LUCAS MACHINE TOOL COMPANY

Cable Address
"LUCAS" Cleveland
Iron Age Code on page 8

CLEVELAND, OHIO, U.S.A.

Manufacturers of Machine Tools

Other Code Used
Lieber's

FOREIGN REPRESENTATIVES

COVENTRY, Alfred Herbert, Ltd.
PARIS, Alfred Herbert, Société Anonyme
BRUSSELS, Alfred Herbert, Société Anonyme Belge
TURIN, Allied Machinery Co. d'Italia
BARCELONA, Allied Machinery Co. de España
LISBON, Allied Machinery Co. of America
ZURICH, Allied Machinery Co. of America
SYDNEY, Benson Bros., Ltd.
MELBOURNE, Benson Bros., Ltd.
DENMARK, NORWAY, SWEDEN AND FINLAND, V. Lowener
TOKYO, Andrews & George Company

Products

BORING, DRILLING AND MILLING MACHINES
POWER FORCING PRESSES

Uses

Our boring, drilling and milling machine is the result of nineteen years of development and improvement. It can be used on any kind of metal for boring, drilling or milling. It is especially suitable for the use of watch manufacturers, automobile manufacturers, and in gas engine and automobile repair shops.

"Precision" Horizontal Boring, Drilling and Milling Machine

The principal feature of this machine is that the spindle head raises and lowers. Since the head is a constant weight, the elevating screw is constructed proportionately to the weight of the head. In other types of machines, the table with load raises or lowers, and this, at times, throws an exceptionally heavy load on the elevating screws.

This construction admits of a deep, substantial bed which gives a solid foundation to other parts of the machine. Simplicity of construction has been kept in mind and all complicated mechanism has been avoided. Operation of each lever is simple and readily understood. Improved interlocking devices make it impossible to engage more than one feed at a time.

CONSTRUCTION—Bed is of box section design with numerous ribs and a continuous bottom. The machine can be set up in any part of the shop without the necessity of building a foundation under it.

Column is rectangular with a liberal base where bolted to bed. Spindle (bar) is of special hammered high carbon

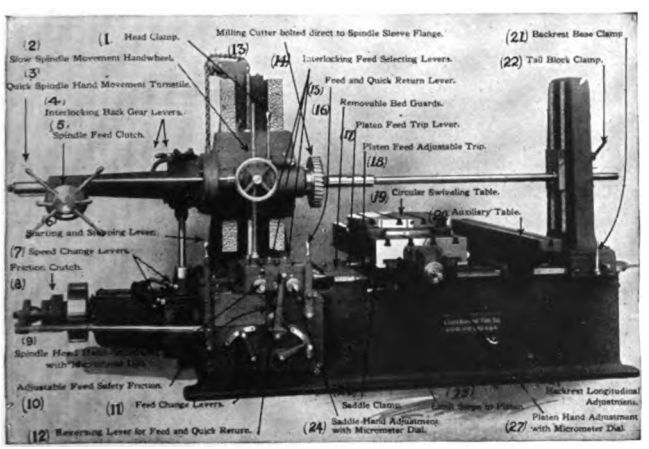

FIG. 1 STANDARD MACHINE NO. 31—FRONT VIEW

steel accurately ground. It cannot be lowered far enough to come into contact with platen. It is fed by a rack which runs out of engagement with its pinion at either end of the stroke, and thus makes jamming of the parts impossible. Spindle sleeve is a solid high carbon steel forging with a conical journal at the front, revolving in a solid bronze box. Spindle head has a long, narrow guiding edge with taper gib for take-up on one side and a square lock and cap with binder on the other. Center of spindle is close to face of column.

Elevating screw between the face of column and spindle (bar) is in such relation to the guide as to insure the most direct and accurate control of the vertical movement of the spindle head, which together with all parts connected to it, is balanced by a weight within the column. Spindle head and tail blocks are connected by a shaft and planed bevel gears and are therefore raised and lowered together. Platen is of extra size to give a large working surface. It is of such depth as to withstand any exceptional load that may be put on it. It has finished T-slots which are deep to insure additional strength in clamping.

