in its normal operating position. Under this condition, the reading on the indicator will show the exact setting of the apron blade in relation to the centerline of the breast roll.



APRON BLADE ADJUSTMENT ASSEMBLY

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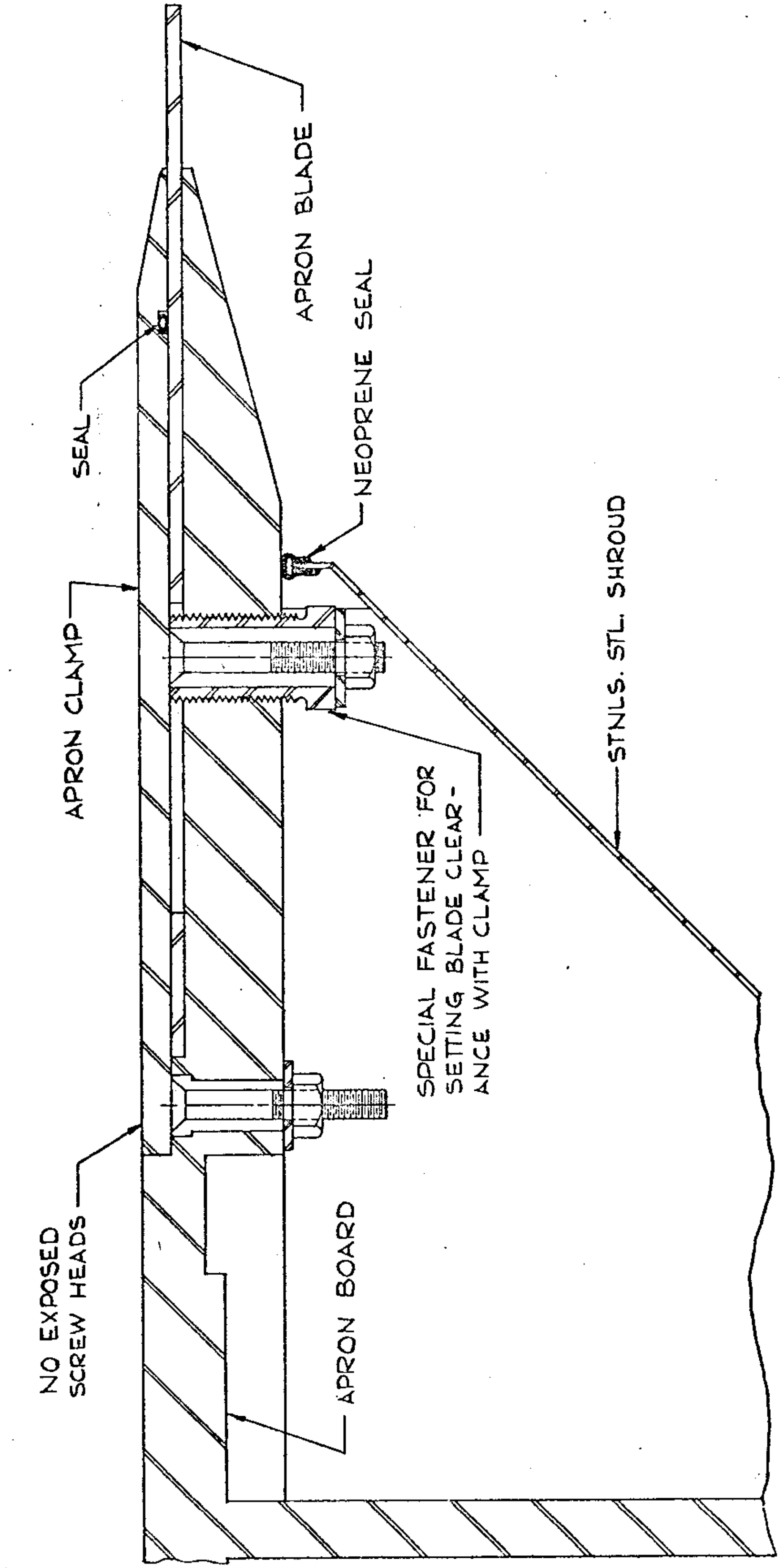


APRON BLADE CLAMPING

Function:

The CONTROFORM upper nozzle blade assembly converges in the direction of flow to accelerate the stock from the vat velocity at the slice distributing roll to machine speed at the point of jet discharge.

The upper nozzle blade has two hinge points to allow change of the nozzle angles.

By horizontal adjustment of the upper nozzle blade, the angle of jet discharge can be controlled.

The upper nozzle blade with micro-adjusting rods also provides cross-direction profile adjustment.

Description:

The upper nozzle blade is composed of two sections, an upper (upstream) blade, and a lower (downstream) blade.

The lower blade has an integral pivot bead at its upstream end. This is clamped in place on the downstream end of the upper blade.

The upstream end of the upper blade also has an integral pivot bead. This is clamped in a machined hinge located in a rotating nozzle positioning beam.

The nozzle positioning beam is clamped to the headbox front panel, and is rotated, by jacks, to obtain horizontal movement of the nozzle blade tip.

Welded studs are located on approximately 6" centers across the nozzle blade length. These studs have 5/16" diameter holes for spring pin connection to the micro-adjusting rods which are used to warp the downstream nozzle blade tip for cross-direction profile correction.

Blade Movement:

Positioning of the upper nozzle blade discharge point can be horizontally adjusted upstream or downstream from the centerline of the breast roll by rotating the nozzle positioning beam with a jack (or jacks) located on the headbox front panel.

A handwheel is used to manually actuate the jack (if more than one jack is used, a connecting cross-shaft provides aligned movement).

An indicator scale, located on the headbox side panel, just opposite the nozzle positioning beam, provides a reference for repeat settings.

Blade Angles:

Jacks mounted vertically on the front of the headbox are connected to brackets mounted on the upper blade. This allows adjustments of the relative angle between the two blades to arrive at an optimum slice angle configuration for each grade being produced.

The upper nozzle blade angle adjustment is in the range of 15° to 45° from horizontal.

The lower nozzle blade angle adjustment is in the range of 6.5° to 25° from horizontal.

The limits of the blade angle adjustments are controlled by limit switches to prevent possible damage from the nozzle blades pivoting too far and pulling out of the pivot clamps.

A scale is located on the tending side angle adjusting jack to provide a reference for repeat settings.

Slice Opening Adjustment:

The slice opening is controlled by operating a jack at the top front of the headbox.

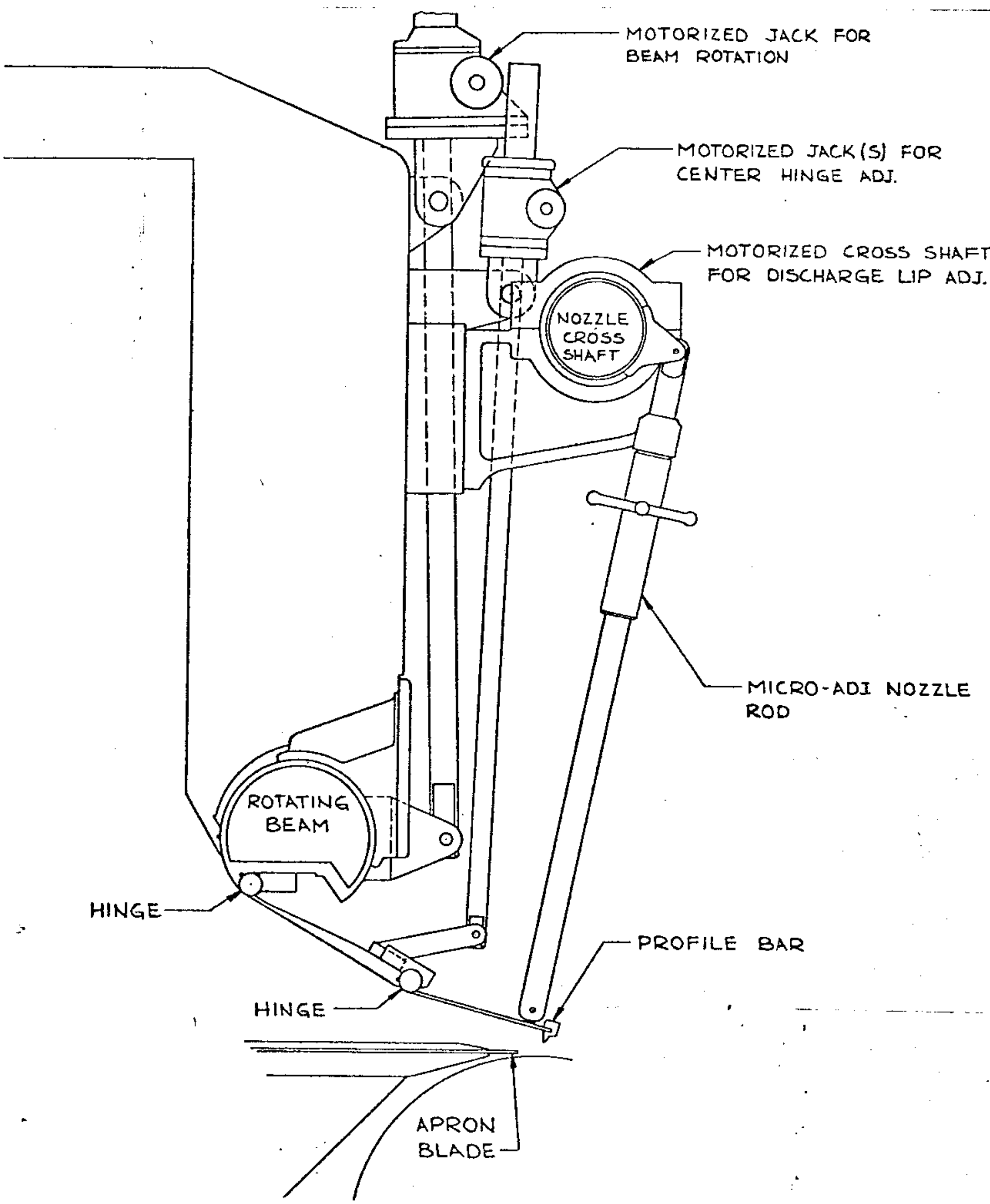
The jack is connected to a lever arm that operates a rotating beam. The beam has brackets spaced across its' length where the micro-adjusting rods are attached. The movement that effects slice opening is thus transmitted from the rotating beam through the micro-adjusting rods, and to the nozzle blade.

Operation of the slice opening jack is by manual hand-wheel or air-motor.

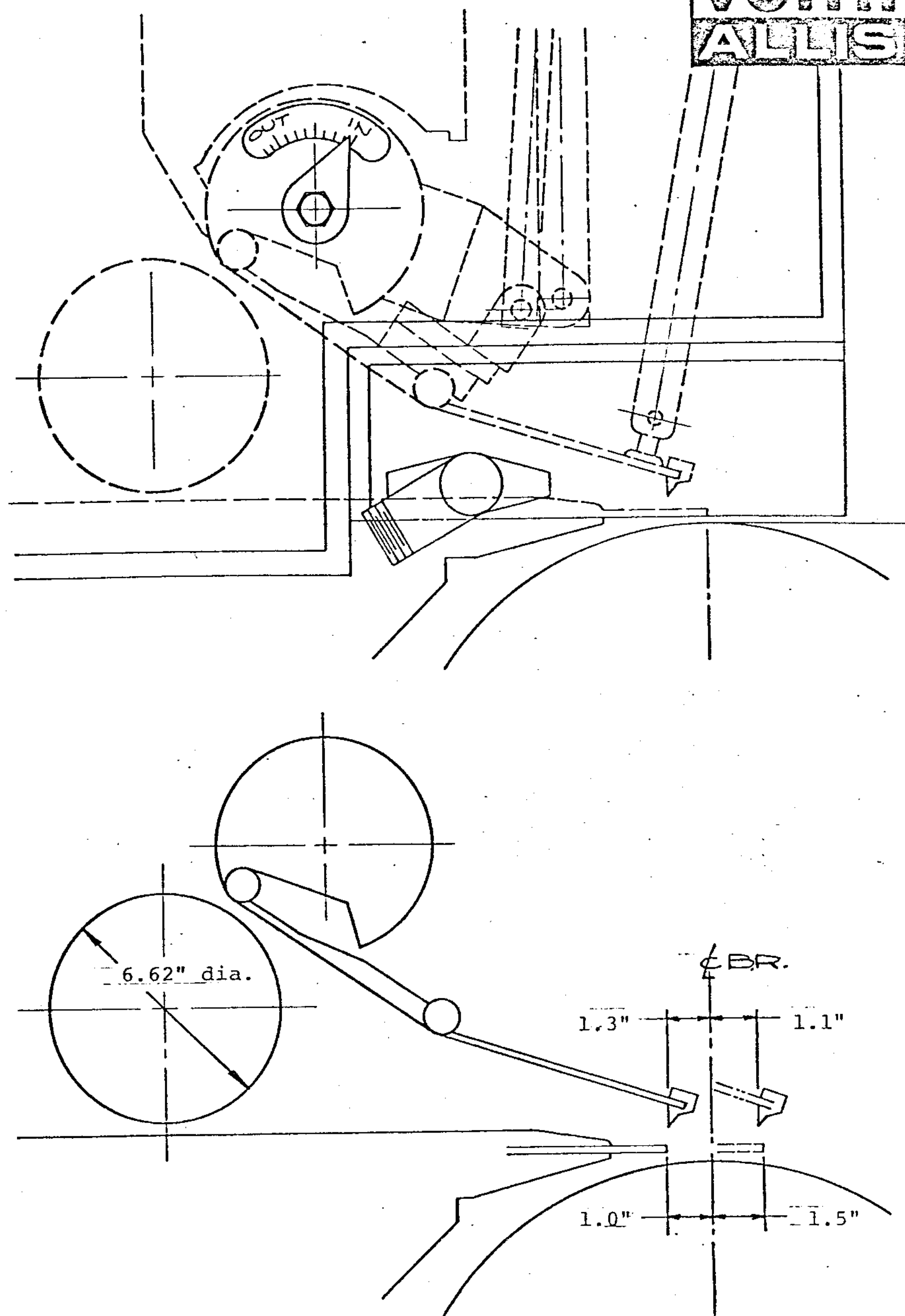
A scale is located on the rotating beam to provide a reference for repeat settings. This scale does not indicate the actual slice opening.

