

28 TAPE PRINTER UNIT (STOCK TICKER)

DESCRIPTION AND PRINCIPLES OF OPERATION

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DOUBLE PRINT HAMMER	8	ceiving-only tape-type printing telegraph	
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RIBBON FEED AND TAPE		wire or radio telegraph circuit. The unit re-	
FEED MECHANISMS	9	ceives stock quotations and transactions on an	
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A. General	10	mation on one inch wide paper tape for direct	
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OF TYPEBOX	15	2.01 The tape printer unit consists of a se-	
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		shaft assembly with a selector clutch, codebar	
		clutch, function clutch, and typebox clutch; an	
		aggregate motion transverse positioning mech-	
		anism controlled by four all steel clutches;	
		double print hammer printing mechanism; type-	
		box; ribbon feed and tape feed mechanism	
		(Figs. 1 & 2).	

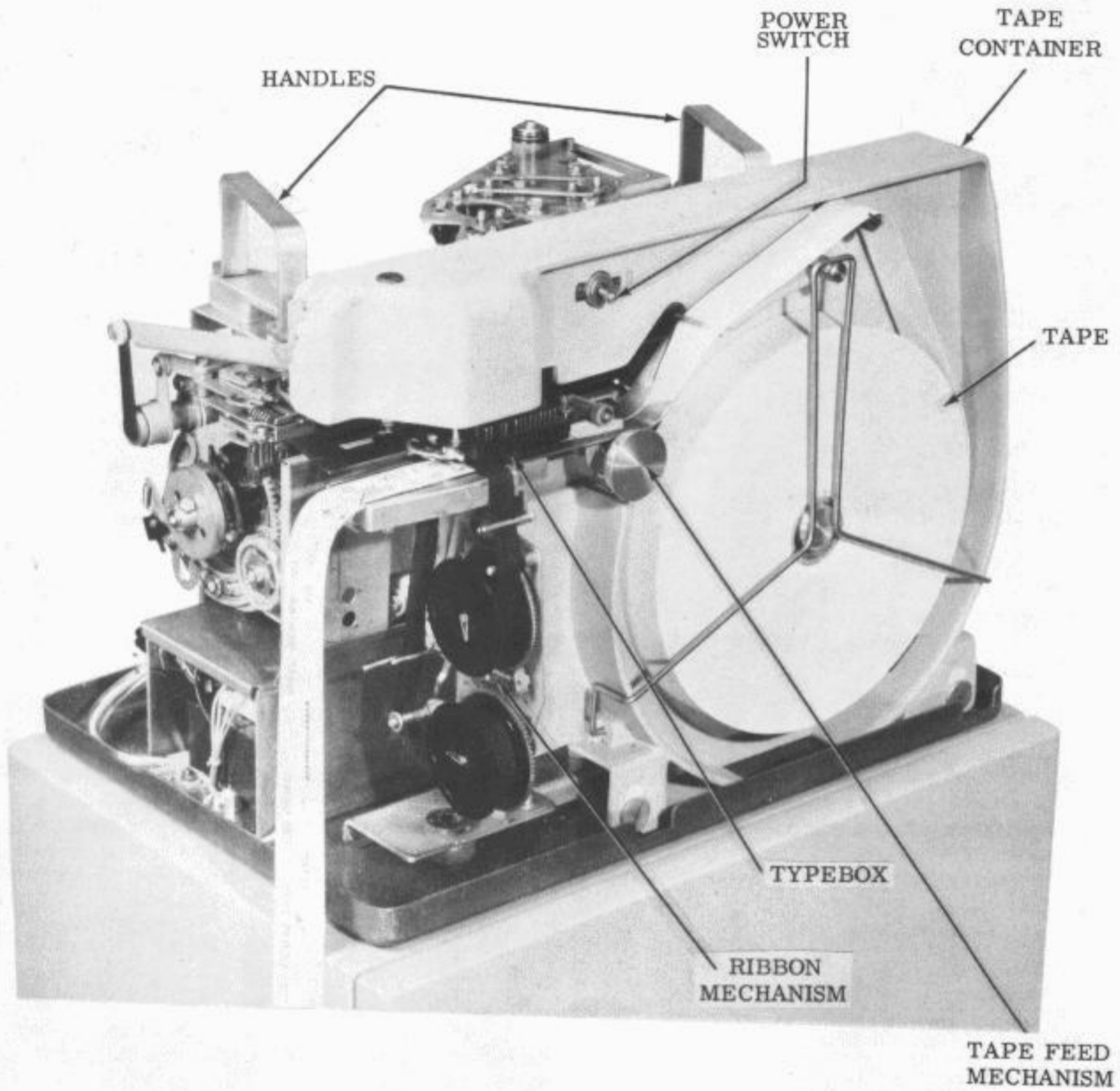


Figure 1 - Tape Printer Unit (Stock Ticker) on Base

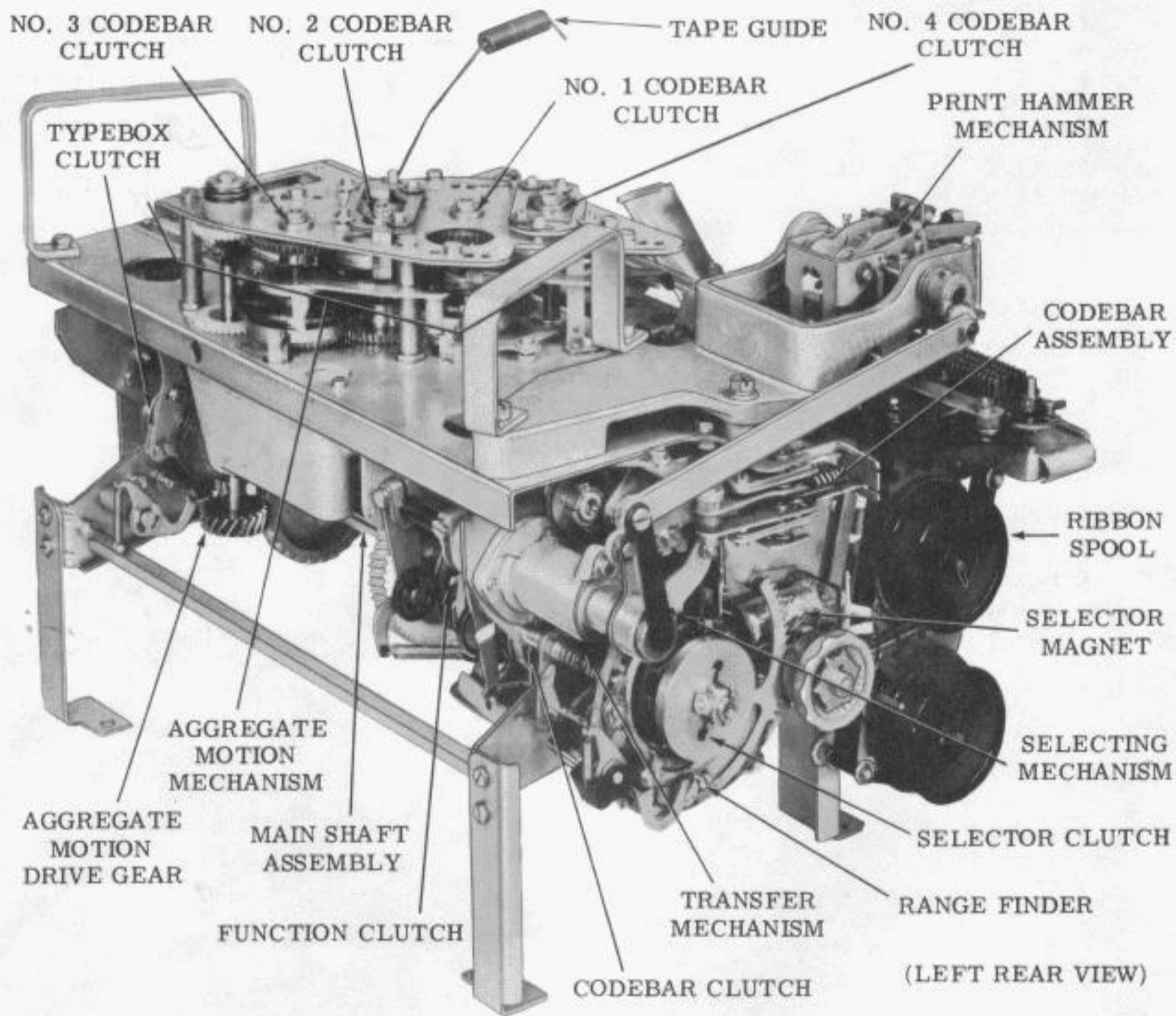


Figure 2 - Tape Printer Unit (Stock Ticker)