Saddle is long and platen is therefore exceptionally well supported in its extreme front and rear positions. Back rest is symmetrical in design, and has a base with liberal bearings on the bed. The feed is applicable to spindle in or out, to spindle head and tail block up or down, to saddle along bed and to platen across the saddle. The feed is operated by two levers which control sliding gears, giving nine changes for either position of the spindle back gears, making a total of eighteen changes.

The rate of feed is the same wherever applied and is designed coarse enough for the largest milling cutter, and fine enough for drilling or for the most accurate boring. The feed reverse lever is located adjacent to the feed changing levers. It reverses any feed which may be engaged. Hand

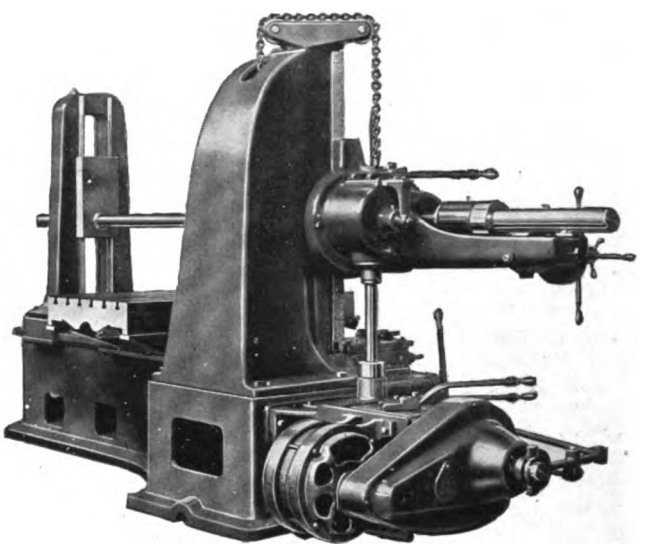

FIG. 2. MOTOR DRIVE—REAR VIEW

adjustments of spindle head, platen and saddle are available from both front and end of machine, and are so designed that no two parts can be moved at the same time with the same wrench. All actuating screws are of large diameter, are true to pitch and are provided with dials graduated to read in thousandths of an inch.

Safety friction devices are designed to introduce a yielding point and will slip before any of the mechanism is damaged. They are provided for both feed and power rapid traverse and all gears are enclosed. All levers are so arranged as to be within easy reach and so as to provide protection for the operator.

POWER—Spindle drive is transmitted from the power source to a gear of large diameter on the spindle sleeve. Back gears are located on the head and are engaged or disengaged by convenient interlocking levers. Machine is started and stopped by a friction clutch of simple construction, and is either belt or motor driven. Constant speed power rapid traverse is always in the reverse direction from the feed and is obtained by moving the feed engaging lever in the reverse direction. The reverse movement cannot be used when any feed is engaged, and the feed cannot be engaged when the reverse movement is in use, since the same lever operates both. The primary drive, whether by belt or motor, has constant speed.

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TABLE I. SPECIFICATIONS FOR HORIZONTAL BORING, DRILLING AND MILLING MACHINES*