IMPORTANT CAUTION!

When adjusting the slice opening, care must be taken not to close the slice to a point where the profile bar hits the apron blade. The profile bar has a finely machined tip, and serious damage may result, which can cause cross-direction profile problems. Use special caution when adjusting slice opening with the air-motor since the movement is rapid and the force is much greater than with manual adjustment.



CONTROFORM SLICE - ILLUST.



CONTROFORM ADJUSTMENT - ILLUST.

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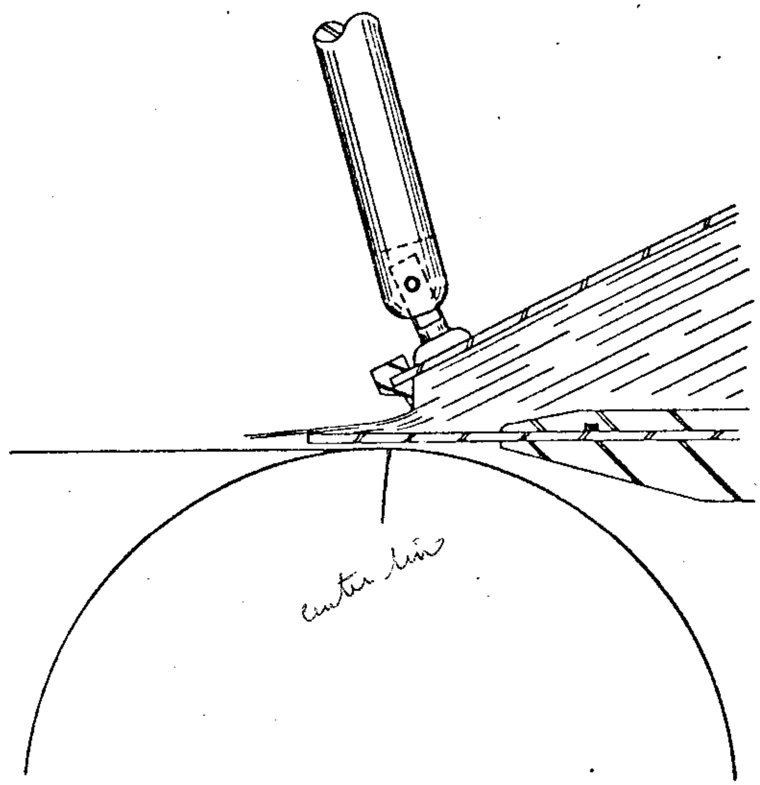
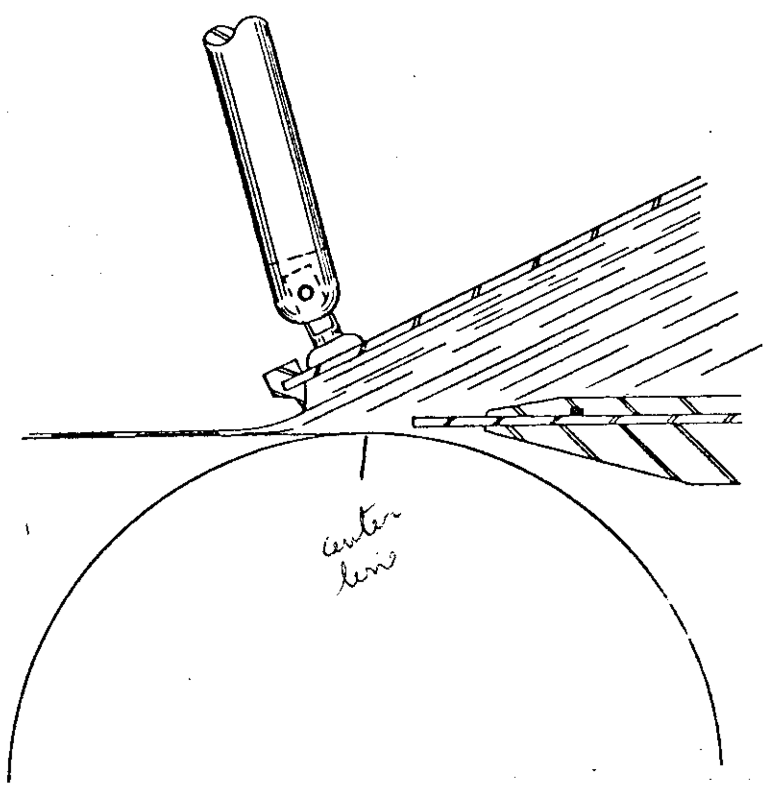


VELOCITY FORMATION



PRESSURE FORMATION

VELOCITY AND PRESSURE FORMATION

Function:

A profile bar is located at the downstream edge of the upper nozzle blade. Its purpose is to create micro-turbulence in the stock just before discharging onto the wire. The profile bar also provides a sharp-edge orifice for accurate metering of the stock jet.

Description:

The profile bar is fastened to the upper nozzle blade by a series of socket head setscrews. Also, at approximately three (3) foot centers, square head screws are used with an attached wire connected to the nozzle micro-adjusting studs to prevent the profile bar from slipping off the nozzle blade if the setscrews happen to loosen.

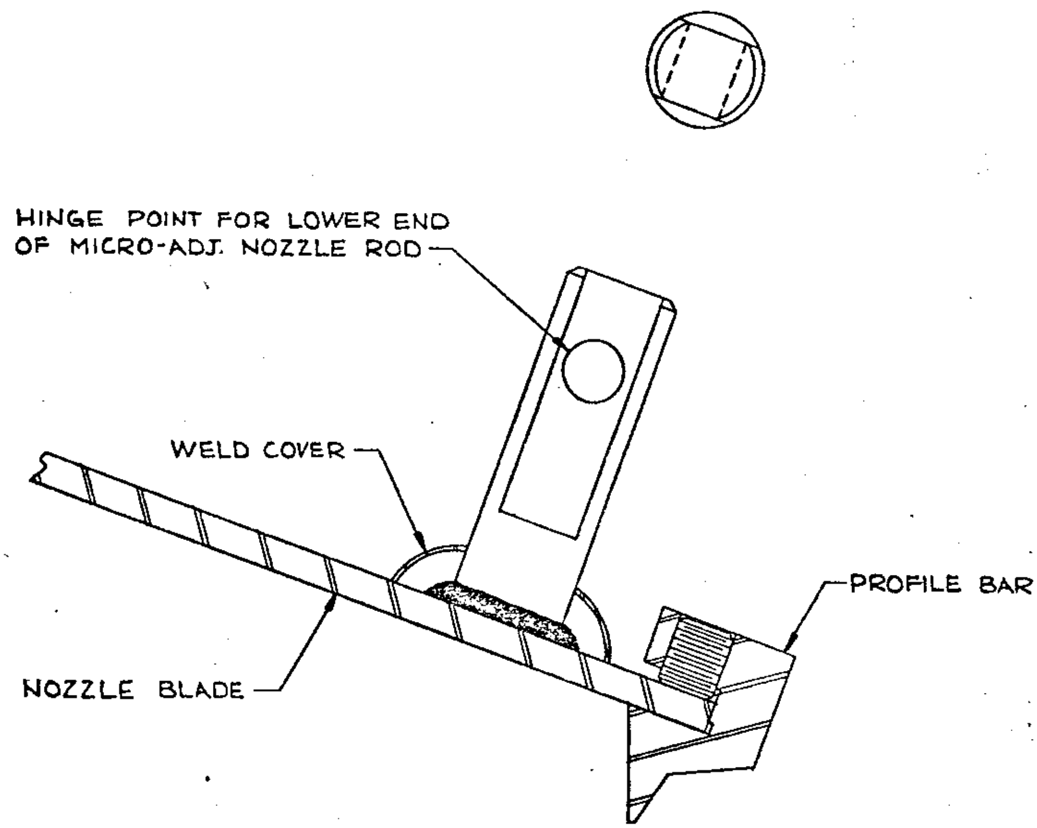
If the profile bar becomes corroded or damaged, it can easily be replaced by first backing off the setscrews and sliding it off the nozzle blade.

IMPORTANT CAUTION!

The setscrews should be periodically checked for tightness.

Do not close the slice to the point where the profile bar hits the apron blade to prevent serious damage to the finely machined profile bar tip which can affect cross-direction profiles.

The profile bar delivery edge should be protected with a notched board or split hose when the machine is down for wire change or maintenance.



PROFILE BAR - ILLUST.

Profile Bar Installation:

Prior to the installation of the profile bar the following adjustments should be made to insure proper alignment between it and the upper nozzle blade:

1.) The individual nozzle micro-adjusting rods should all be reset to zero (0).

2.) Using a piece of 1/2" nylon block as a feeler gauge adjust the top nozzle blade down until it begins to pinch the nylon block inserted between it and the apron blade. Check both extreme ends of the nozzle blade and readjust the blade opening for the tightest feel with the nylon block.

3.) Working from the tightest end of the nozzle blade with the nylon block, move across the machine turning the adjusting rods until the same "feel" is felt under each rod. Return to the beginning of this step and recheck the setting once more. Sometimes a third time is required to assure perfect alignment between the nozzle blade and the apron blade.

The nozzle blade is now ready for installation of the profile bar.

1.) Slip the profile bar onto the nozzle blade and adjust for even clearance between the ends.

2.) Starting at the middle of the profile bar and working simultaneously toward both ends, tighten the setscrews firmly while pushing the profile bar onto the nozzle blade. Recheck tightness of all the setscrews.

3.) Again using the 1/2" nylon block as a feeler gauge, open the nozzle blade until the nylon block will fit under it.

4.) Moving from the tightest end toward the other side, turn the adjusting rod nuts to re-establish the proper "feel" under each. Recheck a second time if any adjustment on the rods is made.

The slice is now in perfect alignment with the profile bar installed.

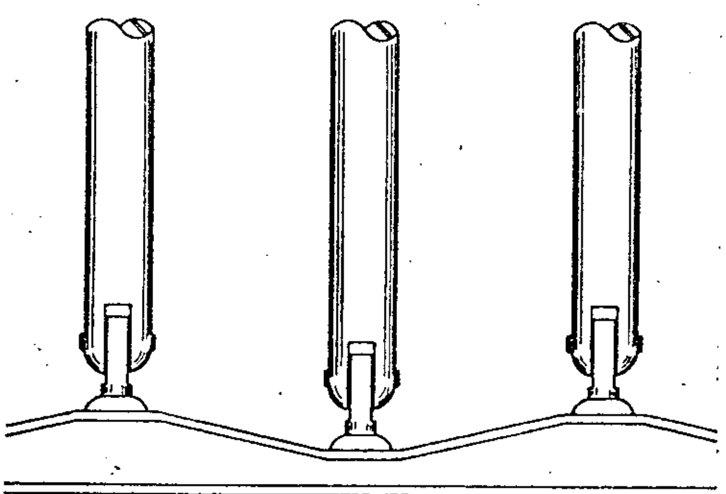
Micro-Adjusting Rod Operation:

If a profile measuring instrument indicates that uneven profiles are occurring, the upper nozzle blade can be warped to help the problem.