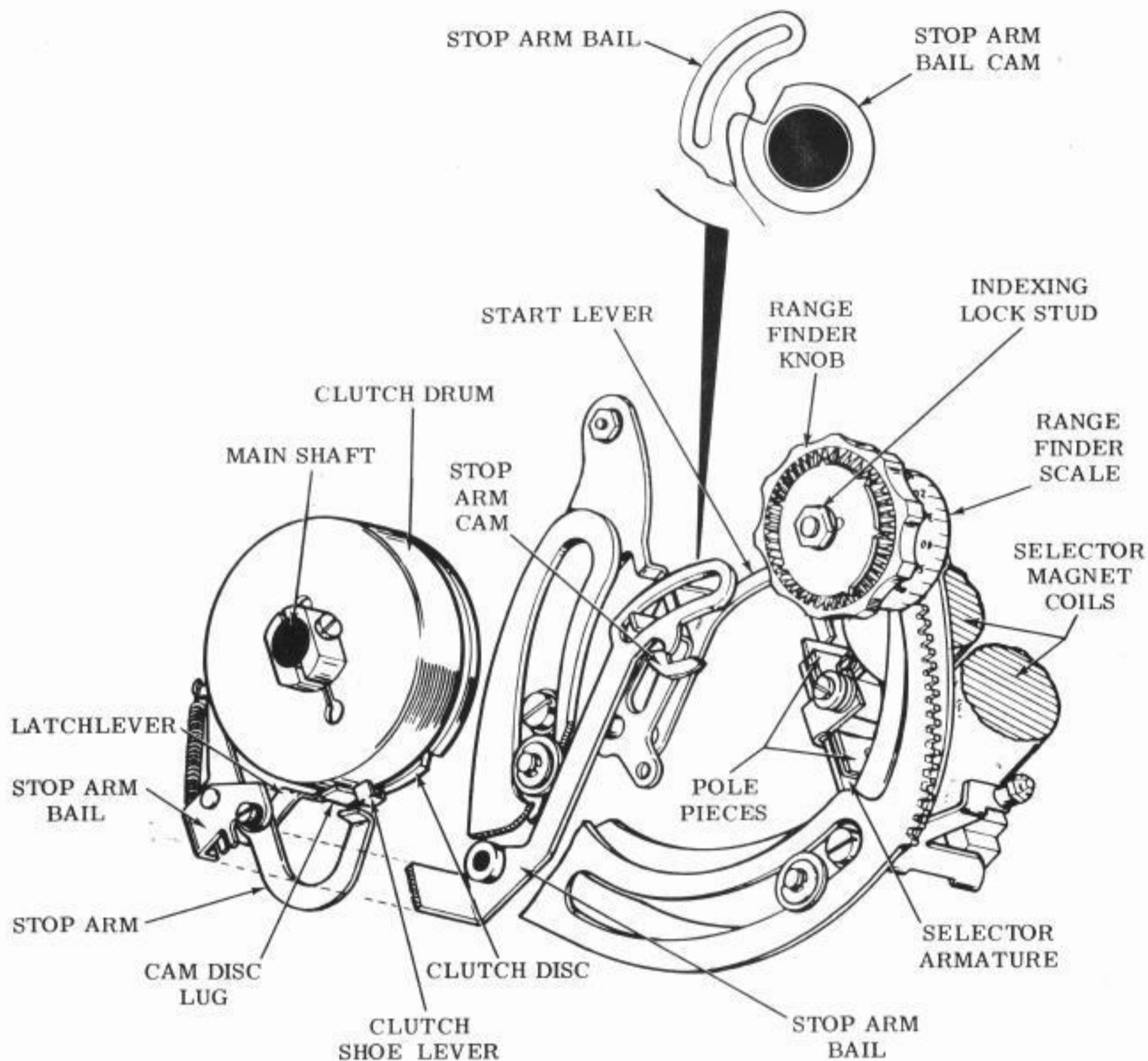


Figure 3 - Range Finder and Selecting Cam-Clutch Assembly

SELECTING MECHANISM

2.02 The selecting mechanism is basically a Model 28 2-Cycle Selector converted to 6-level. It consists of two selector magnet coils, an armature, selector levers, pushlevers and bails necessary to convert the electrical input pulses of the start-stop 6-level code to mechanical arrangements as the 2-cycle all steel internal expansion selector cam-clutch rotates. See Figures 3 and 4.

TRANSFER ASSEMBLY

2.03 A set of six transfer levers are located adjacent to the selector mechanism in line with the pushlevers of the selector (Fig. 4). The six transfer levers are Y shaped with extensions reaching to associated codebar shift-bars that are attached to a set of six codebars (Figs. 4 and 5). This chain of linkage is arranged to transfer marking or spacing code selections to the codebars. Two shift levers