Machine Number		31	32	33
(1) Maximum distance—spindle center to top of platen	in. (mm.)	24 (610)	30 (762)	36 (914)
(2) Minimum distance—spindle center to top of platen	in. (mm.)	1⅝ (41)	2 (51)	2⅜ (60)
(3) Maximum distance—face plate to spindle outer support, standard bed*	in. (mm.)	60 (1524)	72 (1829)	84 (2134)
(4) Distance—top of bed to top of platen	in. (mm.)	8⅝ (219)	9¾ (248)	10¼ (260)
(5) Spindle-diameter	in. (mm.)	3 (76)	3¾ (95)	4½ (114)
(6) Spindle-size of taper hole—(Morse)	No.	5	6	6
(7) Spindle travel—horizontal	in. (mm.)	24 (610)	52-2x26 (1320-2x660)	60-2x30 (1524-2x762)
(8) Spindle head travel—vertical	in. (mm.)	22⅞ (581)	28½ (724)	34⅛ (867)
(9) Platen travel—cross	in. (mm.)	36 (914)	44 (1118)	52 (1321)
(10) Platen working surface—size	in. (mm.)	24x48 (610x1219)	30x56 (762x1422)	36x64 (915x1626)
(11) Feeds (18), boring, drilling and milling—per revolution of spindle	in. (mm.)	0.003 to 0.399 (0,08 to 10,13)	0.004 to 0.606 (0,10 to 15,39)	0.004 to 0.735 (0,10 to 18,67)
(12) Rapid traverse—spindle, spindle head, saddle and platen (per minute)	in. (mm.	97 (2464)	84 (2134)	84 (2134)
(13) Speeds—spindle-number		12	18	18
(14) Speeds—spindle	r. p. m	15–200	7½–152	5–151
(15) Speed—main driveshaft—recommended	r. p. m.	350	300	300
(16) Speed—motor—recommended	r. p. m.	1000–1400	900–1300	900–1300
(17) Driving pulley diameter	in. (mm.)	14 (356)	16 (406)	20 (508)
(18) Belt width	in. (mm.)	3 (76)	4 (102)	4½ (114)
(19) Power required	h. p.	5	7½	10
(20) Floor space	in. (m.)	48x114 (1,2x2,90)	56x132 (1,4x3,4)	64x156 (1,6x4,0)
(21) Weight, net	lb. (kg.)	9000 (4080)	14500 (6580)	19500 (8845)
(22) Weight, boxed for export	lb. (kg.)	10400 (4720)	16600 (7530)	22000 (9980)
(23) Volume, boxed for export	cu. ft. (m³)	243 (6,9)	364 (10,3)	486 (13,8)
(24) Code word		AUTOCRAT	BANNER	FAMOUS
(25)	Attachments			
(26) Circular revolving table, plain, graduated to ½ degree. Diameter and thickness	in. (mm.)	24x4 (610x102)	30x4¼ (762x108)	36x4½ (914x114)
(27) Code word		DUFAB	DOGAT	DIJAX
(28) Circular revolving table with lockbolt for four positions 90 degrees apart, mounted on base plate, graduated to ½ degree. Diameter	in. (mm.)	24 (610)	30 (762)	36 (914)
(29) Thickness (Table and base plate)	in. (mm.)	5⅜ (137)	5¾ (146)	6 (152)
(30) Code word		DULEN	DOMES	DINOT
(31) Auxiliary table to support long work (length and width)	in. (mm.)	60x5 (1524x127)	72x5 (1829x127)	84x5 (2134x127)
(32) Code word		DUNAF	DOPIK	DIRAL
(33) Boring bars—any diameter up to	in. (mm.)	3 (76)	3¾ (95)	4½ (114)
(34) Code word		DUBEL	DOXOD	DISUM
(35) Star feed facing head, to be clamped to spindle or bolted to face plate, capacity—diameters up to	in. (mm.)	18 (457)	24 (610)	30 (762)
(36) Code word		DUCAN	DOVUR	DITAB
(37) Inserted tooth face milling cutters, with high speed steel blades, bolted to face plate, diameters in stock	in. (mm.)	8, 10, 12 (203, 254, 305)	10, 12, 15 (254, 305, 381)	12, 15, 18 (305, 381, 457)
(38) Code word		DUNEC	DORUV	DIBAT

*Extra length beds furnished to take 6, 7, 8, 9, and 10 ft. (1,8-2,1-2,4-2,7-and 3,0 m.). Special platens can also be furnished.

The variations of spindle speed are accomplished by sliding steel gears. The driving pulley runs on a sleeve so that the shaft is relieved of belt pressure. Gears, shafts and actuating screws are of large diameter and more than amply strong for the work they have to do.

Vertical Milling Attachment

This is a development of the "Precision" Horizontal Boring, Drilling and Milling Machine. Its application to the machine converts the latter into a vertical milling machine of great range and convenience. It is quickly and easily removed, leaving the machine unencumbered for its regular uses. On account of certain provisions which must be made for its application, this attachment must be ordered with the machine and cannot be furnished later. It is made in one length only, spanning the full length of the standard bed. It requires the double setting spindle feed to move vertical spindle head the entire length of cross rail.

