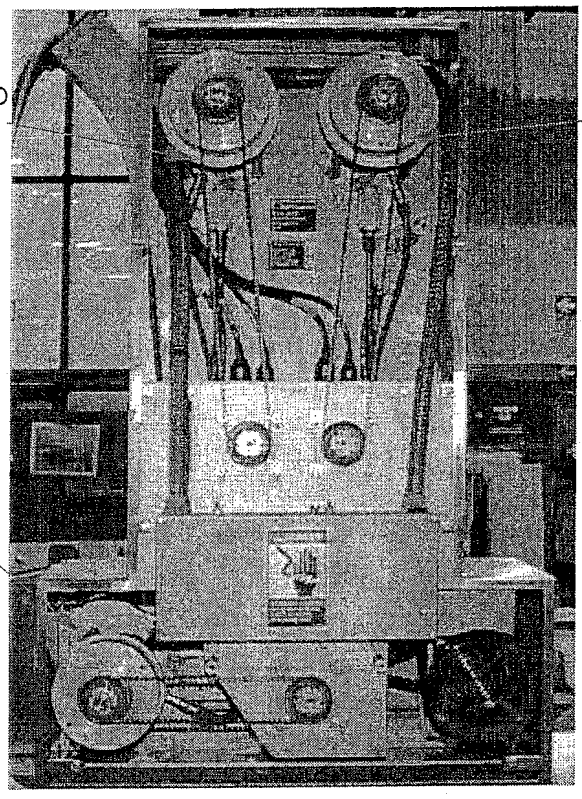


Motion Principle

The head assembly incorporates three independent servo controlled mechanisms, one for case deposit pump bar motion, one for centre deposit bar motion and one for head reciprocation motion. The motion profiles and phasings are electronically variable.

Safety Protection

All motions are protected by screw fixed guards or interlocked covers. The machine must not be operated with cover interlocks disconnected or guards removed except for maintenance by trained and authorised personnel.

WARNING THE POTENTIAL EXISTS FOR UNEXPECTED MOVEMENT DURING ELECTRONIC SET-UP ADJUSTMENTS AND THIS COULD BE VERY DANGEROUS.

Cycle Speed

The unit is supplied for 55 cycles per minute although geared for 70 cycles per minute.

Limitations on speed increase depends on product viscosity for pump motion; for reciprocation motion, it depends on travel distance and unit weight. Reciprocation is likely to prove the limiting factor. Although high rates are practical at short distances (80 cycles/min at 1" reciprocation), this reduces to approximately 55 cycles/min at 2" reciprocation and 30 cycles/min at 3" reciprocation.

As the reciprocation travel increases, average velocity is increased and hence inertia of head and acceleration and de-acceleration forces. For guarantee life of

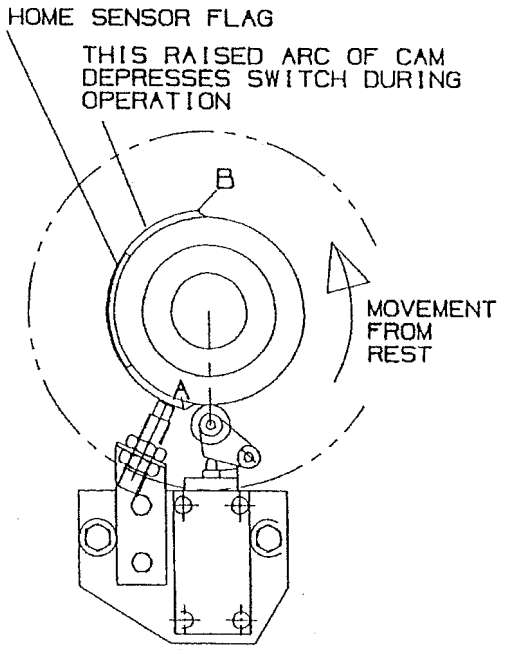
gearboxes, the acceleration torque at the input should not exceed 6.9 Nm (5.1 lb.ft). This can best be assessed as motor current limited to 5.58 amps peak.

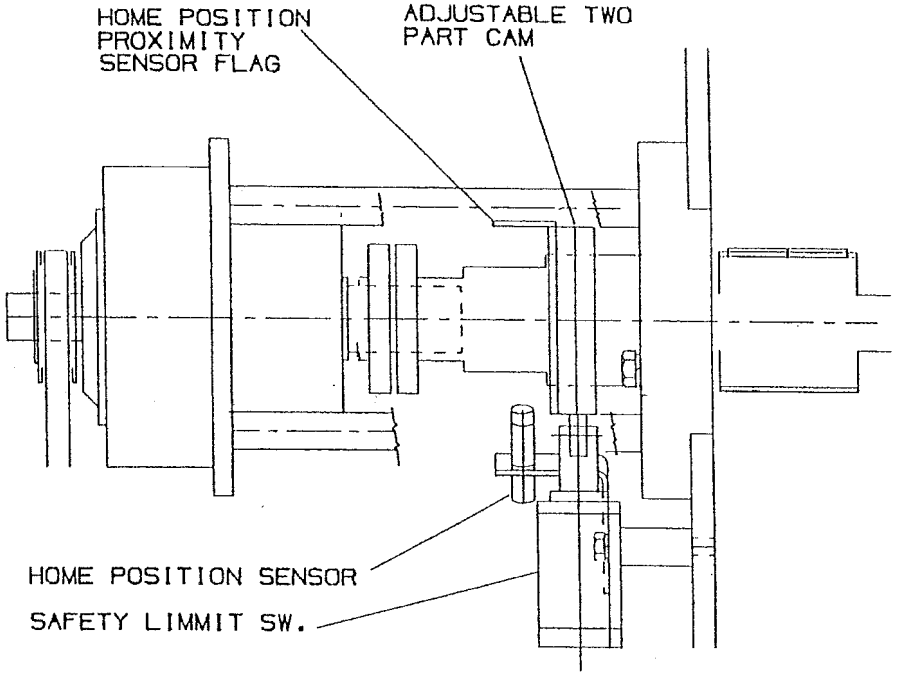
This current limit also applies to the pump bar lift motors when developing suck-back profile.