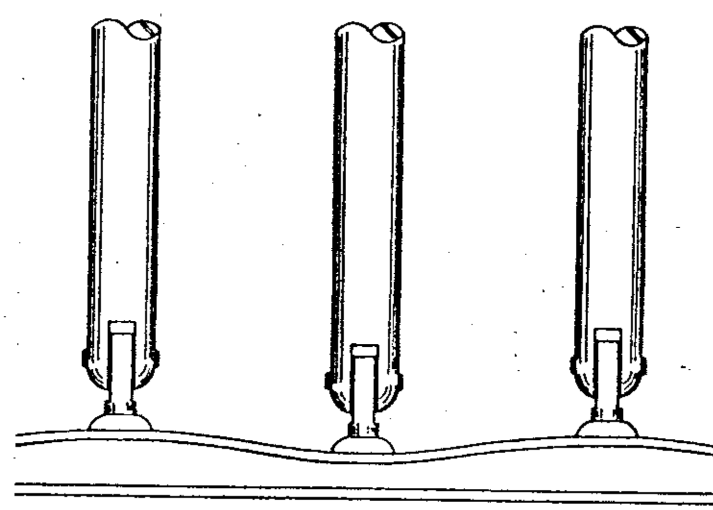
Micro-adjusting rods with handwheels are connected to welded nozzle blade studs spaced on approximately 6" centers across the width of the headbox. These rods are used to manually warp the nozzle blade tip.

Each micro-adjusting rod has a calibrated dial to indicate how far the nozzle tip has moved. Each revolution is 0.0208" inch of rod travel.

Care must be taken that the amount of adjustment of any single rod be limited to not more than two or three turns of the hand adjusting nut. If more adjustment is needed, adjacent rods must also be moved in the same direction to avoid putting a permanent distortion, or bend, into the profile bar and upper nozzle blade.

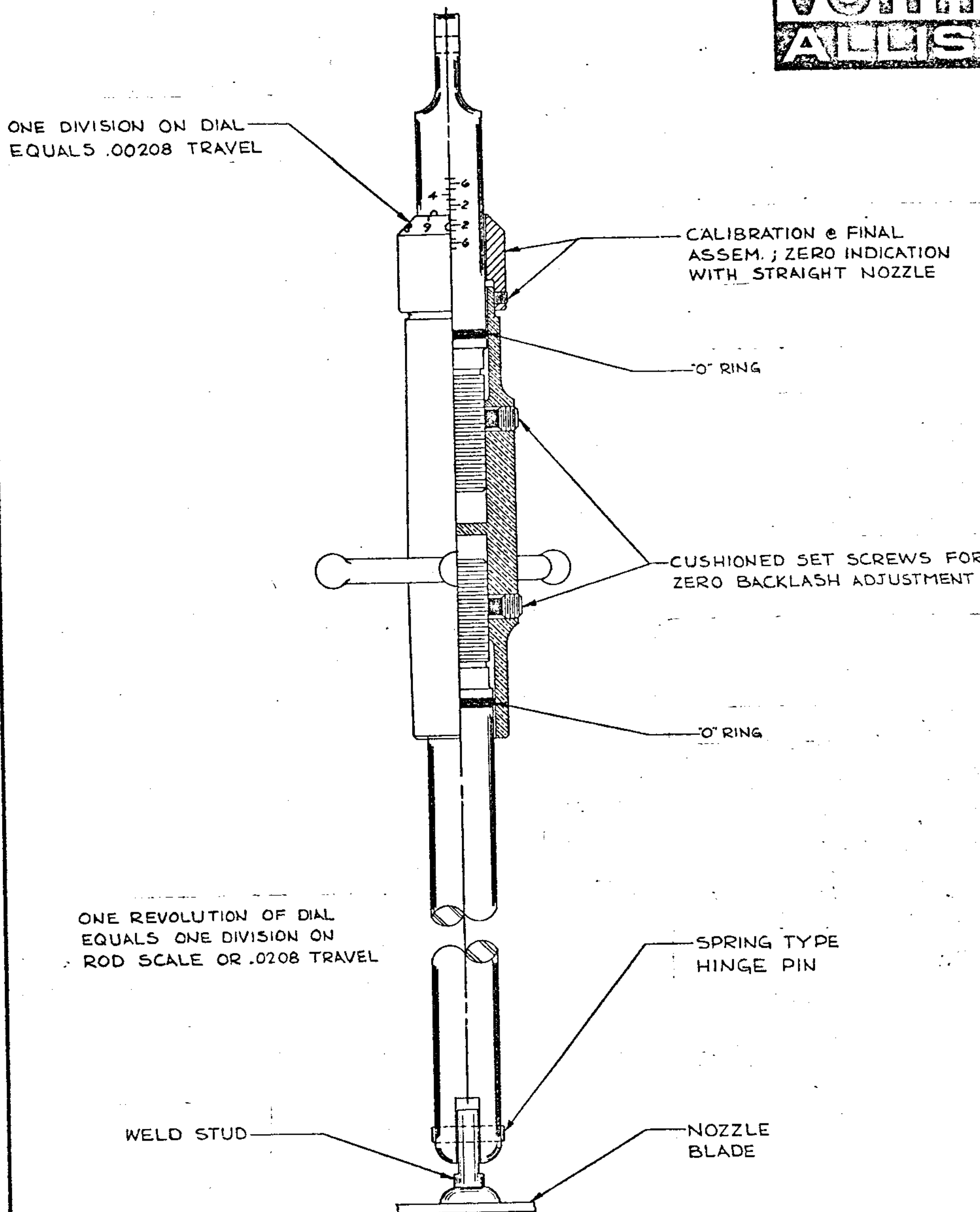


NO SHARP BENDS



MAINTAIN SMOOTH CURVE
ADJUST SEVERAL RODS

It is suggested that only one area of an inadequate profile be worked on at one time. The adjustment of a rod or a close series of rods sometimes creates a profile change at another point. Trying to correct more than one point at a time could create a condition where one or more points would be worse than before the adjustments were made.

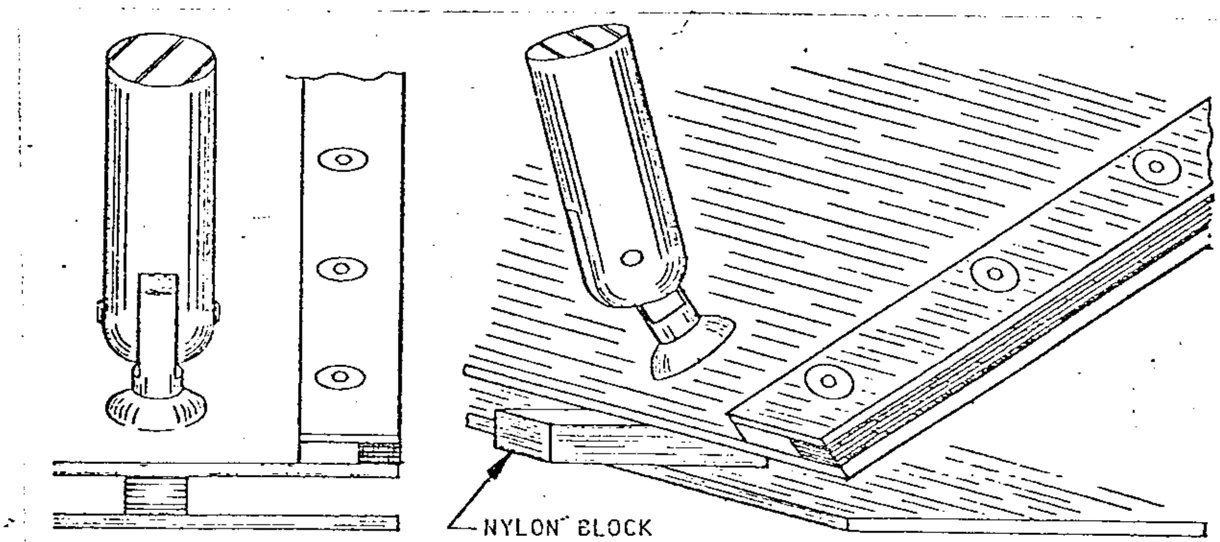


MICRO-ADJUSTING ROD - ILLUST.

Slice Opening Calibration:

At least once a year the slice opening should be checked and calibrated for evenness.

Remove the profile bar by backing the set screws off before sliding it off the nozzle blade. Set all adjusting rod nuts at the mid-point, or zero setting, and lower the slice until set to some pre-determined measurement. A nylon block of approximately 1/2" thickness used as a feeler gauge should be slid through the opening and, if necessary, individual rods adjusted to allow the nylon to fit snugly into the opening. This gauging should be performed at least three times across the headbox before re-installing the profile bar. When installing the profile bar, check the end clearance and tighten the set screws, starting at the middle and working toward the two headbox sides. After the profile bar is installed, recheck the opening calibration with the nylon block again.



After the entire length of the slice opening has been set evenly the slice will be level with the apron board. The heavy duty type of rods have a movable calibrated adaptor, or sleeve, at the top of the nut. Each collar should be reset to zero by loosening up the two socket set screws and resetting the indicators to the zero position.

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Function:

The deckle pans serve to define the deckle width of the Headbox at the point of jet discharge. These pieces also provide a seal between the Headbox sides and the wire to prevent stock from moving out beyond deckle width.

Description:

The deckle pans are rectangular in shape with flanges to bolt to the Headbox side panels.

Located on the downstream bottom half of the deckle pans are adjustable rubber edge seals. These can be adjusted vertically by loosening the adjusting nuts. Also, the rubber seals can be moved a small amount in the cross-machine direction by turning the adjusting nuts and warping the lower portion which is machined to a thinner thickness for flexibility.

When the rubber seals are worn, they can be inverted and used in the deckle edge piece on the opposite side of the Headbox.

Function:

Due to friction acting upon the stock flowing next to the Headbox walls, the flows near the edges are reduced. This causes the sheet to be lighter in basis weight for a short distance in from the edges.

To compensate for the light edges, edge bleeds are used to remove a small amount of stock from the Headbox sides in the nozzle area as close to the discharge as possible. This causes more stock from the flow toward the center of the machine to move toward the edges, compensating for the frictional effects.

Description:

The VALLEY edge bleeds are an integral part of the nozzle deckle piece. The bleeds are of rectangular cross sectional area, slightly inclined to the direction of flow. The rectangular section transitions to a standard pipe elbow for recirculation to the stock system. The amount of stock bleed is regulated by a hand valve downstream from the bleeds.