Cross Rail

Both ends of the cross rail are strongly tied to its supports, as distinguished from the conventional type where the spindle head and saddle both overhang. The cross rail is of box section, well ribbed, and of ample proportions. This construction insures rigidity and furnishes a good bearing for the vertical spindle head.

VERTICAL SPINDLE HEAD—Is similar in construction to the horizontal spindle head of the machine itself. The drive is by large bevel gears of coarse pitch. Large diameter milling cutters are bolted directly to the flange of the vertical spindle. They are interchangeable with those used on the horizontal spindle sleeve of the machine. Small milling cutters and other tools with taper shanks are held by a draw bolt. Feeds in either direction are as simply obtained, and the same safety devices employed as in the horizontal machine proper.

VERTICAL SPINDLE DRIVE—Is through large bevel gears of coarse pitch. The pinion shaft of this drive is coupled to the horizontal spindle of the machine.

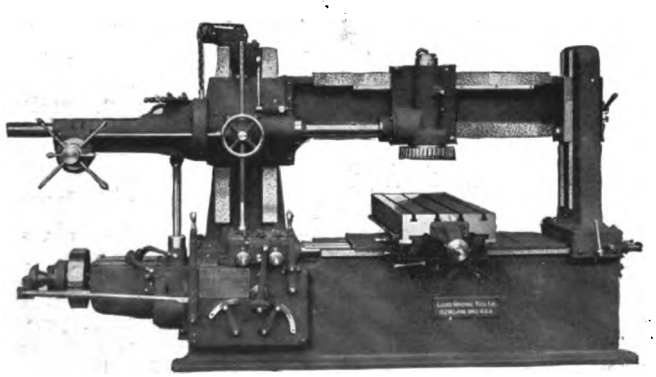

FIG. 3. VERTICAL MILLING ATTACHMENT—FRONT VIEW

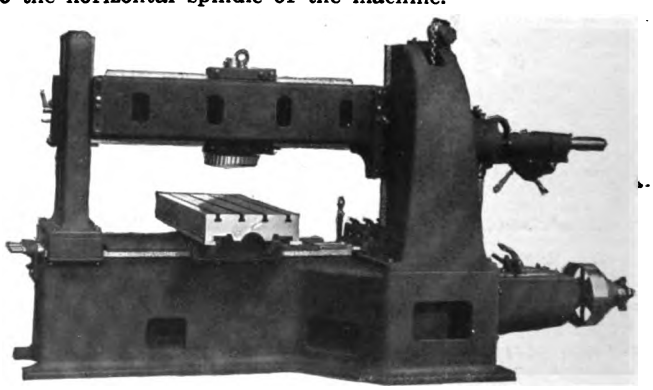

FIG. 4. VERTICAL MILLING ATTACHMENT—REAR VIEW

TABLE II. SPECIFICATIONS

(1) For machine number		31	32	33
(2) Morse taper hole in vertical spindle	No.	6	6	6
(3) Total travel of head along rail	in. (mm.)	40½ (1029)	52 (1321)	60½ (1537)
(4) Greatest distance from top of platen to face of vertical spindle	in. (mm.)	20½ (521)	26½ (673)	32½ (826)
(5) Range of speed	r.p.m.	7½–97	4–80	10¼–54
(6) Range of feeds per revolution of vertical spindle	in.	0.006–0.825	0.007–1.127	0.011–0.360
	(mm.)	(0,15–20,96)	(0,18–28,63)	(0,28–9,14)
(7) Largest milling cutter recommended	in. (mm.)	12 (305)	12 (305)	15 (381)
(8) Code word		CAJAW	CAJEK	CAJIB

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Lucas Power Forcing Press

The Lucas Press performs by power a large variety of operations requiring pressure. These applications cover the range of work between the operations of the hand or screw press and those executed by the hydraulic press. The press is simple in construction and effective in operation.