Motion Control

Movement of the three independent motions is determined by programmable logic control. Each motion has a proximity sensor to relate machine motion to program map. Each motion also has safety limit switches to protect the machine from software operational failure or set-up error which cause the drives to hammer repeatedly into mechanical motion limit stops. The sensing and switching arrangements are shown on the following illustration.

SK ED2





THE ADJUSTABLE TWO PART CAM OPERATES A SAFETY SWITCH FOR MACHINE PROTECTION

SWITCH CONTACTS ARE MADE WHEN SWITCH ROLLER IS DEPRESSED

THIS SKETCH SHOWS ROLLER EXTENDED - CONTACTS BROCKEN - WITH PUMP BARS RESTING ON BOTTOM STOPS , OR WITH RECIPROCATING HEAD AT REST AGAINST REVERSE LIMIT MECHANICAL STOPS

THE CAM IS ADJUSTED TO CLOSE SWITCH CONTACTS AT A
WHEN PUMP BARS LIFT 5mm UP FROM BOTTOM STOPS OR HEAD MOVES 5mm FROM REVERSE LIMIT STOPS

THE CAM IS ALSO ADJUSTED TO OPEN CONTACTS AT B
WHEN PUMP BARS ARE AT LEAST 5mm BELOW TOP STOPS OR HEAD 5mm BEFORE FORWARD TRAVEL LIMIT STOPS

Hoppers

The depositing hoppers are constructed from stainless steel and are jacketed for oil heating. The oil heating system is manufactured by Churchill and detailed information is provided in the OML section of this manual. The insulation jackets are designed in two halves and held in place by spring clips. Facilities for in-plant cleaning are provided or alternatively, the hopper is easily removed, to the side of the machine, for cleaning.

The base of the hopper, in which the pumps are housed, is electrically heated. Variable heat input controls are accessed from the Operator Control Panel.

The hopper is fitted with stainless steel pistons which work in copper cylinders and are designed to give a measured deposit to each individual mould. The weight of the deposit can be adjusted 'on the run' from the Operator Control Panel.

To avoid intermittent movement of the moulds, the depositing hopper reciprocates in a horizontal plane and is synchronised with the continuous mould movement.

Stripe Work

For striped-filling, two hoppers are used, one for hard candy casing, the other for the striped centre filling. Special nozzle assemblies bring the two materials together to a concentric nozzle where they are deposited simultaneously.

The weight of centre and hard candy can be adjusted independently. The timing of the two depositing mechanisms can also be adjusted with the machine in motion.

Moulds

The moulds are high pressure aluminium castings which are PTFE coated; there are 550 supplied on this contract. Each mould has a number of impressions arranged in a pattern to use the maximum effective area of the mould. The mould impressions are fitted with spring-loaded injection pins with PTFE sleeves. The pins lie flush with the bottom of the moulds. A 3/4 inch standard duplex chain is used to carry the moulds along the conveyor.

Depositor Lower Frames

The Depositor Lower Frames house the Conveyor Drive, Mould Lifter, Pneumatic Equipment, Mould Ejection components, Encoder and wash-out facility.

Mould Lifter

A pneumatically operated device, to lift the moulds at the deposit point, is fitted to reduce tailing. The height of the lift is adjustable using screw adjusters. The timing and length of lift time, can be controlled 'on the run' electronically.

The object of the mould lifter is to break any tails of product that tend to pull between nozzle and mould.

The lifter should be set to move the top face of the moulds away from the tip of the nozzle approximately 7mm for solids depositing for initial trials.

The lifter, pneumatically operated via an air cylinder, is controlled through the PLC. Adjustable flow control valves are installed between the valve and

cylinders which allow the speed of the upward and downward strokes to be adjusted.

Mould Conveyor Drive

The Conveyor Main Drive Assembly consists of a 3KW AC geared drive motor, master encoder and proximity sensor. The main drive motor is used to drive the mould conveyor via a chainwheel and drive shaft. The encoder is also driven from the drive shaft. Pulses produced from the proximity sensor attached to the encoder, are used to time the various functions of the machine.

The moulds are of the 'quick release' type and are held in circuit by trap rails.

Towards the end of the return run of the mould circuit, the spring loaded pin in each mould impression, is depressed by a pneumatically-operated pad, ejecting the sweet.