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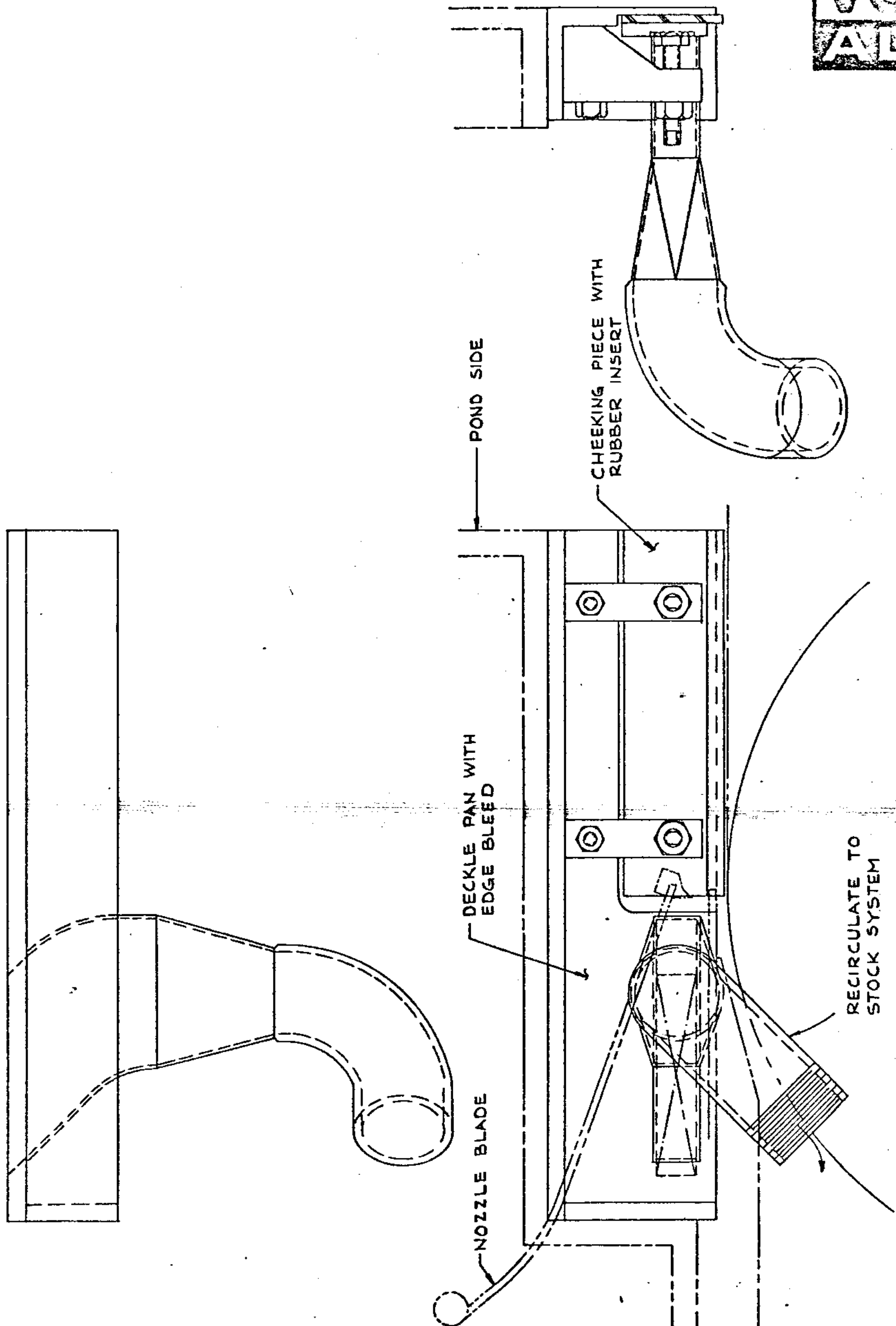


DECKLE PAN WITH EDGE BLEEDS

Function:

Distributing rolls are used to create a level of turbulence in the stock to agitate and deflocculate the fibers. This is necessary for good sheet formation.

The rolls also function as flow evening devices by creating a small pressure drop which reduces defects in the flow.

Description:

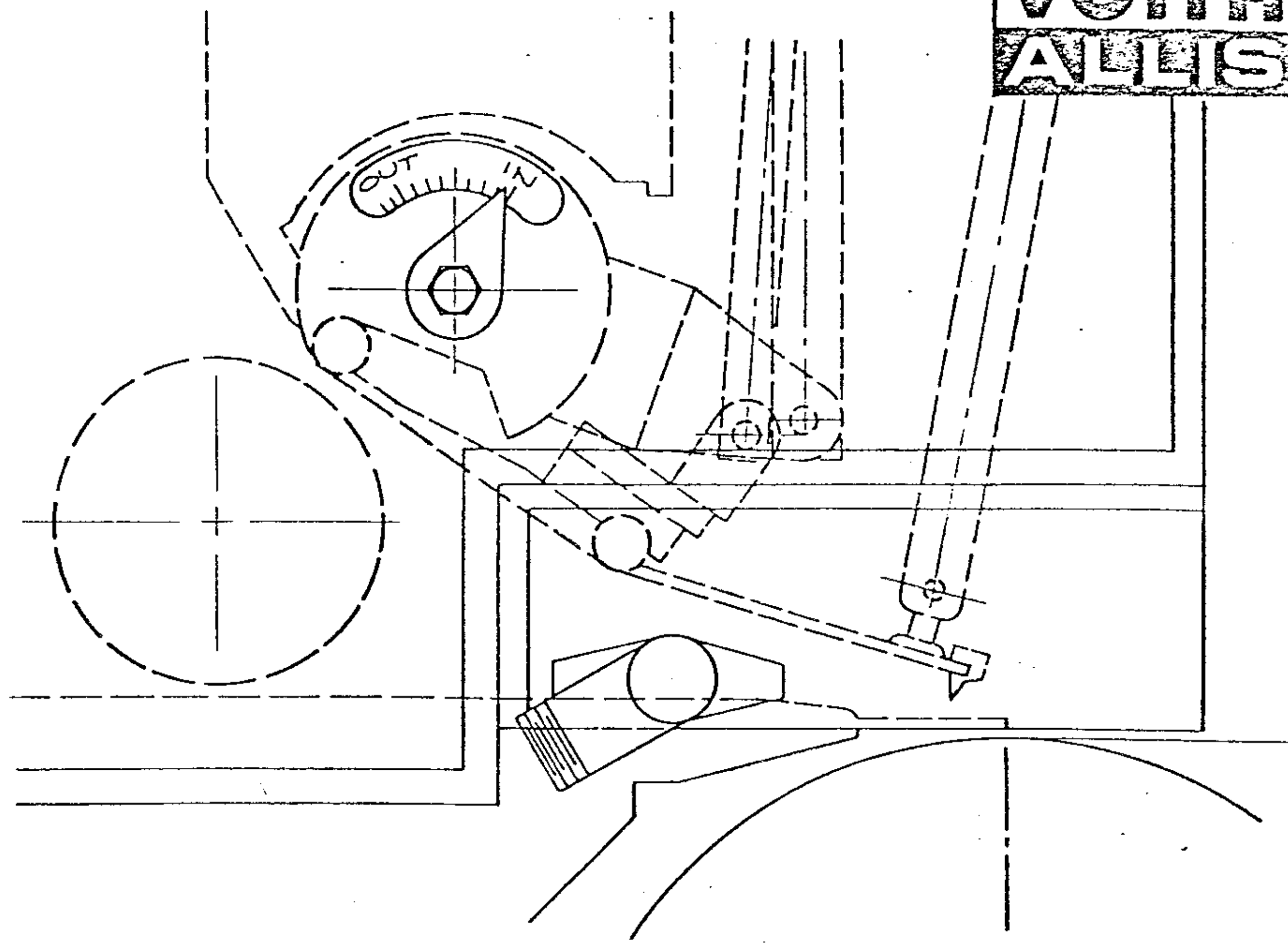
Distributing rolls are constructed from a stainless steel shell with single disc stainless steel end ends.

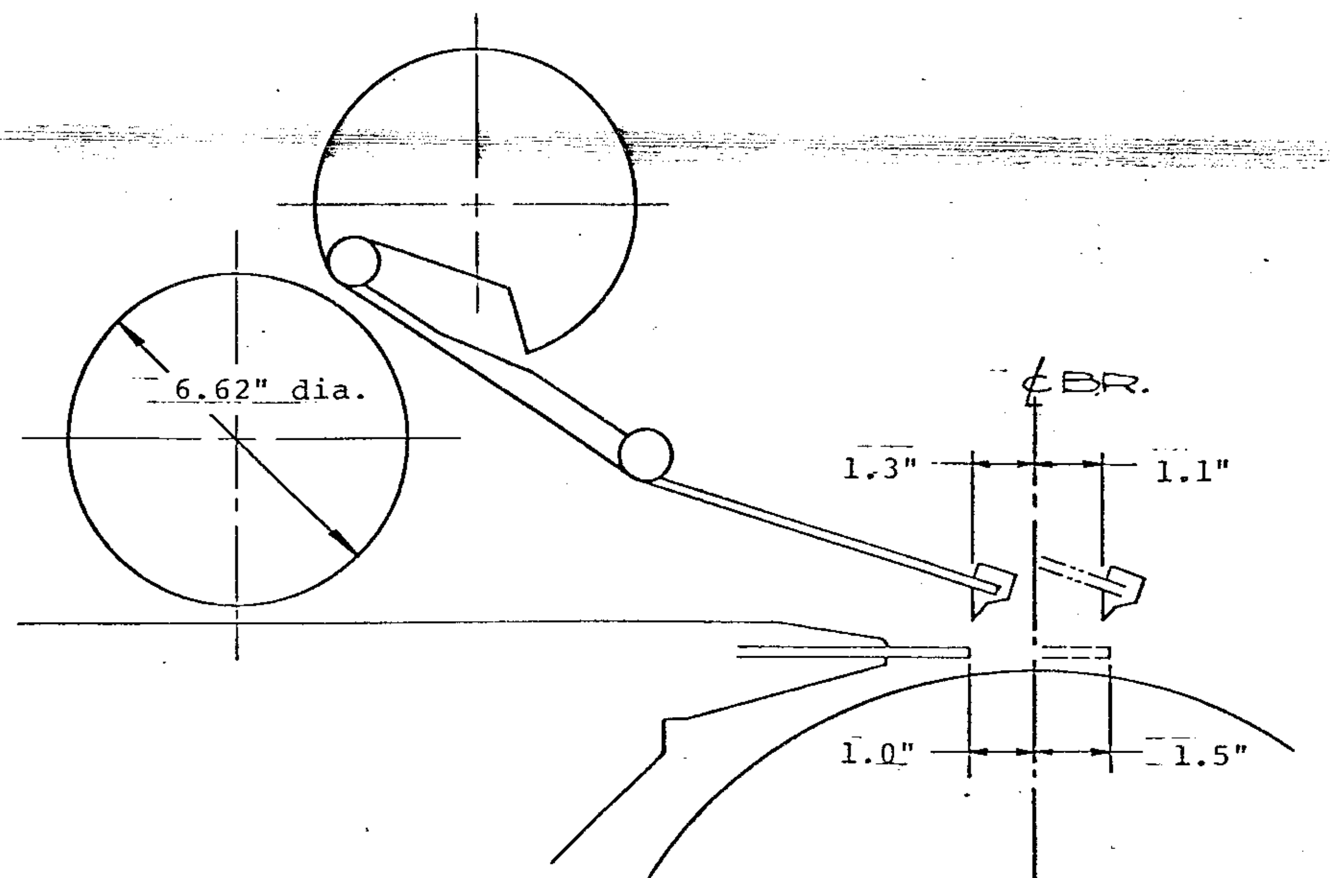
The end heads have an internal gear to accommodate a spline on the end of each journal.

The roll journals extend through the headbox side panels and are sealed by gland bushings and packing glands. The bushings and glands do not support the roll wieght, but only serve to seal and lubricate the journal rotation in the side panel.

The roll weight is supported by the journal anti-friction bearings mounted on brackets outside the headbox side panels. There are two (2) bearings supporting the journal on each end of the roll.

The spline on the end of the journal is smaller in diameter than the journal itself. If it becomes necessary to replace a journal or remove the roll, the journal can easily be pulled out through the packing without removing the gland.





CONTROFORM ADJUSTMENT - ILLUST.