ADAPTABILITY—Performs efficiently the following duties, where pressure is necessary: Forcing arbors (mandrels), bushings, shafts or pins in or out of holes; forcing linings into pumps, seats into valves, etc.; bending or straightening; forming, marking, or broaching work; sizing holes with hardened plugs; testing castings; expanding babbitt bearings; sealing valves for testing; applying or removing locomotive driving box and rod brasses, brake lever fulcrum, link hanger and all motion work, bushings, etc.

WORKING ELEMENTS — The chief working elements are the ram, to which motion is transmitted by means of gearing controlled by a hand wheel, and a friction which engages a worm wheel. The latter is driven continuously by a worm on the pulley shaft.

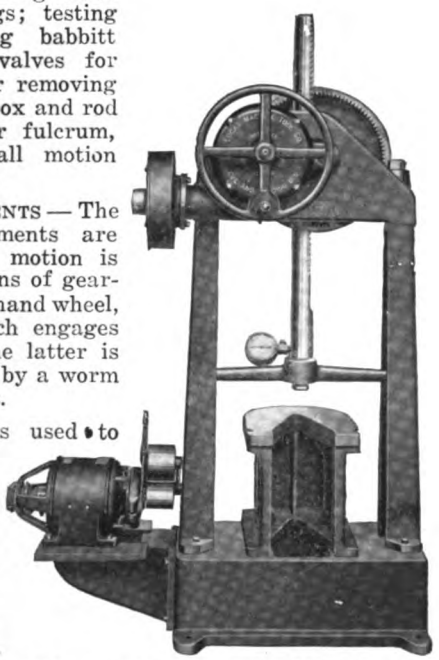

FIG. 5. STANDARD 15-TON (14 t.) PRESS, MOTOR DRIVEN

With base above floor.

HAND WHEEL—Is used to raise or lower the ram quickly. It also automatically applies the power when the ram meets with the resistance of the work. The amount of pressure is proportionate to the force exerted on the wheel. When the hand wheel is released, or when resistance ceases (as in forcing things out or off), the action of the press comes to an end. This insures freedom from accidents.

OPERATION—The operator applies, controls, graduates, and releases the power and does everything that has to be done to operate the press, all with one wheel.

MOTOR DRIVE—Fig. 5 shows the general arrangement for motor drive. Motors with belt-tightener attachment are recommended.

RATCHET-PRESSURE HOLDING ATTACHMENT — Holds the ram in the lowest position by means of pawls and a ratchet wheel. Can be attached to all types of Lucas Presses for stacking armature and transformer laminations, assembling commutators, sealing valves for testing, etc.

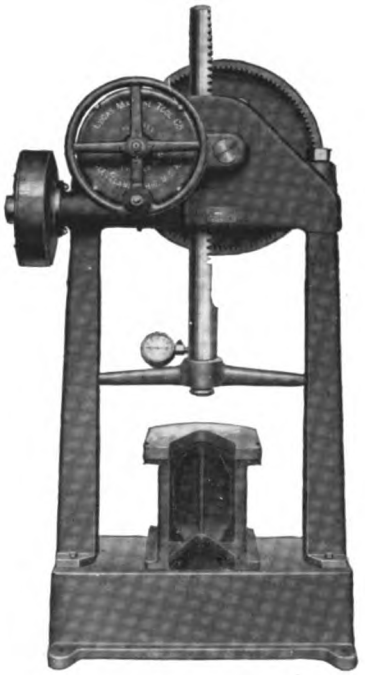

FIG. 6. STANDARD 30-TON (27 t.) PRESS, BELT DRIVE

With base above floor.