Pneumatic Ejection

The function of the ejector mechanism is to depress ejector pins fitted to each mould cavity and push out the solidified sweets.

The mechanism is reciprocated backwards and forwards in time with the moulds and at the time of ejecting, the speed of the mould circuit and ejector linkage is matched.

The traverse stroke is cam driven and spring returned. The cam can be rotated in relation to its drive shaft to affect the timing. Tension can be added to the return springs by adjusters.

The vertical stroke that pushes the sweets from the moulds is effected by air cylinders. These cylinders are controlled via a solenoid valve which drives its signals though the PLC. The timing of the air cylinder valve can be adjusted through the PLC for position and time down.

The speed of the air cylinder stroke is variable by air throttle valves fitted to the exhaust air pipes. The down travel of the ejector pads is adjusted against stops.

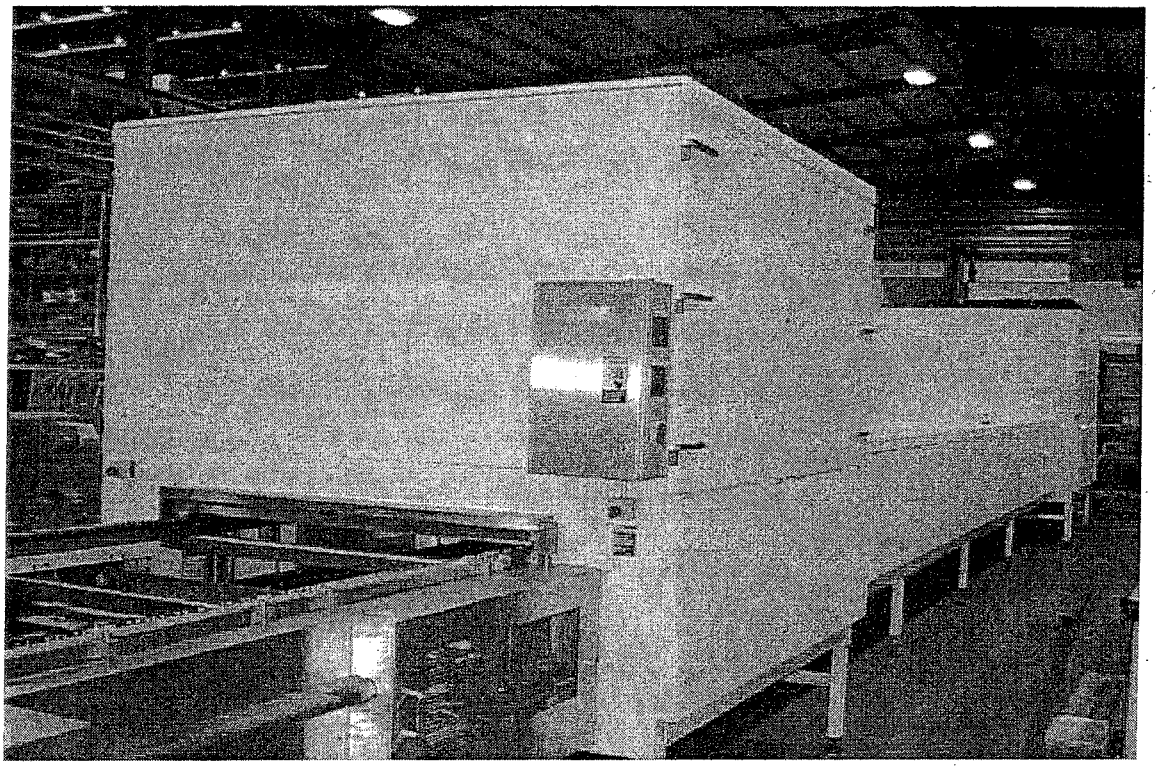
A secondary ejector unit is installed and consists of a row of fixed nylon skids set to depress the mould ejector pins. As the moulds pass beneath the ejector the pins are depressed slowly and return quickly and should any sweets be stuck to the ejector pins they are shaken off. The nylon skids are adjustable up and down and for angle see Drg. No.CU10303 for guide dimensions.

Note When moulds are new it is unlikely that this unit will be necessary and it is recommended that it is adjusted up clear of the moulds until required

If the ejector bar fails to return, there is an overrun limit switch that stops the machine. Mains air pressure is measured by a pressure switch fitted to the main air inlet unit and this switch should be set to 75 p.s.i.

Note The ejector must be timed AFTER the depositor/mould circuit adjustments have been made. Adjust Air Ejectors (see Detailed Maintenance section) well clear of the moulds to prevent possible damage when setting up. Use nuts 'D'.

Cooling Tunnel



After receiving the measured deposits, the moulds travel the length of a cooling tunnel and return to the ejection point.

The cooling system consists of:

- A cooling tunnel framework which is constructed from painted mild steel. It incorporates urethene foam opening side covers, painted on the outside surfaces only, and bottom covers.
- Two refrigeration cooling modules situated at either end of the cooling tunnel.
- Air circulation around the cooling circuit is provided by four fans.
- A total circuit length of 120.2 ft. The cooling duty is based on a maximum ambient of 68°F/35%RH and the tunnel is sized for a maximum hard candy throughput of 3,696 lb/hr.
- Four temperature probes are fitted at selected points in the cooler air ducting to give readings on the operator control panel.