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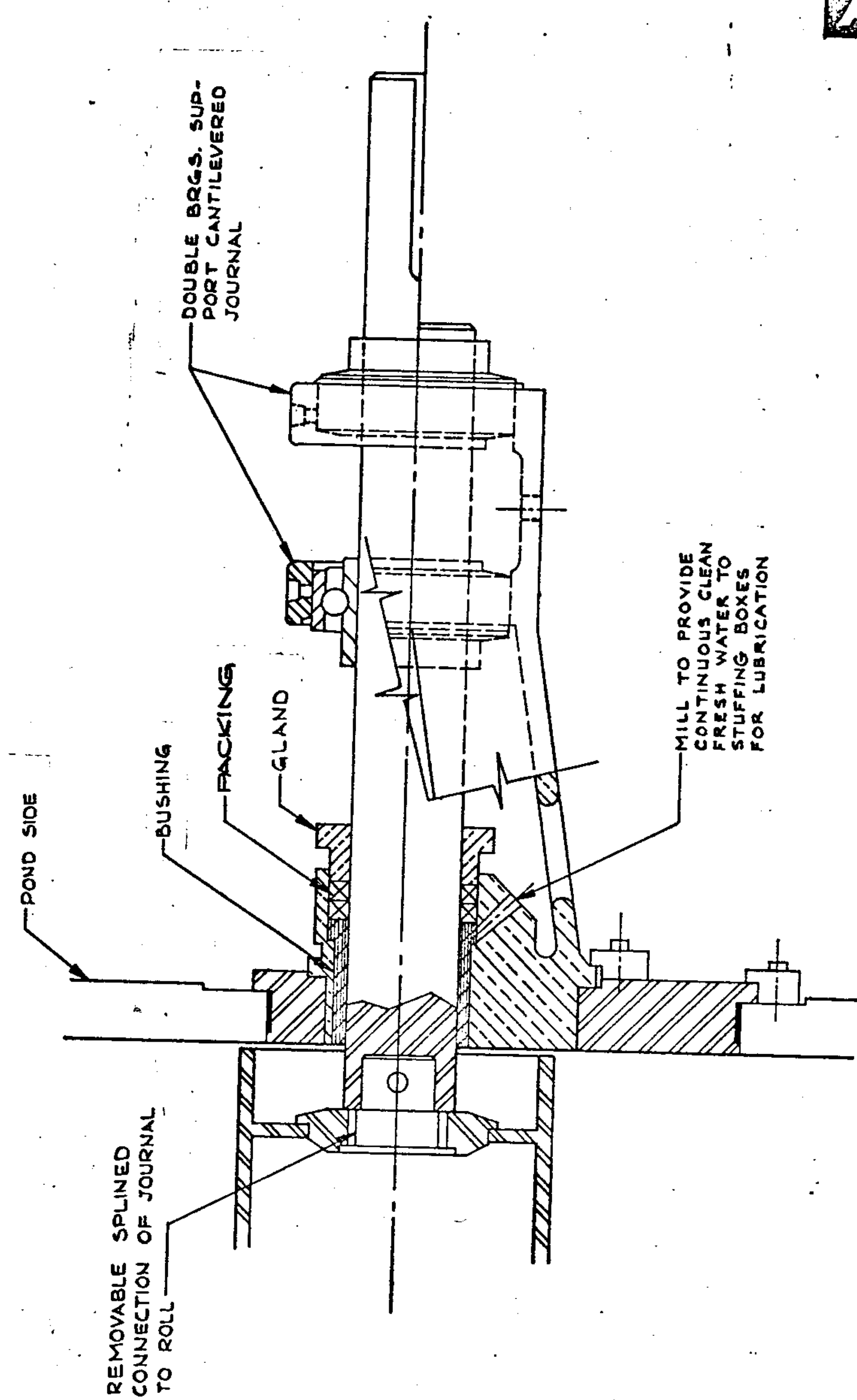

SLICE DISTRIBUTING ROLL

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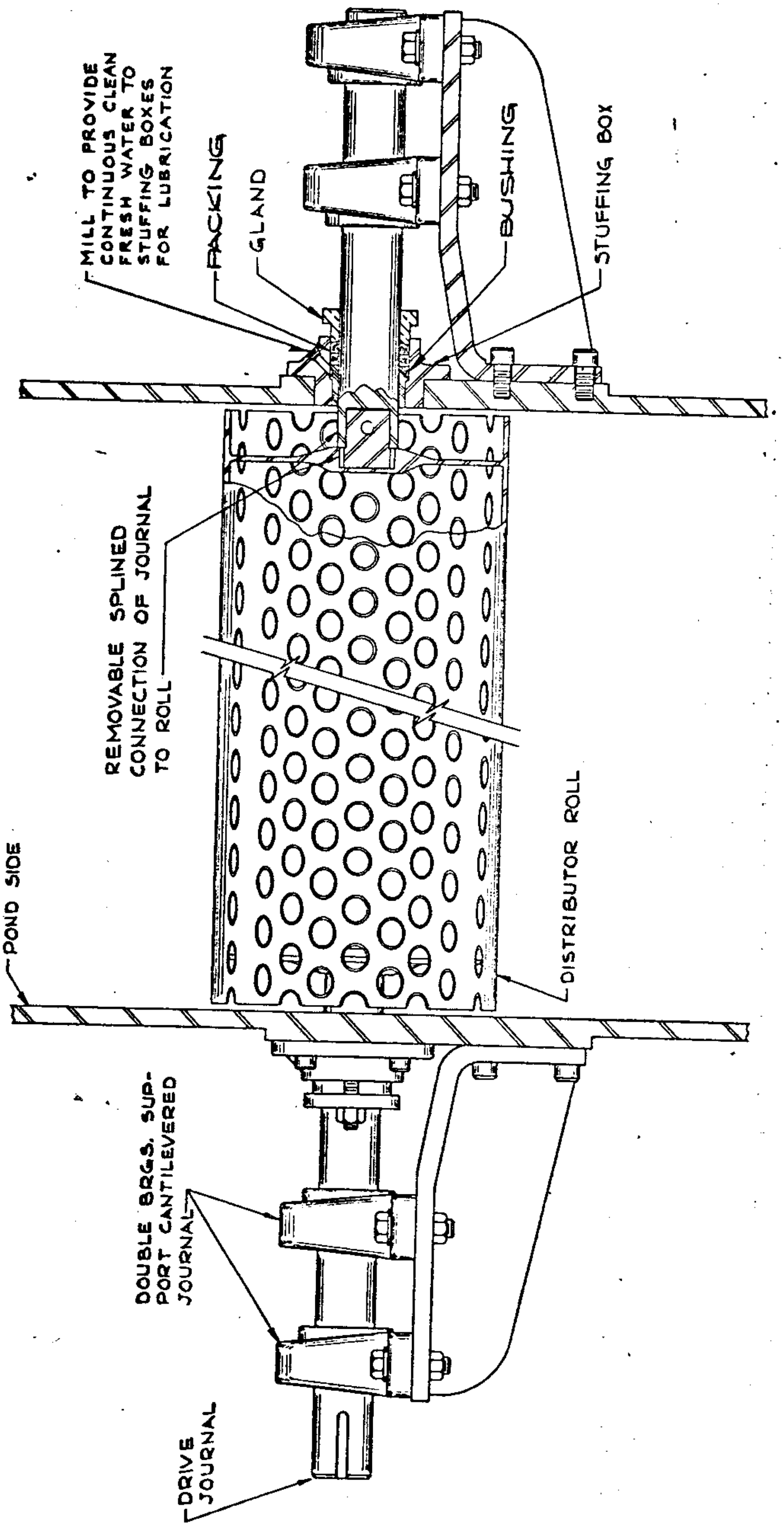


TURNING DISTRIBUTING ROLL - ILLUST.	

Slice Roll Adjustments:

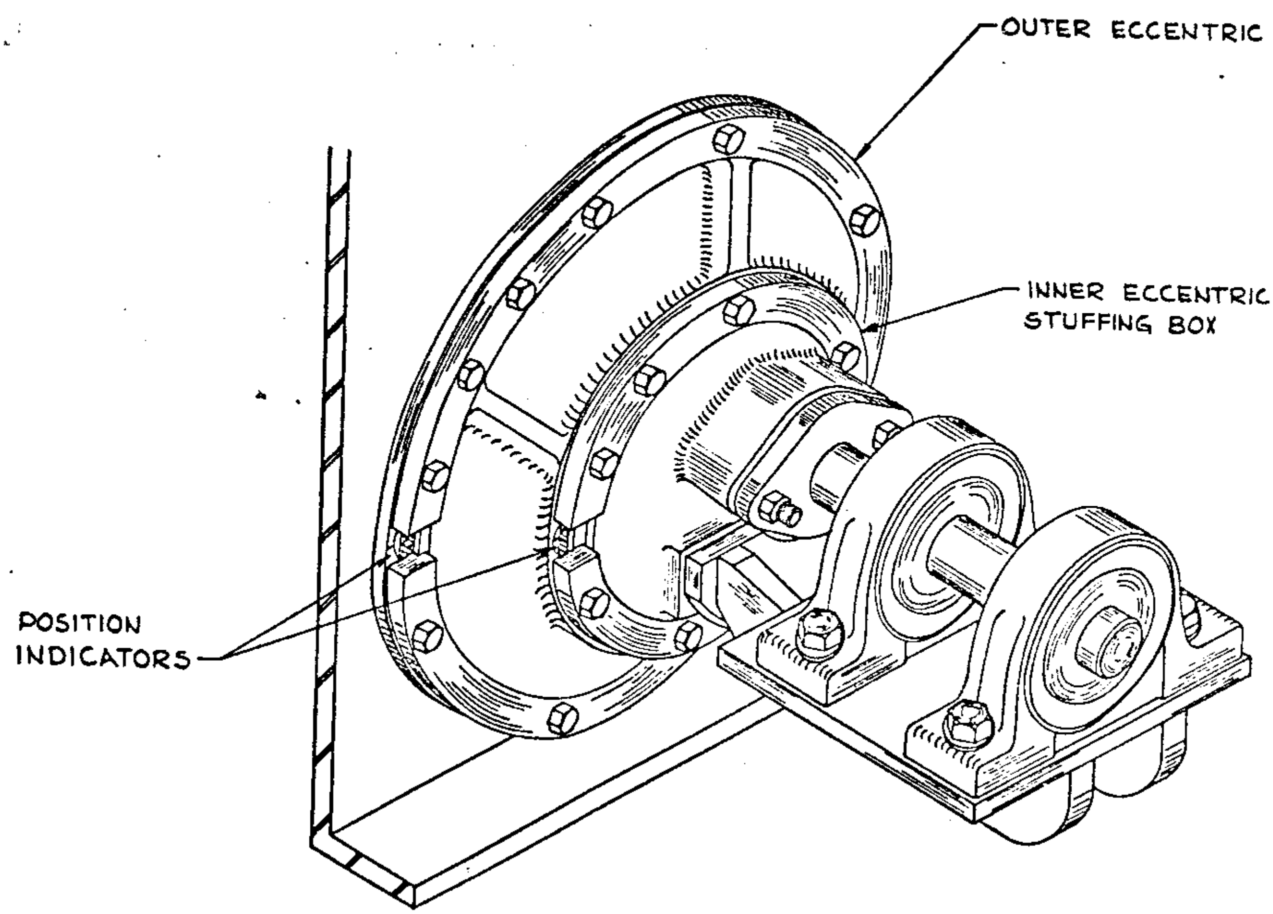
It is important for the slice distributing roll to be adjustable in both the vertical and horizontal directions.

Vertical movement allows the clearance between the roll and the headbox apron top to be adjusted. Normally this should be approximately 0.25 inch or less to prevent excess stock flowing under the roll.

Horizontal adjustment allows the distance from the slice roll to nozzle discharge to be optimized when operating at the high end of the headbox flow capacity. At high flows, the high stock velocities through the slice distributing roll may not provide enough time for the turbulence to decay to a satisfactory level before jetting onto the wire. To increase the turbulence decay time, the slice distributing roll is moved upstream.

Adjustment of the slice roll is accomplished by an arrangement of double-eccentrics.

The slice roll bearing support brackets are mounted on the inner eccentric. The roll journal extends through the bushing and stuffing box contained within the inner eccentric.



SLICE ROLL ADJUSTMENT

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Slice Roll Adjustments: (Cont'd)

To adjust the roll, the inner eccentric is rotated within the outer eccentric; also, the outer eccentric is rotated in the side panel. This allows a large number of possible vertical and horizontal adjustment combinations.

Position indicator scales are located along both inner and outer eccentric mountings on both headbox side panels. This allows equal adjustment on each end of the roll.