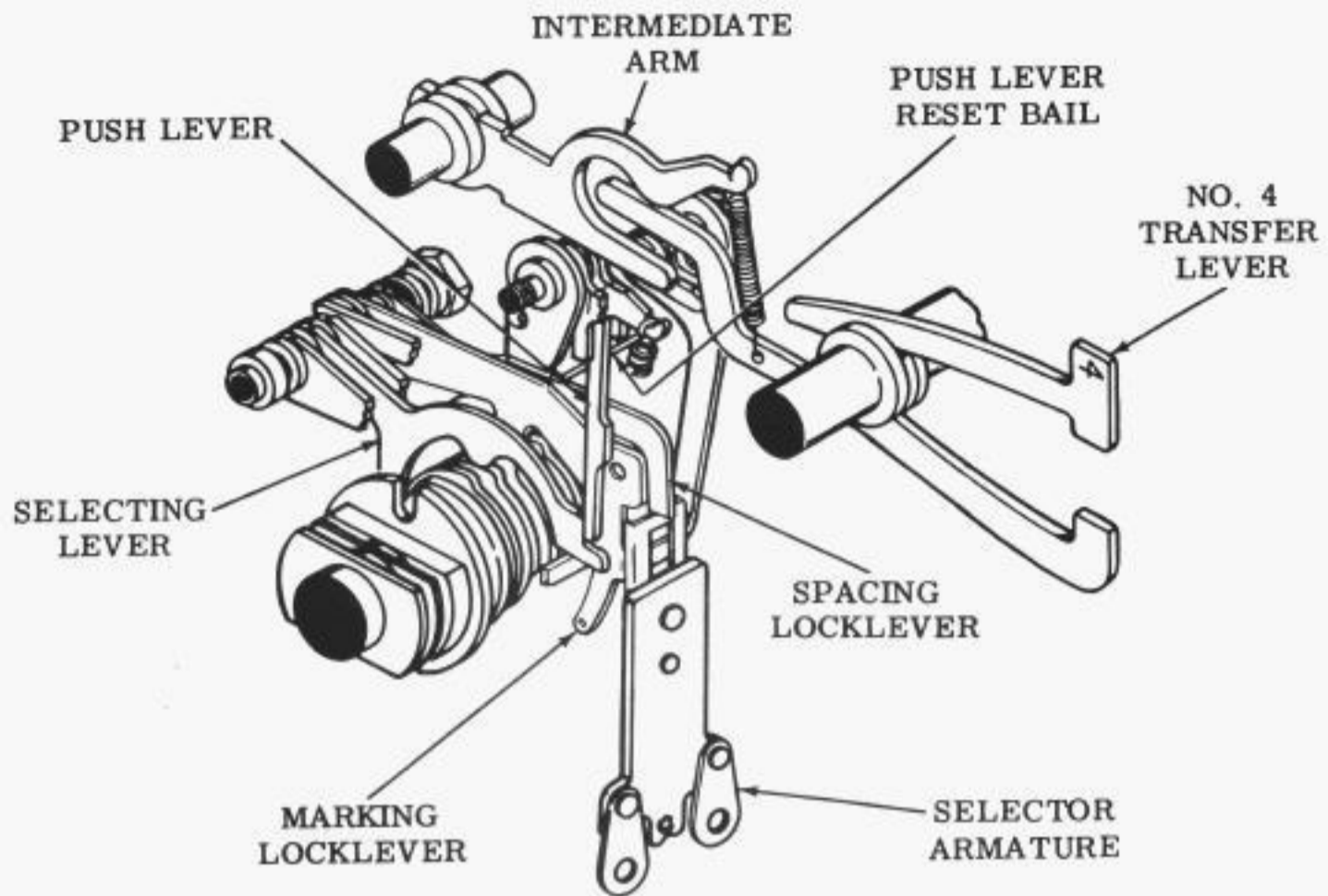


Figure 4 - Selecting Mechanism and Transfer Mechanism

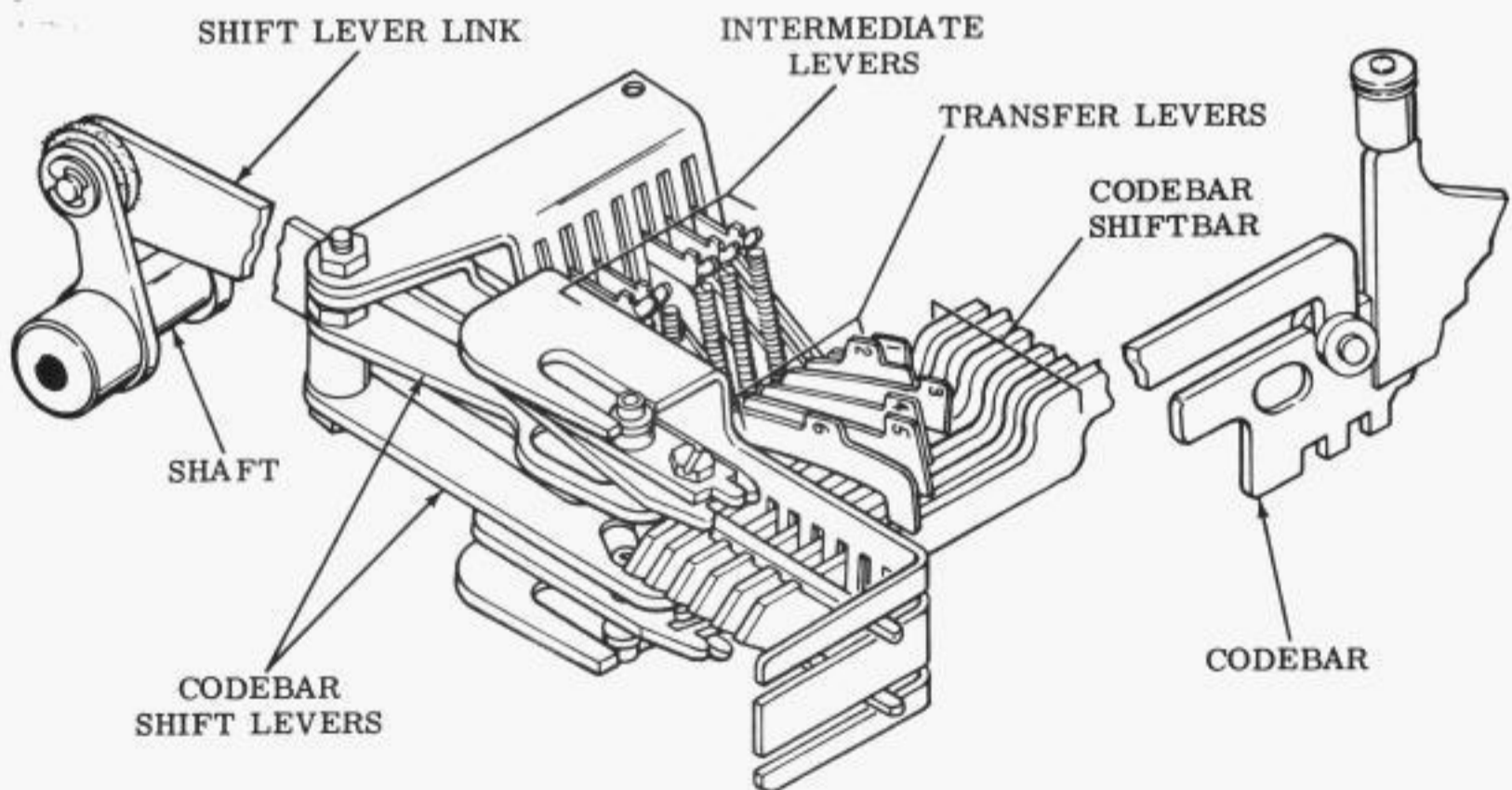


Figure 5 - Codebar Mechanism

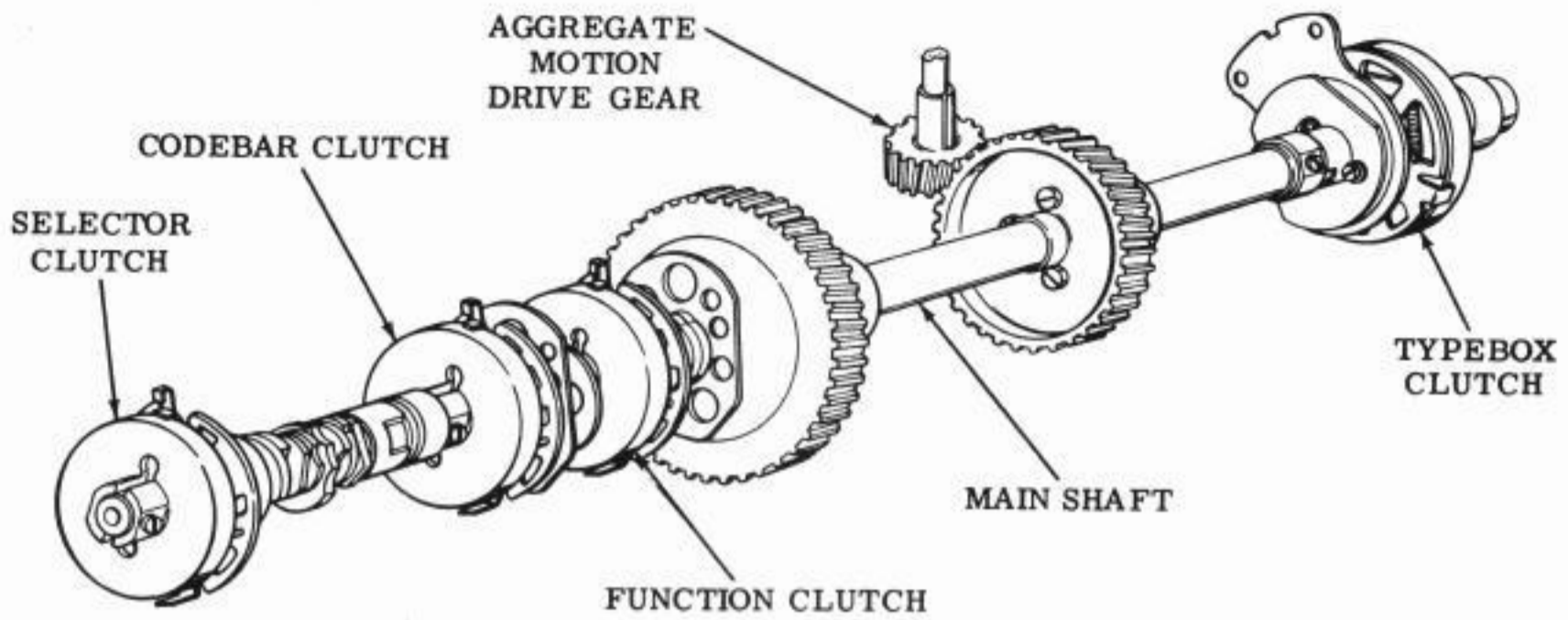


Figure 6 - Main Shaft Assembly

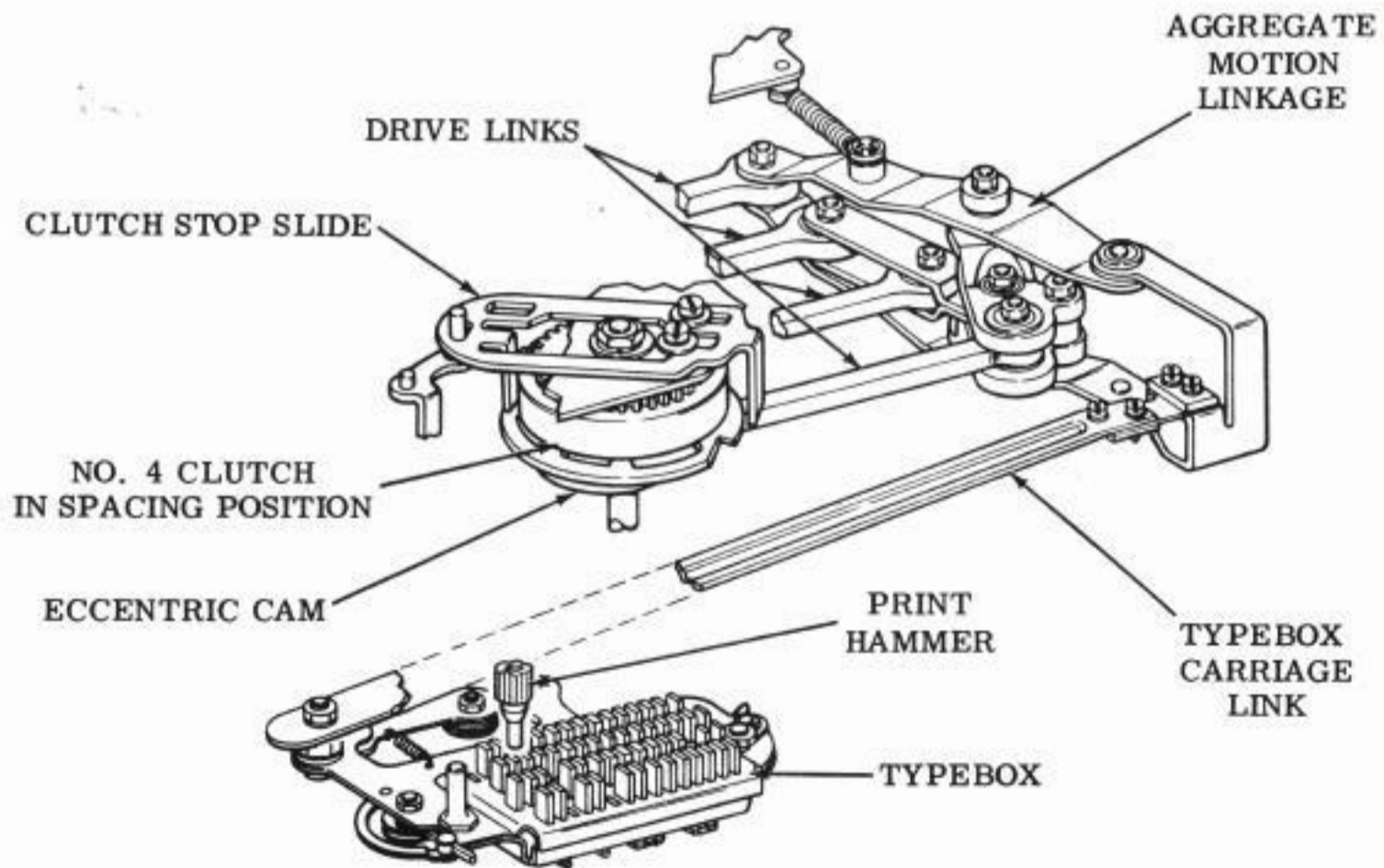


Figure 7 - Aggregate Motion Positioning Mechanism

that are actuated by a cam on the codebar clutch are positioned adjacent to the codebar shiftbars. These shift levers push or pull the codebars to or from marking or spacing position.

CODEBAR ASSEMBLY

2.04 Six codebars are positioned across the unit in line with the codebar shiftbars (Fig. 5). The No. 1, 2, 3, and 4 codebars (numbered from rear to front) have extensions reaching upward to bellcranks associated with the four clutch trip mechanisms of the aggregate motion positioning clutches. Through selection of each of these four codebars these clutches are tripped. The No. 5 codebar operates a bellcrank lever which is part of a clutch trip linkage of the typebox clutch. Positioning of this codebar determines the forward (spacing) or backward (marking) position of the typebox. The No. 6 codebar has an extension upward to a print hammer selecting mechanism. The marking position of this codebar selects the front print hammer, and the spacing position selects the rear print hammer.

MAIN SHAFT

2.05 The main shaft assembly extends across the entire length of the unit and is supported by ball bearings at each side frame. The assembly consists of a shaft, four all steel internal expansion clutches, and two gears (Fig. 6). One gear is driven by the pinion of a motor. The other gear drives the four clutches of the aggregate motion positioning mechanism through a drive shaft and a train of gears (Figs. 4 and 7).

2.06 The selector cam-clutch located at the left end of the main shaft is a two-cycle clutch with a cam sleeve which drives the 6-level selector through a complete operation during each half of a revolution.

2.07 The codebar clutch located just inside the side frame adjacent to the selector is tripped by the selector cam-clutch. This clutch also is the two-stop type. A cam on the clutch provides motion for operation of the codebars after their selection by the selecting mechanism.