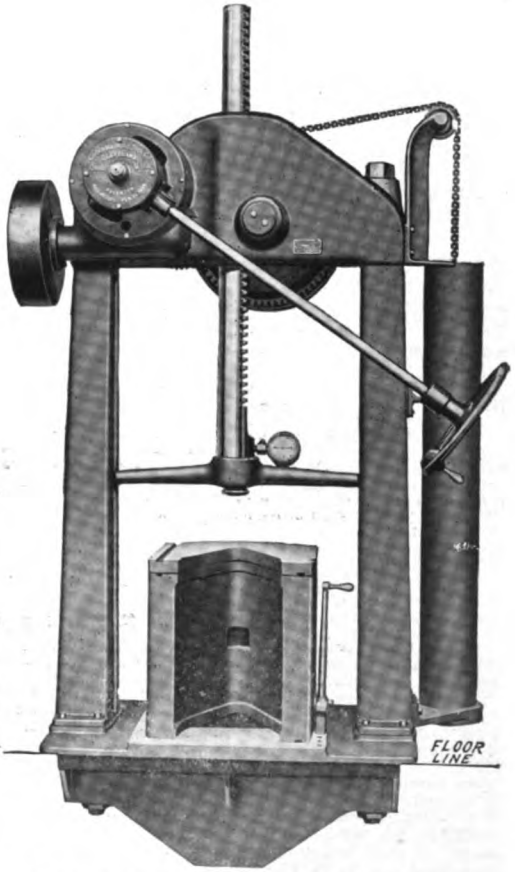

FIG. 7. HIGH PATTERN 50-TON (45 t.) PRESS, BELT DRIVE

With base below floor. Ram is counterweighted. All types of presses can be equipped with a pressure-holding attachment.

TABLE III. SPECIFICATIONS

Machine Number	15 ton (14t.)	30 ton (27t.)	50 ton (45t.)
(1) Capacity ..... tons (met. t.)	15 (13,6)	30 (27,2)	50 (45,36)
(2) Distance between housings ..... in. (mm.)	25 (635)	30¼ (768)	37 (940)
(3) Greatest dist. base to end of ram, with gauge .. in. (mm.)	39 (991)	39 (991)	36 (914)
(4) Height of base ..... in. (mm.)	12 (305)	12 (305)	12 (305)
(5) Height of V block ..... in. (mm.)	16 (406)	16 (406)	12 (305)
(6) Hole through base ..... in. (mm.)	8 (203)	10 (254)	12 (305)
(7) Diameter of tension rods ..... in. (mm.)	1½ (38)	2 (51)	2½ (64)
(8) Driving pulley, dimensions ..... in. (mm.)	12x2¾ (305x70)	14x3¼ (356x83)	16x4 (406x102)
(9) Speed ..... r.p.m.	250	250	250
(10) Speed of ram ..... in. (mm.) per minute	27 (686)	18 (457)	12 (305)
(11) Movement of ram per revolution of handwheel in. (mm.)	1.29 (32,77)	1.61 (40,89)	1.09 (27,69)
(12) Weight, net ..... lb. (kg.)	1950 (885)	2800 (1270)	5600 (2540)
(13) Weight, boxed for export ..... lb. (kg.)	2400 (1090)	3300 (1500)	6200 (2810)
(14) Volume, boxed for export ..... cu. ft. (m^3)	91 (2,6)	114 (3,2)	157 (4,4)
(15) Code word	CAMEO	CAMERA	CHAPLET
(16) The following special features can be furnished upon special order:			
(17) Wide pattern. Distance between housings ..... in. (mm.)	42 (1067)	48 (1219)	.....
(18) Code word	CABAL	CADAR	CAFAS
(19) High pattern, hand wheel not lowered. Vertical cap. ..... in. (mm.)	48 (1219)	48 (1219)	48 (1219)
(20) Code word	CABET	CADEM	CAFED
(21) High pattern, hand wheel lowered. Vertical cap. ..... in. (mm.)	60 (1524)	60 (1524)	60 (1524)
(22) Code word	CABIN	CADIT	CAFIL
(23) High pattern, with hand wheel. Vertical cap. in. (mm.)	72 (1829)	72 (1829)	72 (1829)
(24) Code word	CABOV	CADOK	CAFOB
(25) Constant speed motor for electric drive ..... h.p.	2	3	5
(26) Code word	CABUS	CADUL	CAFUR
(27) Motor speed recommended ..... r.p.m.	1200	1200	1200

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