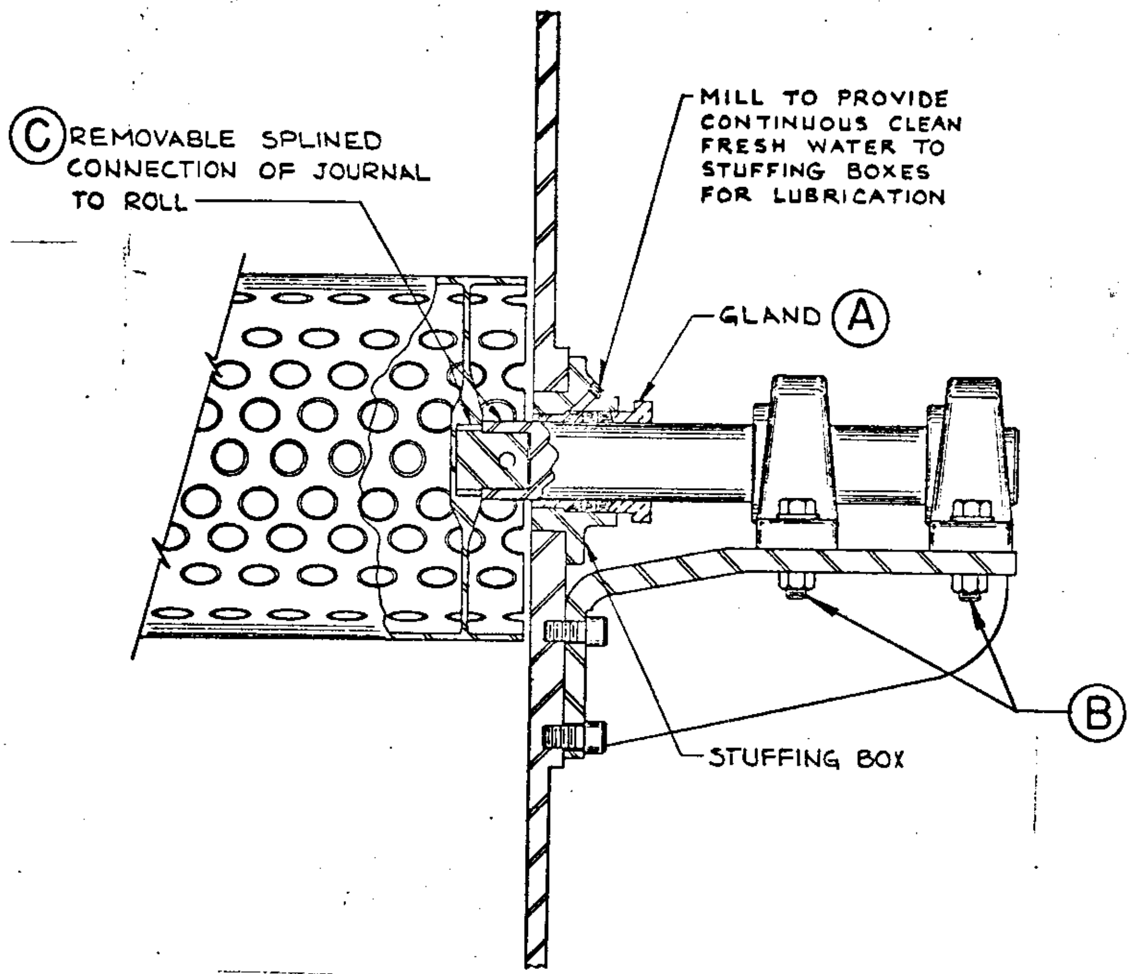
IMPORTANT CAUTIONS!

1. The gland bushings are designed for lubrication with water. Care should be taken to be sure this water is turned on at all times during machine operation. Failure to keep the water flowing into the bushings can allow stock build-up inside the gland, resulting in possible damage to the gland bushing and journal.

2. The anti-friction bearings supporting the journals and rolls should be properly lubricated and periodically checked for wear. The roll will drop verticlly as the bearings wear, and if excessive, damage can occur to the distributing roll surface, journals, and headbox lining.

3. The machine must be shut down and the headbox empty, before making adjustments to the distributing roll.

4. When adjusting the double-eccentrics the eccentric on each end of the roll should be simultaneously rotated an equal amount. This prevents twist and binding in the roll journals.



To remove the journals, loosen gland (A) and remove bolts (B) holding the pillow blocks.

Journals can then be slid outward a sufficient distance to clear the inside surface of the side panels. This will disengage the gear type coupling (C).

Be sure the distributing roll shell is supported before removing the journals.

To replace the journals, reverse the above procedure.

Slice Roll Drive:

The slice distributing roll is driven by a variable speed motor with speed reducer. The motor and reducer are mounted on a pedestal on the drive side of the headbox. The reducer is directly connected to the roll journal by a shaft and double universal joint.

The motor variable speed range is 220 to 1750 RPM rated at 1.5 HP. This produces 5.62 to 45 RPM of the slice roll.

Direction of slice roll rotation can be changed by reversing the motor leads.

Speed and direction of slice roll rotation can have an effect on sheet formation. Too low a speed can result in a streaking pattern on the wire that can be traced to the hole pattern of the roll. Too fast a speed can result in a more violent action causing foam conditions and undesirable turbulence on the wire.

Best results are usually obtained when the circumferential speed of the roll is approximately equal to the velocity of the stock approaching the roll.

The recommended slice roll speed is from minimum 25 RPM to maximum 40 RPM.

Turning Roll Drive:

The turning roll is driven by a constant speed gearmotor pedestal mounted on the drive side of the headbox. The roll is directly connected to the gearmotor by a shaft and spacer coupling.

The gearmotor output is 25 RPM, rated at 1.5 HP.

Function:

The auxiliary slice baffle is used to provide flow evening and turbulence for fiber mixing by increasing the velocity of the stock as it travels under the baffle.

Description:

The auxiliary slice moves vertically on keys mounted in the headbox side panels. The height of the auxiliary baffle is regulated by either a manual handwheel, or airmotor, that operates a cross-shaft, gear boxes, and vertical screws.

The auxiliary slice should be raised or lowered to provide a visible head differential between the upstream and downstream liquid levels. This increases the velocity of the stock as it travels under the auxiliary slice baffle.

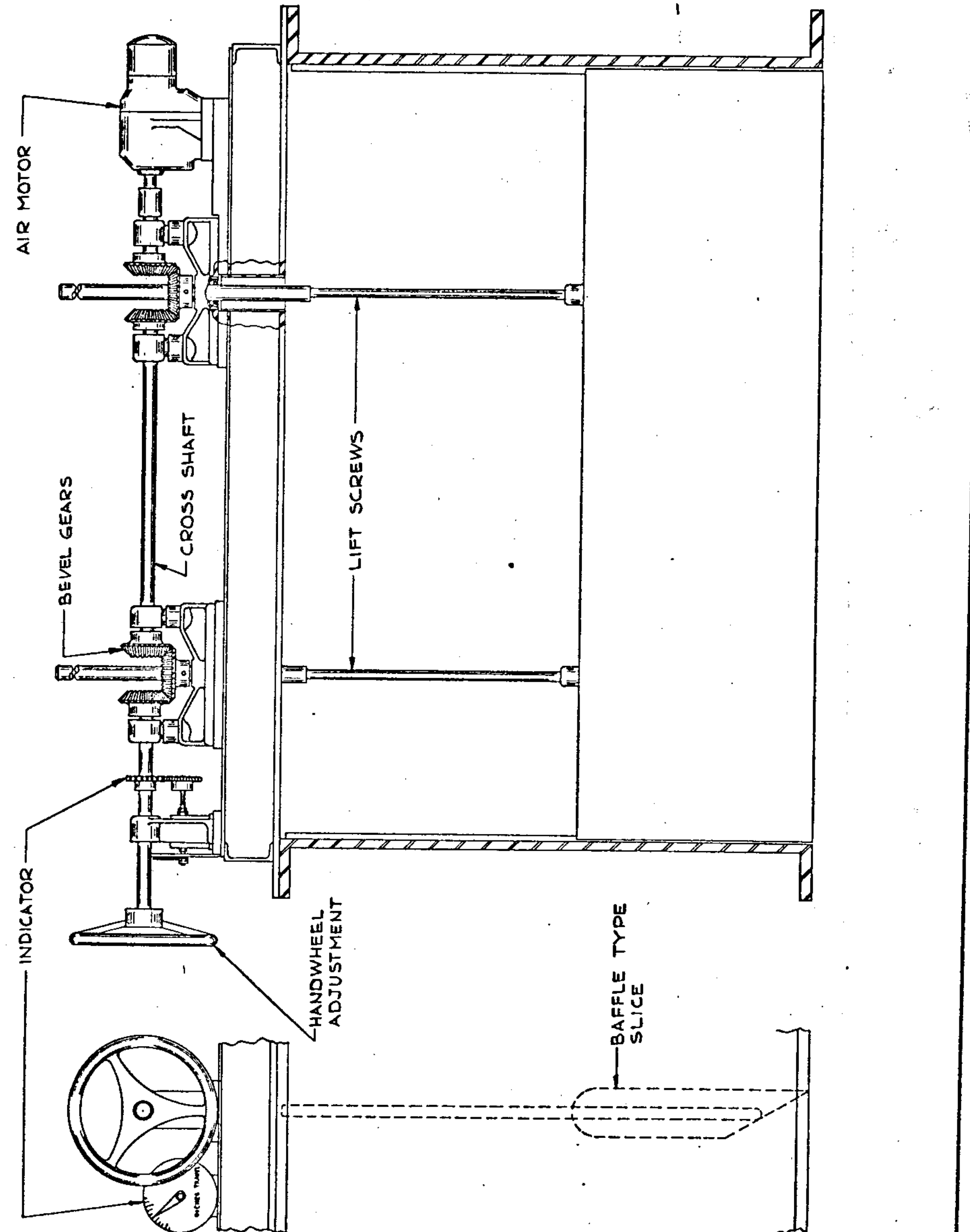
The operator should adjust the slice downward to a point where he observes turbulence in the stock flow downstream of it, then back it off a small amount.

As the speed of the machine decreases, the auxiliary slice becomes more important to the operation because the velocity through the box decreases and flocculation is more likely to occur. As the speed of the machine increases, the auxiliary slice becomes less important to the operation because the velocity through the box increases, allowing less time for flocculation.

IMPORTANT:

Be careful not to lower the auxiliary slice down into the vat floor causing damage to the headbox interior finish.

The auxiliary slice should never be lowered to a point where the stock and water mixture cascades over the top of the slice. This could cause air entrainment and a dirt build-up condition on the downstream face of the auxiliary slice resulting in lumps and slime spots on the wire.



AUXILIARY SLICE - ILLUSTRATION

Function:

Two showers are located in the air cushion chamber of the Headbox to keep the interior walls and cover clean. Also the showers prevent foam build-up on the liquid level surface.

Description:

The shower heads and pipes extend vertically through the Headbox cover at approximately the center of the Headbox width.

The shower head is a spinning type that obtains its rotation from the water pressure. The heads have multiple nozzles over their circumference to provide full coverage of the Headbox interior.

The showers normally can be used with either filtered white water or fresh water.

Care should be taken that the temperature of the shower water is approximately at the same temperature as the stock.

Cold shower water hitting warm or hot stock can cause rapid flocculation and streaking on the machine.

The shower heads are connected to a length of pipe and a pipe coupling. The height of the shower head above the pond level may be adjusted by changing the length of pipe between the shower head and the coupling.

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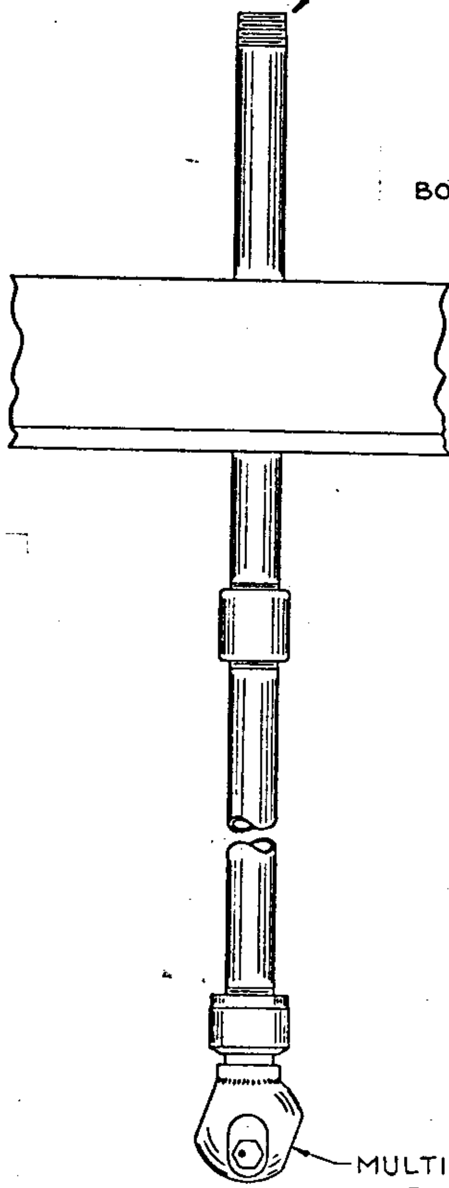

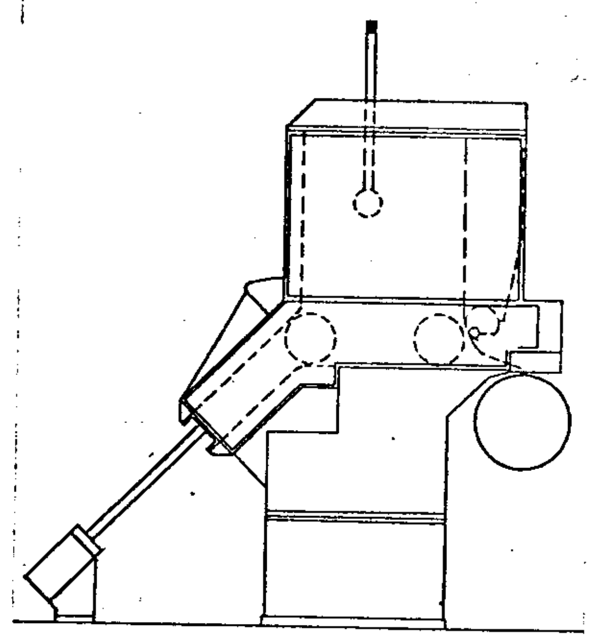

ONE SHOWER HEAD COVERS BOX WIDTH OF 10 FEET; MULTIPLE SHOWER HEADS REQUIRED FOR WIDER BOXES

Description:

Every headbox must produce a pressure inside of it that will force the stock out onto the fourdrinier wire with a jetting velocity approximately equal to the wire speed.