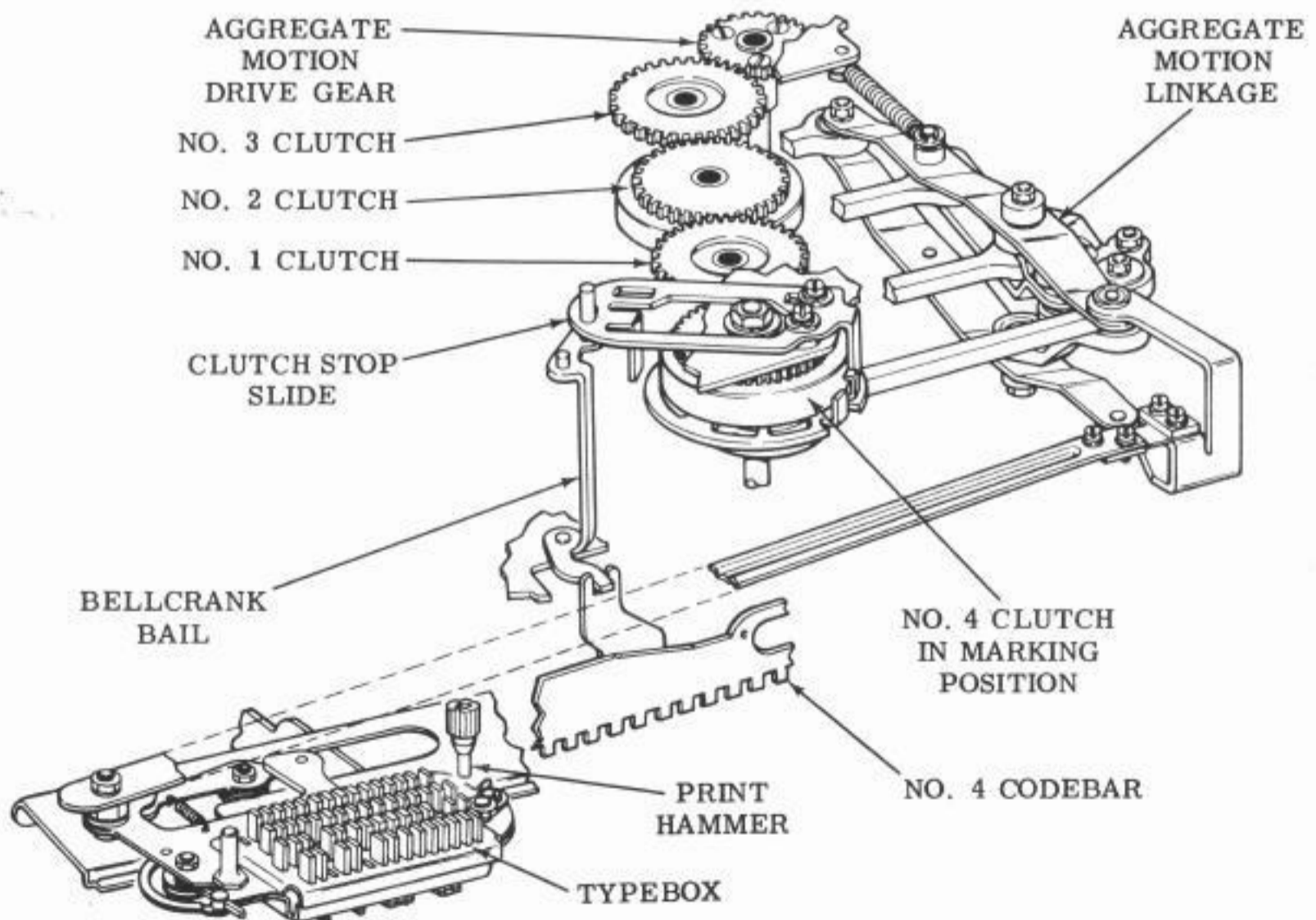


Figure 8 - Aggregate Motion Positioning Mechanism

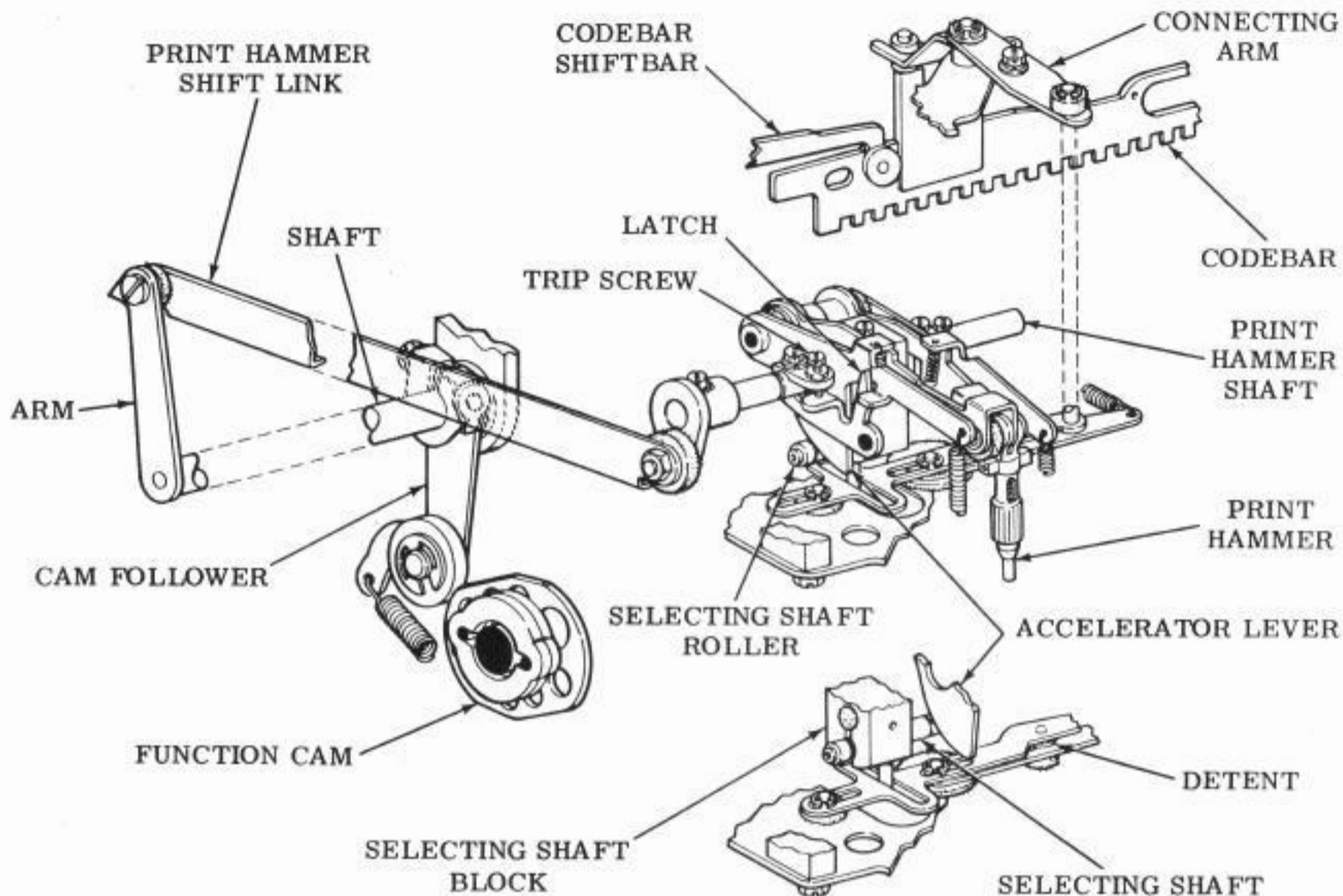


Figure 9 - Print Hammer Mechanism

2.08 The function clutch, third in line, is a two-stop clutch identical to the codebar clutch except for cams. This clutch is tripped by a cam on the codebar clutch. A cam associated with this clutch provides motion for operating the double print hammer mechanism. The same cam imparts motion that operates the tape feed and ribbon feed mechanisms.