Auxiliary Drive

Refer to Drg. No. CU10308.

The Depositor is fitted with an auxiliary drive unit. This unit is used on machines with mould circuit lengths over 22m. Its function is to take some of the load necessary to drive the mould circuit from the main drive circuit and to reduce the shake on the mould circuit.

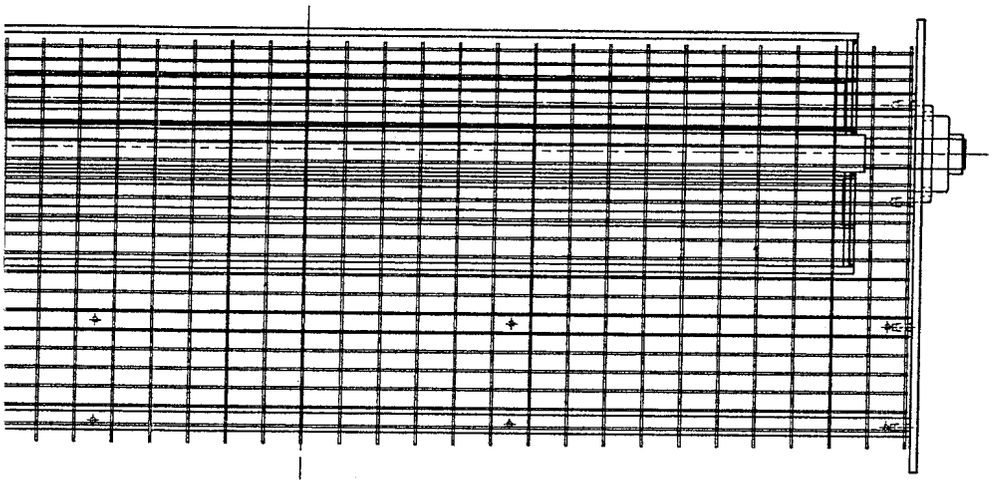
The drive consists of:

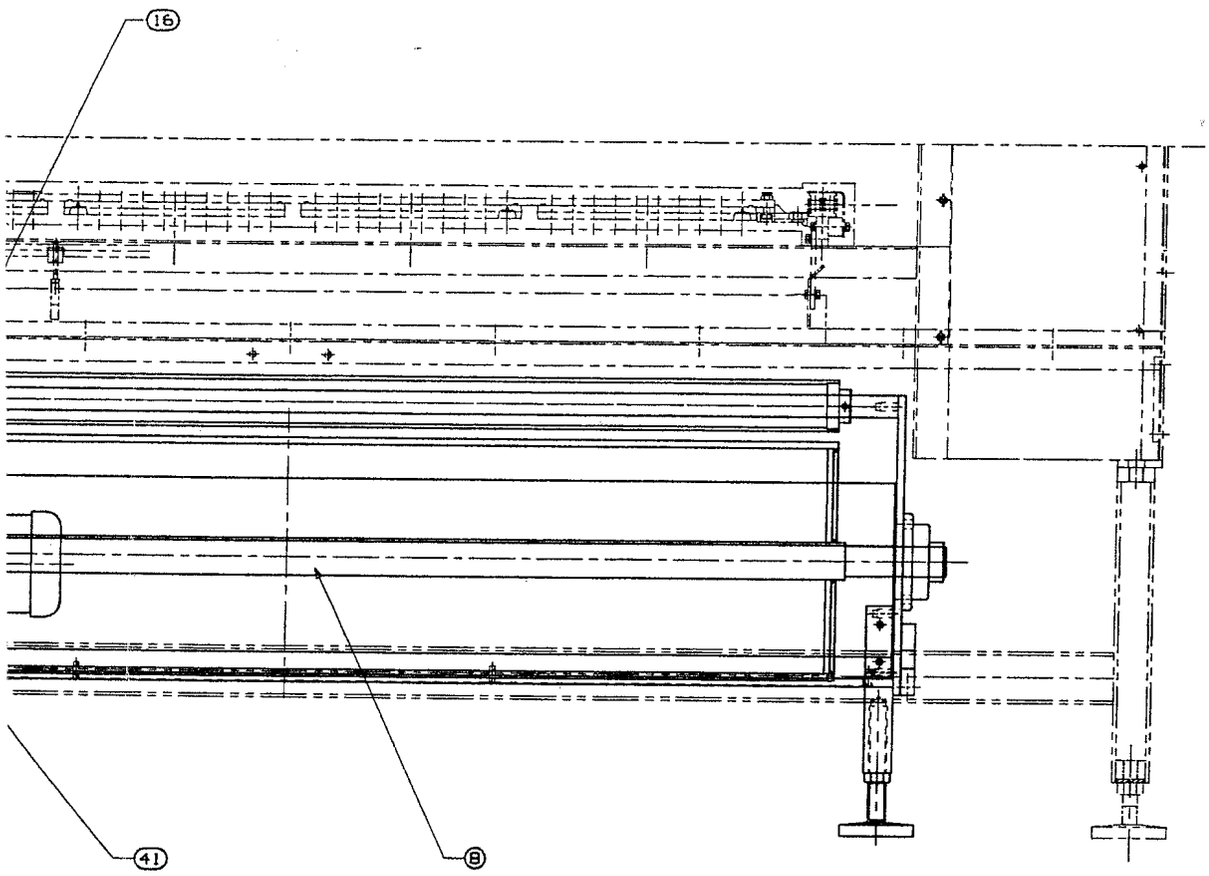
- A drive motor, controlled by a frequency controller, which is cascaded with the main conveyor drive motor. The motor is set to drive the assistor approximately 5-10% faster than the main drive.
- A magnetic powder coupling arrangement is included as an adjustable torque limiter. By altering the current to this unit, the amount of transmitted torque can be altered. It is designed to slip, taking up the difference in speed between the head and auxiliary drives whist maintaining a set torque throughout its speed range.
- A reduction gear is used to reduce the motor speed to match the conveyor speed.
- A sprag clutch allows the conveyor drive to run with the auxiliary drive switched off. When driven from the auxiliary drive motor, the clutch transmits the torque, set by the particle coupling, to the mould conveyor shaft.