This pressure is called "total head". It is equal to the height of the liquid level inside the headbox plus the air pressure, or vacuum, inside the headbox air cushion.

The amount of total head is indicated on the total head gauge glass that is located on the tending side of the headbox. The scale behind the gauge glass is calibrated in inches of water along the left side, and equivalent machine speed in feet per minute along the right side.

When the machine operator knows what speed he wants to run, he sets the total head gauge to the equivalent inches of water. This adjustment is accomplished by opening or closing the headbox slice.

If the machine operator changes the stock consistency in the headbox by adjusting the water valve, he must readjust the total head setting.

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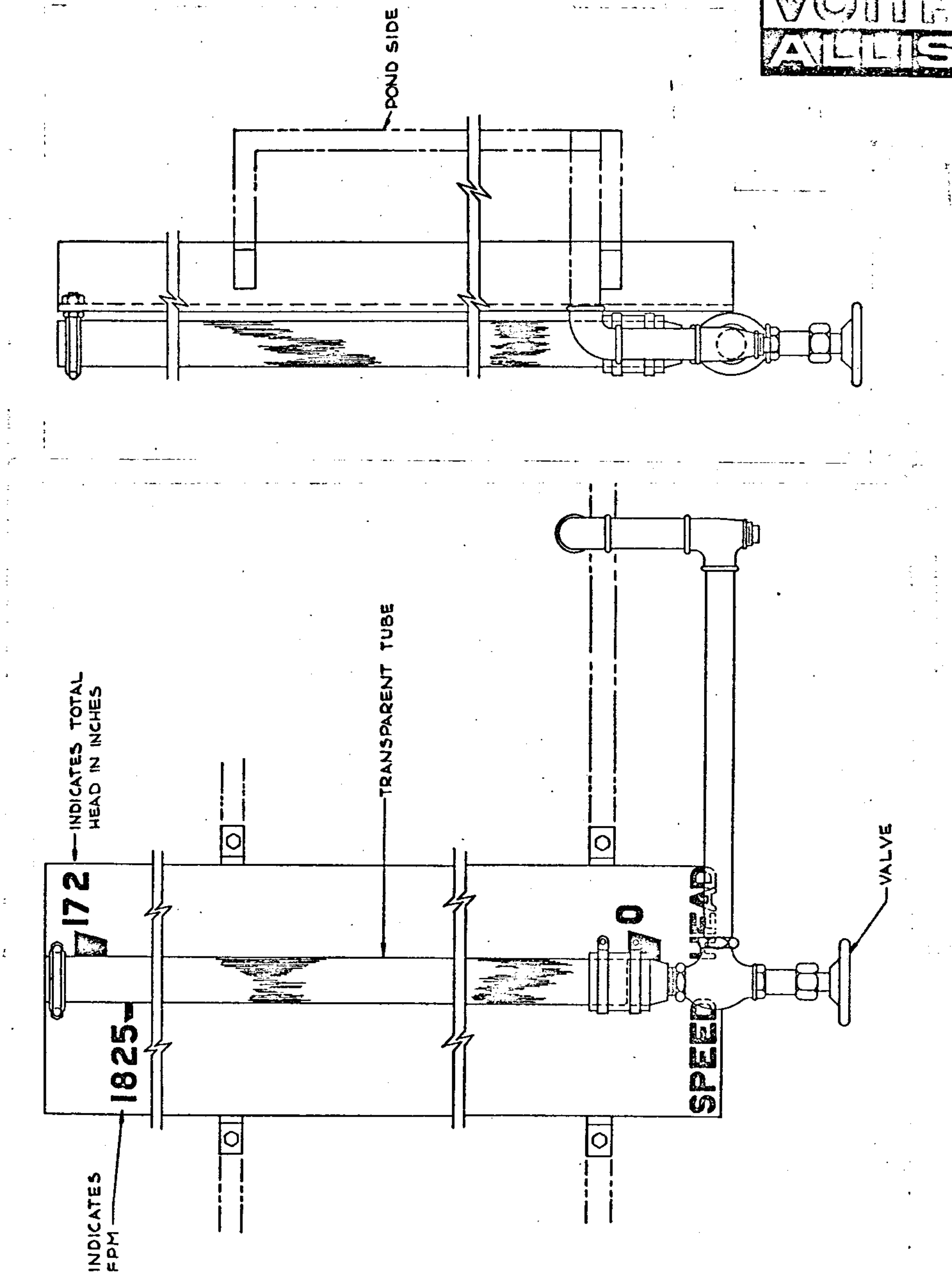

TOTAL HEAD GAUGE - ILLUSTRATION

WIRE SPEED Ft/Min	SPEED Ft/Sec	HEAD IN FEET THEORETICAL	HEAD IN INCHES THEORETICAL	PRESSURE P S I A
100	1.667	0.0433	0.518	0.019
150	2.500	0.097	1.165	0.042
200	3.333	0.173	2.070	0.075
250	4.167	0.270	3.235	0.117
300	5.000	0.388	4.658	0.168
350	5.833	0.528	6.341	0.229
400	6.667	0.690	8.282	0.299
450	7.500	0.873	10.481	0.378
500	8.333	1.078	12.940	0.467
550	9.167	1.305	15.657	0.565
600	10.000	1.533	18.634	0.672
650	10.833	1.822	21.869	0.789
700	11.667	2.114	25.362	0.915
750	12.500	2.426	29.115	1.051
800	13.333	2.761	33.126	1.195
850	14.167	3.116	37.396	1.349
900	15.000	3.494	41.925	1.513
950	15.833	3.893	46.713	1.686
1000	16.667	4.313	51.760	1.868
1050	17.500	4.755	57.065	2.059
1100	18.333	5.219	62.629	2.260
1150	19.167	5.704	68.452	2.470
1200	20.000	6.211	74.534	2.690
1250	20.833	6.740	80.875	2.980
1300	21.667	7.290	87.474	3.156
1350	22.500	7.861	94.322	3.404
1400	23.333	8.454	101.449	3.661
1450	24.167	9.069	108.825	3.927
1500	25.000	9.750	116.460	4.202
1550	25.833	10.363	124.353	4.487
1600	26.667	11.042	132.505	4.781
1650	27.500	11.743	140.916	5.085
1700	28.333	12.465	149.586	5.398
1750	29.167	13.210	158.514	5.720
1800	30.000	13.975	167.702	6.051
1850	30.833	14.762	177.148	6.392
1900	31.667	15.557	186.853	6.736
1950	32.500	16.401	196.871	7.102
2000	33.333	17.253	207.039	7.471
2050	34.167	18.127	217.521	7.849
2100	35.000	19.022	228.261	8.236
2150	35.833	19.938	239.260	8.633
2200	36.667	20.876	250.518	9.040
2250	37.500	21.836	262.032	9.455
2300	38.333	22.817	273.810	9.880
2350	39.167	23.830	285.844	10.314
2400	40.000	24.845	298.137	10.758
2450	40.833	25.891	310.688	11.211
2500	41.667	26.958	323.499	11.673
2550	42.500	28.047	336.568	12.145
2600	43.333	29.158	349.896	12.625
2650	44.167	30.290	363.483	13.116
2700	45.000	31.444	377.329	13.615

Function:

The manifold assembly consisting of a rectangular tapered header and multiple tube section, accepts the stock from the approach piping, directs the stock into the machine direction, and uniformly distributes the stock across the headbox width.

Description

Stock from the approach piping is introduced at the large entry end of the tapered header. A round to rectangular transition section, of sufficient length to avoid flow disturbances, connects the approach piping to the rectangular header. At the small end of the header there is a stock recirculation connection with a separate rectangular to circular transition piece. The entry transition section and rectangular header are manufactured as an integral unit.

The rectangular header has its bottom panel tapered in the direction of flow, continuously reducing the cross sectional area to achieve a constant pressure across the manifold width.

A uniform pressure across the width is important to insure that each manifold tube will have an equal flow. This is an important factor in cross-direction fiber distribution and profile stability.

The headbox pressure balance is controlled by varying the amount of recirculation through opening or closing the recirculation valve. If the pressure is substantially lower at the recirculation end of the header, the sheet on the wire will be lighter on that side of the machine. Conversly, if the pressure is higher, the sheet will be heavier.

The multiple tube section is manufactured as an integral part of the tapered header assembly.

The tubes are 1.37 inch I.D., approx. 36.0 inches long, and 58 in number. This tube configuration provides stock velocities for proper pressure drop across the tube section. This aids in balance of tapered header pressure.

The stock flow from the manifold tubes discharges into the portion of the headbox interior called the mixing chamber.

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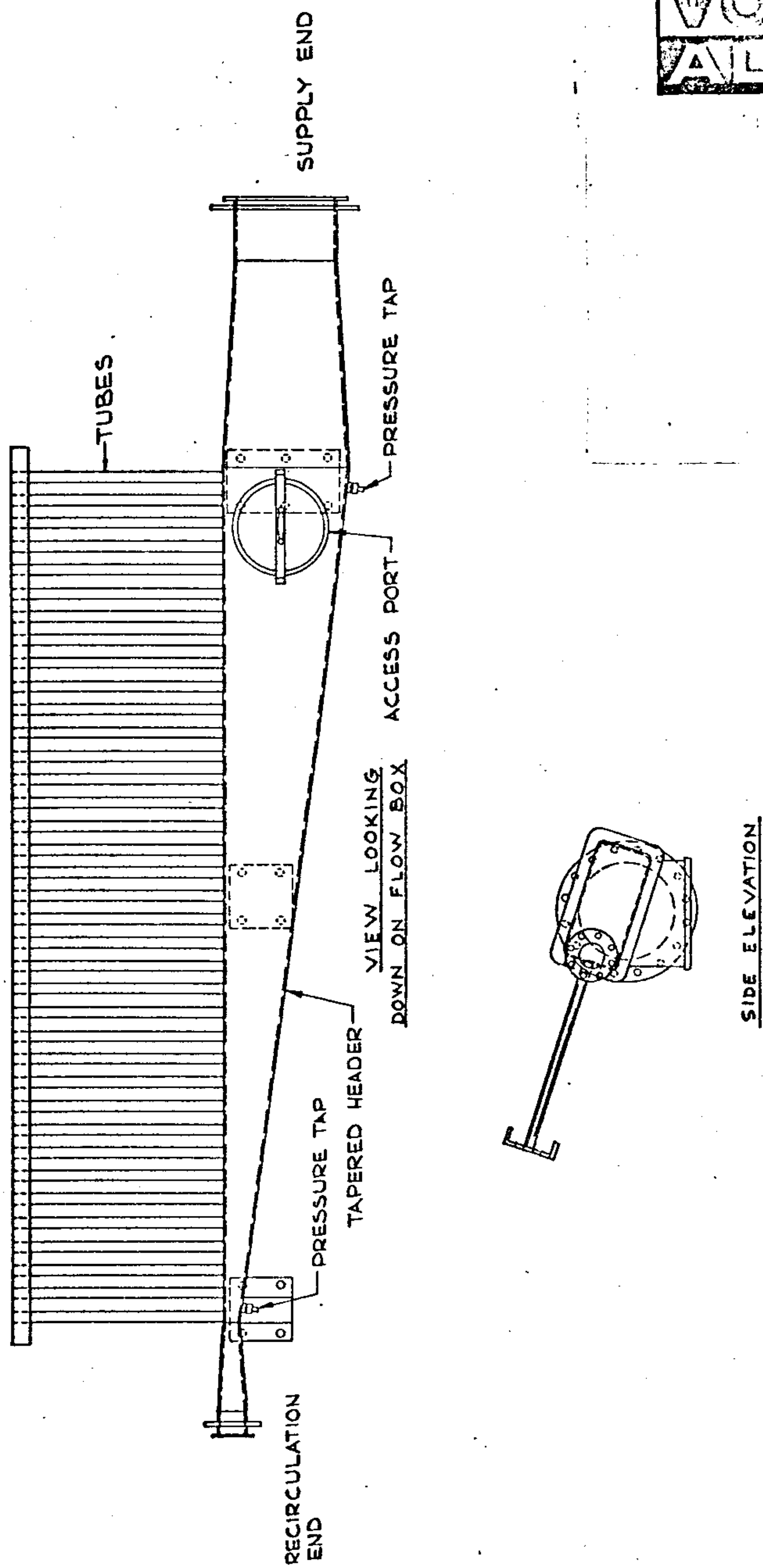
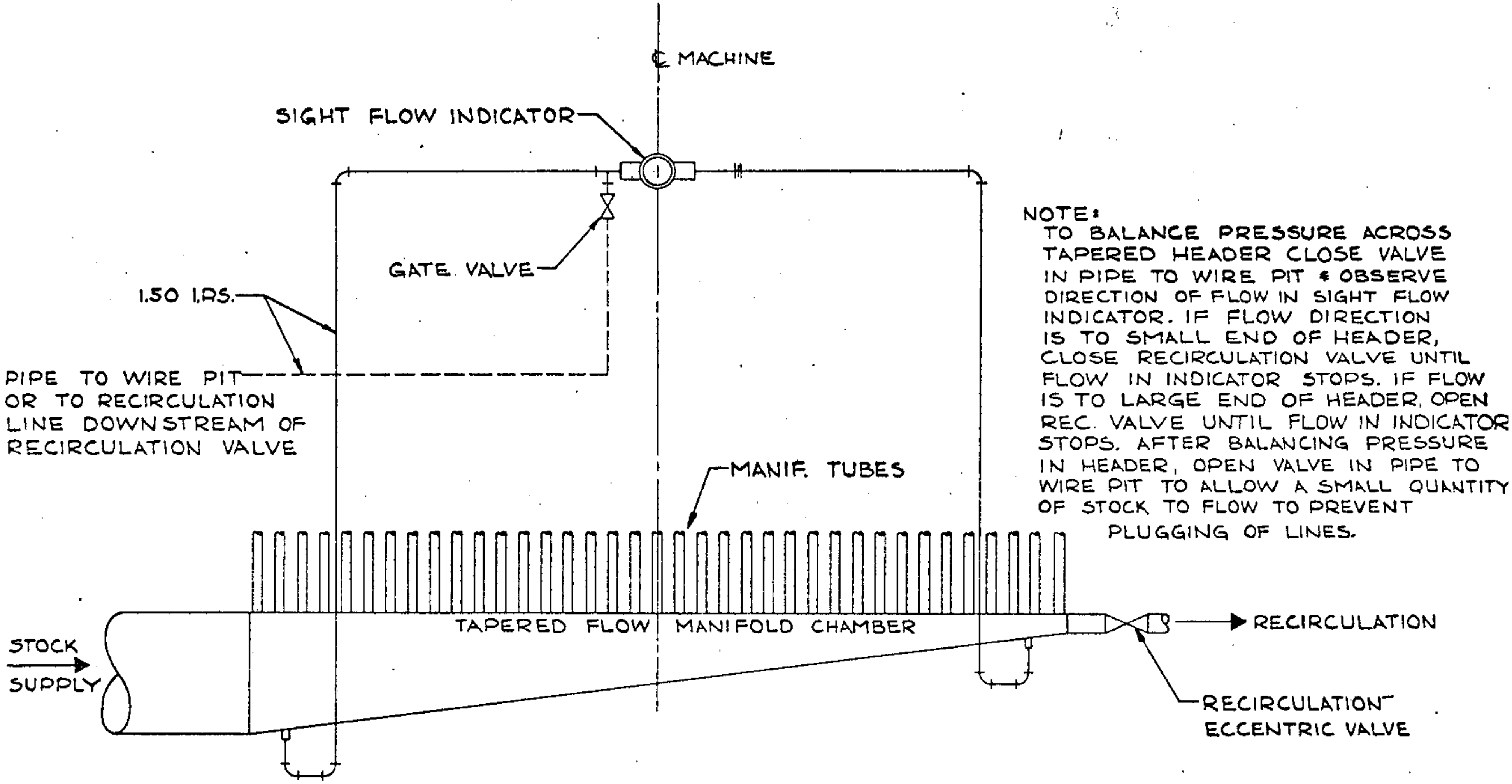


MANIFOLD - ILLUSTRATION

Description:

The manifold pressure balance is checked by observing the direction of the flow in the sight flow indicator. This is located at the header mid-point in a small pipe connecting the two pressure taps on each end of the tapered header.

When flow is observed through the indicator (with the aid of a flashlight) there is an unequal pressure balance and the recirculation valve must either be opened or closed until the flow stops. The system has a valved bleed-off near the indicator. This bleed valve is left open at all times, except when checking the pressure, to avoid plugging the line with de-watered stock. The flow from this bleed-off can be piped to the savealls, wire pit, or to the recirculation line downstream of the recirculation valve.



MANIFOLD PRESSURE BALANCE - ILLUST.

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Description:

The manifold recirculation line can be piped in two different methods.

The first is directly back to the fan pump (suction) that is supplying the headbox and the recirculation valve submerged in respect to the wire pit liquid level. This method will increase the through-put of the fan pump by the amount of recirculation.

The second method is to install a small, low head, recirculation pump. The manifold recirculation line would be directly piped to its suction. The pump discharge line would be piped to the recirculation valve and on to the headbox supply line, entering at a point between the headbox supply valve and the inlet manifold. This method does not subtract from the fan pump capacity. It can also be changed over from the first described method at any time if the mill determines that they are out of fan pump capacity.

Function:

Liquid level control regulates the stock level in the Headbox pond to assure that all stock flows through the distributor rolls.

Description:

The liquid level is controlled by a flush-mounted D/P cell located in the side panel of the Headbox. This senses the liquid level in the pond as well as the pressure in the headbox air cushion.

The D/P cell sends a 3-15 PSI signal to the recorder controller which records and controls the liquid level. The controller sends a 3-15 PSI signal to the two 3-way control valves which controls the flow to and from the constant volume compressor.

Operation:

The liquid level control system is automatic and requires only that the proper Headbox liquid level be set in the recorder controller. This is done by opening the controller face panel and turning the control setting knob. After the liquid level is set, the level control system will automatically maintain the liquid level set in the controller.

To further explain the two valves, the 1¼" three-way valve has an actuator which opens the port from the Headbox totally at 3 PSIG (the port to the atmosphere would be totally closed at this pressure) and is completely closed at 9 PSIG. The 2" valve on the discharge side of the compressor is reverse acting compared to the 1¼" valve. In other words, at 8½ PSIG the port to the Headbox is completely closed whereas the port to the atmosphere is open. At 15 PSI the port to the Headbox is completely open and the port to the atmosphere is closed. As you will notice, there is a ½ lb overlap between these two valves and this is the range that the valves are operating in when there is sufficient liquid level in the box to support the velocity head required without any air pressure.

As an increase or decrease in total head is required, both the 1¼" and 2" valves are automatically adjusted by the

Operation: (Cont'd)

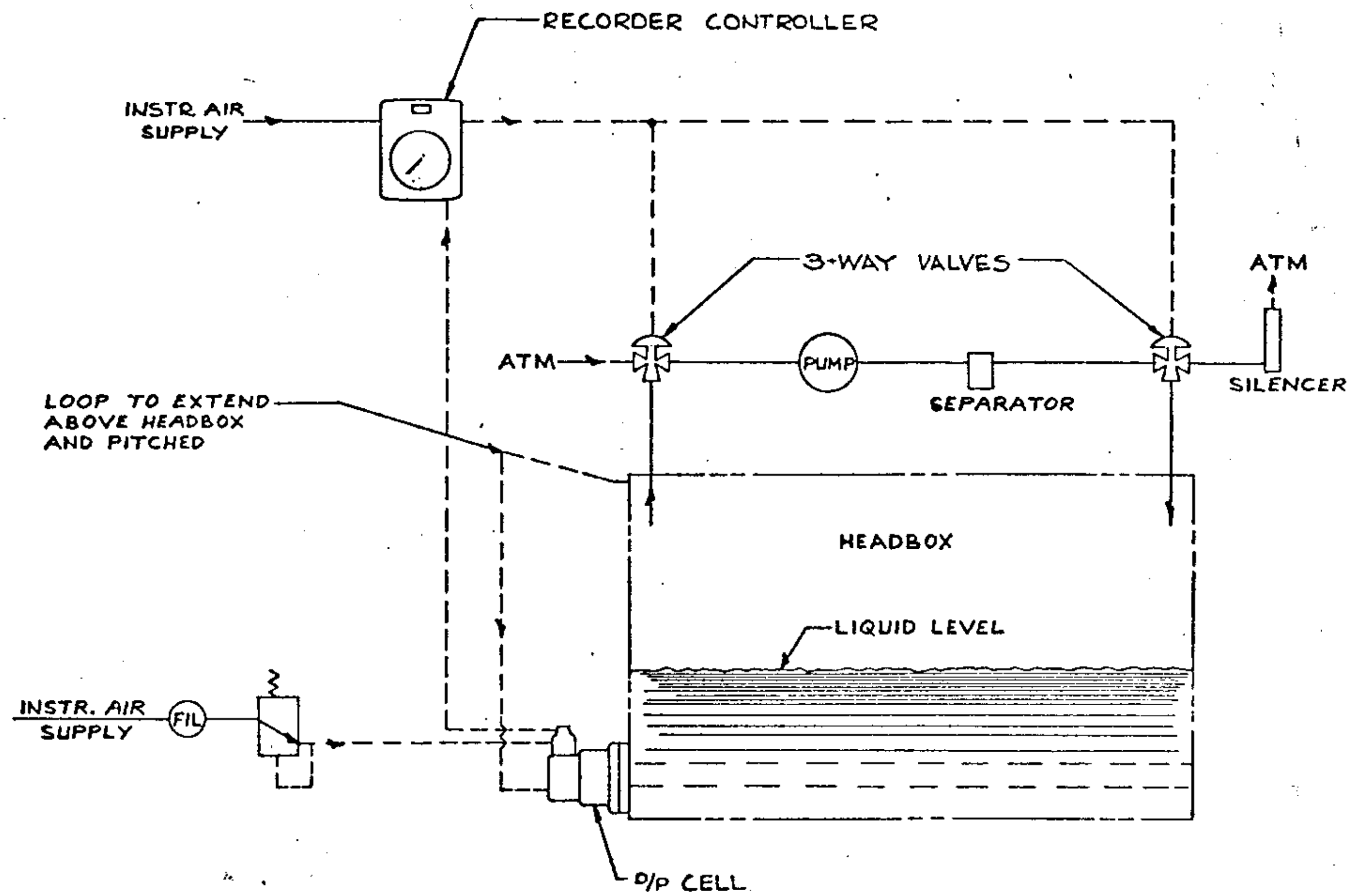
controller to maintain liquid level at the controller set point.

To supply the proper signal to the controller and the three-way control valves, a D/P cell senses the liquid level plus air pressure in the box on its diaphragm. This D/P cell is constructed with a vent and drain on the outboard side of the mounting flange. The vent plug should be removed on this D/P cell and a pipeline inter-connected between it and the Headbox air chamber so that the output signal from the D/P cell will only indicate liquid level. By inter-connecting the air pad to the outboard side of the diaphragm, the diaphragm will be backloaded by the air pressure in the Headbox, and the inboard side of the diaphragm will be loaded with a combination of liquid level and air pressure.

Since the air pressure is backloading the diaphragm, the output signal from the D/P cell will only reflect the liquid level in the Headbox. The signal from the D/P cell is then sent to the recorder controller where the signal is recorded on the chart in relation to the set point indicator. An appropriate output signal from the recorder is sent to the two three-way valves and the liquid level in the Headbox is either increased, maintained, or decreased.

IMPORTANT CAUTION!

All control units must be piped with instrument air as dirt, oil, and moisture will cause the control units to malfunction.



FOR PRESSURE OR VACUUM OPERATION

LIQUID LEVEL CONTROL SYSTEM ILLUSTRATION	-49-