13.4 Principles of Operation

The following block diagram shows the flow of control information in the Depositor.

9	10	11	12	13	14	15	16





REV	NOTE No	ALTERATION PARTICULARS	NAME & DATE

NAME	B.G.ANDREWS
DATE	30 JUL 1997
ORIGINAL SCALE	0.3
GROUP	157
NEAREST EQUIV	CA10060

TITLE: ASSEMBLY OF BAND DRIVE DEPOSITOR - 1300 WIDE M/C

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

THIRD ANGLE

TOLERANCE UNLESS OTHERWISE SPECIFIED MACHINED DETAILS ± 0.5 MM

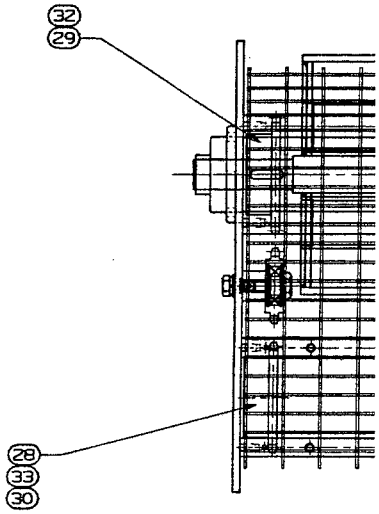
REV | SH 1 | OF 1

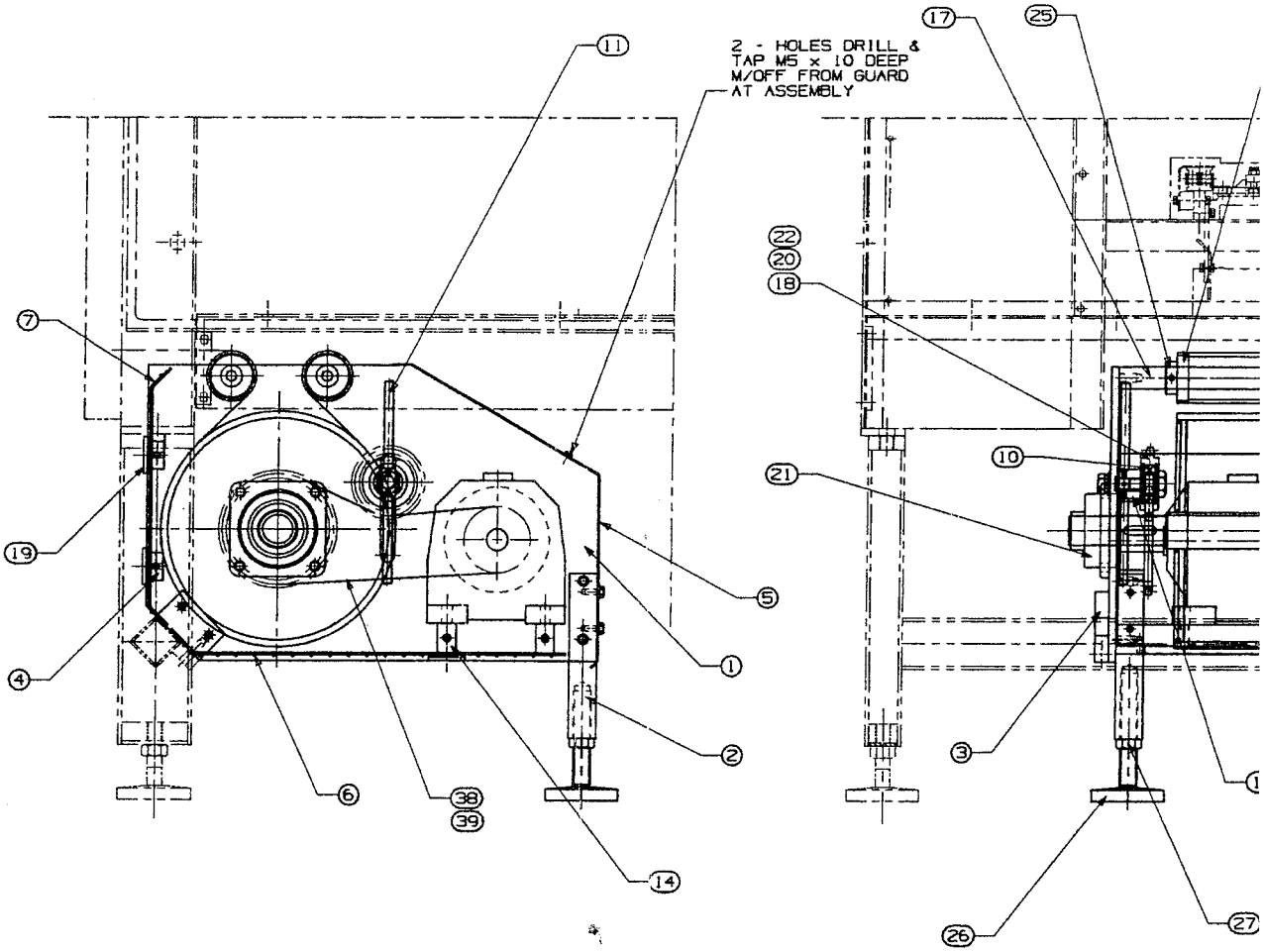
No. CA10435

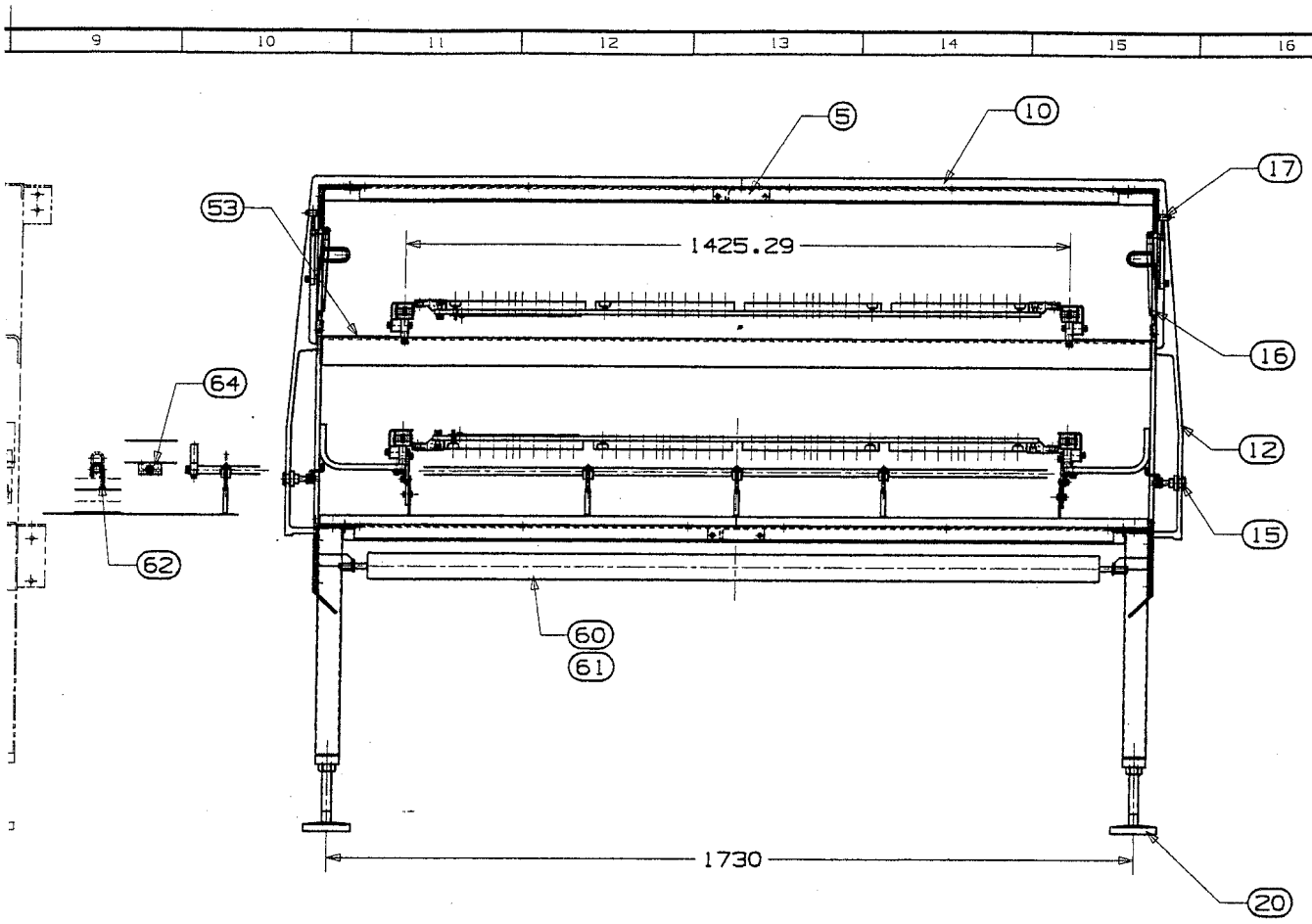
* DRAWING ARCHIVED ON :: 08/09/97 09:15 * UNIGRAPHICS V91 TOP VIEW

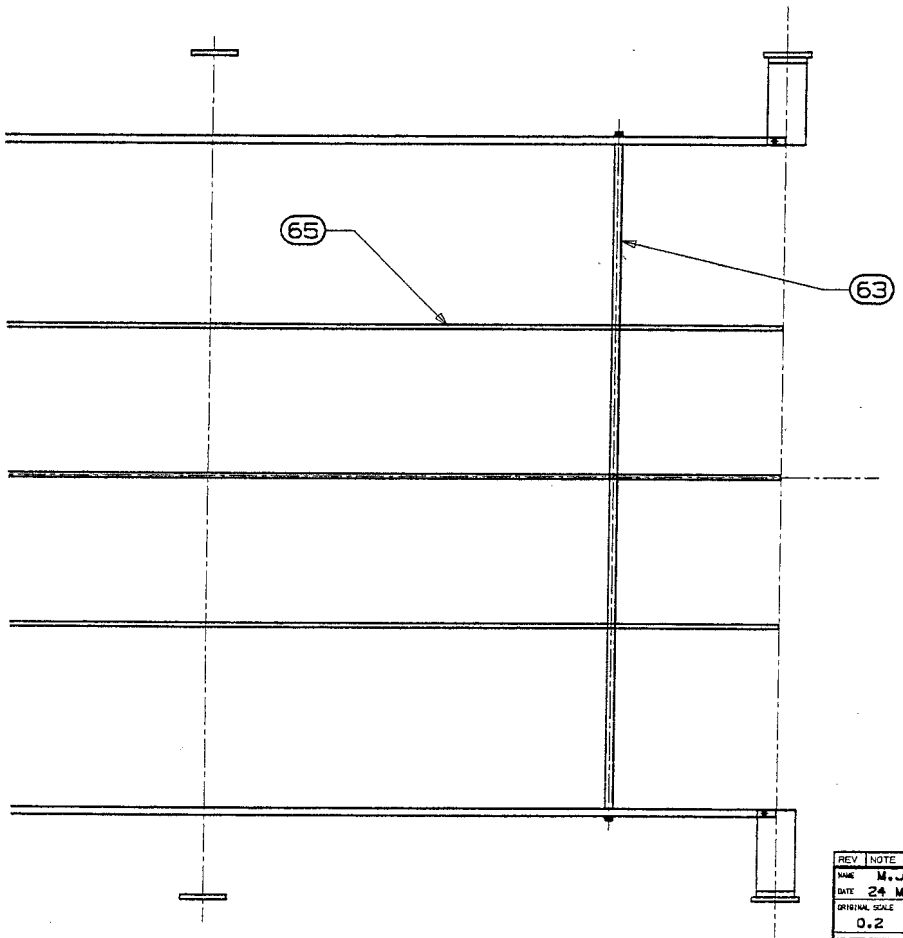
GENERAL NOTES

PARTS LIST:- CP10840









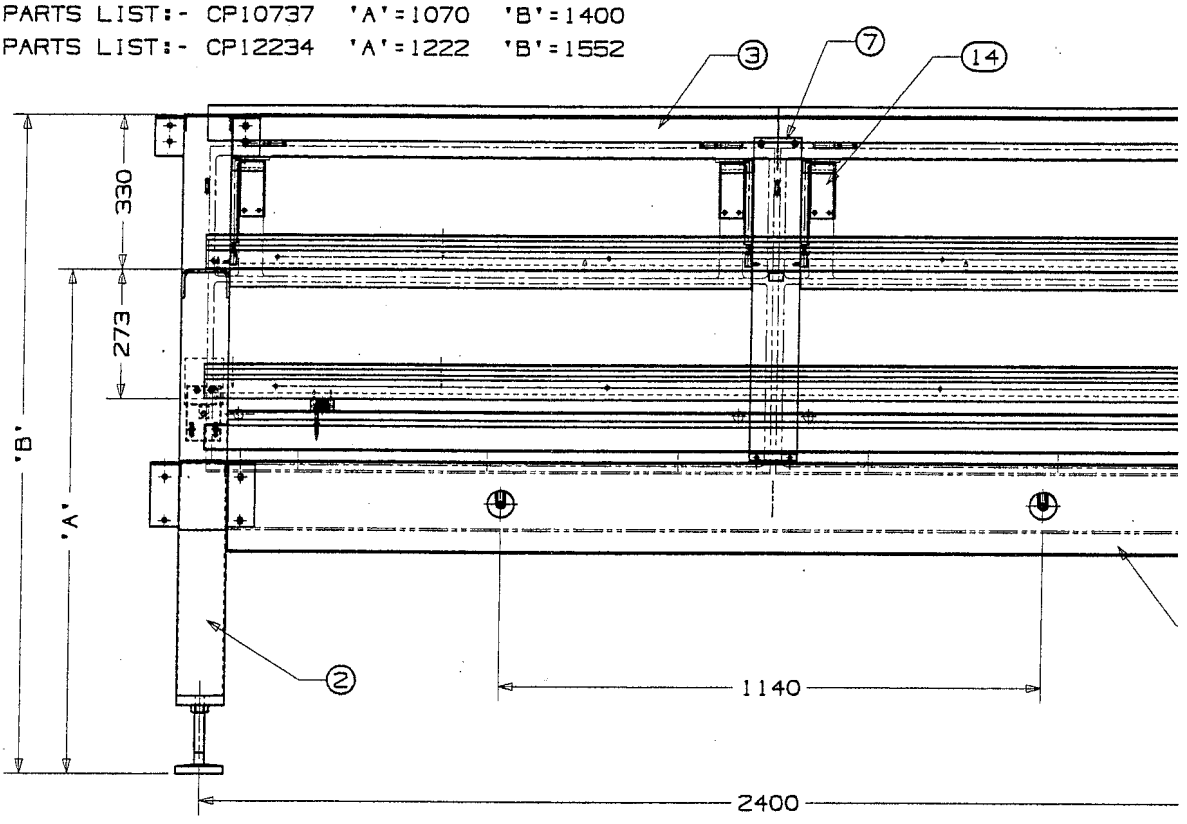
VIEW OF LANE GUIDE RAILS

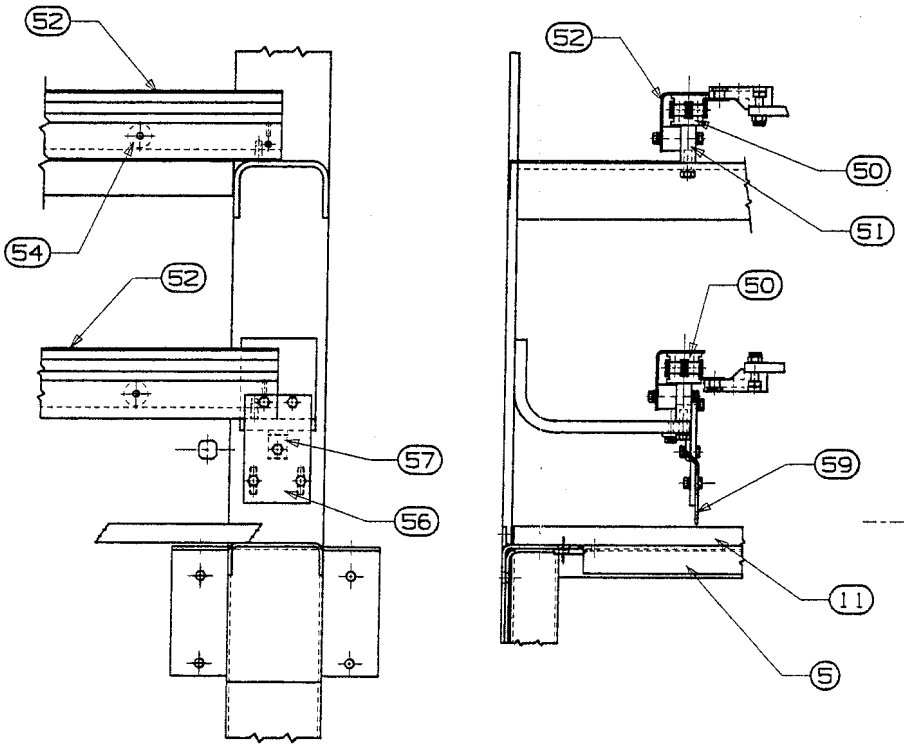
REV	NOTE No	ALTERATION PARTICULARS	NAME & DATE
NAME M.J.BOND.		TITLE 1300 TUNNEL MODULE 2.4 (WITH DIVIDERS) DEPOSITOR	
DATE 24 MAR 1997			
ORIGINAL SCALE 0.2	GROUP 156		
NEAREST EQUIV			

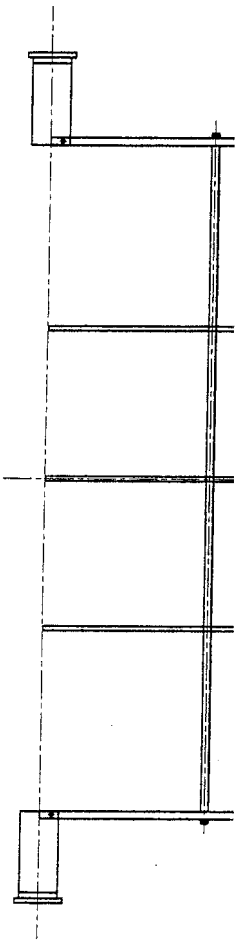
GENERAL NOTES

PARTS LIST:- CP10737 'A'=1070 'B'=1400

PARTS LIST:- CP12234 'A'=1222 'B'=1552







TOP AND BOTTOM COVERS TO BE FIXED WITH DIRECT FIXING 'PT' TYPE SELF TAPPING SCREWS 5 DIA x 25 LONG, PAN FLANGE, (REF.102) AND 1" O/DIA X 1/4" BORE WASHERS, (REF.100) DO NOT OVERTIGHTEN.
USE ADJUSTABLE TORQUE BLACK AND DECKER ELECTRIC SCREWDRIVER, REF.1019 WITH TORQUE SET TO NO.2

LARGER SCREWS 7 x 22, (REF.101) ARE PROVIDED FOR EMERGENCY OR SITE USE FOR INSTANCES WHERE HOLES HAVE BEEN DAMAGED.