2.09 The typebox clutch near the right end of the main shaft is a one-stop clutch which is controlled by a dual stop. It functions as a control for the forward or rearward position of the typebox.

TRANSVERSE POSITIONING

2.10 The transverse positioning mechanism located on top of the unit includes four all steel clutches with eccentric cams. Each

eccentric cam is enclosed in a drive link which transfers motion to an aggregate motion linkage. This linkage is connected through a single link to the typebox carriage (Figs. 2 and 7).

DOUBLE PRINT HAMMER

2.11 The print hammer mechanism (Figs. 2 and 9) located above the typebox consists of two print hammers, two accelerator levers and latches. A print hammer selecting mechanism controlled by the No. 6 codebar is located under the accelerator levers in position to select either print hammer depending on the marking or spacing position of the No. 6 codebar. Motion for operation is provided through a print hammer shaft which is actuated by a cam on the function clutch through a cam follower, shaft and print hammer shaft link.

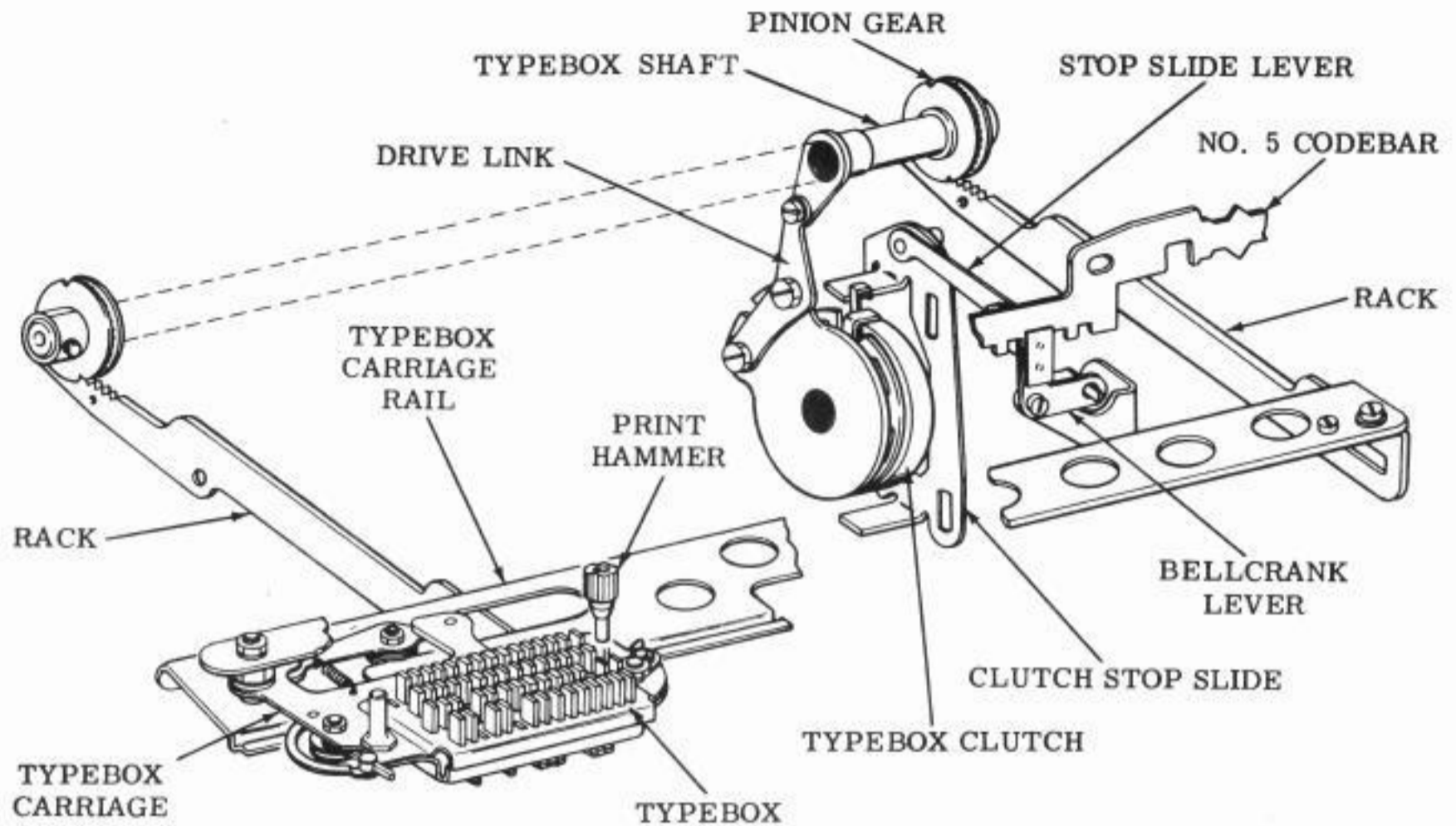


Figure 10 - Typebox Positioning Mechanism

TYPEBOX

2.12 The typebox contains 64 type pallet positions arranged in four horizontal rows of 16 positions each. The two front rows of pallets are figures, fractions and other symbols required for stock market quotations. The two rear rows are large letters. The typebox rides in a typebox carriage actuated horizontally by the aggregate motion positioning mechanism and forward or backward by the typebox clutch (Fig. 10).

RIBBON FEED AND TAPE FEED MECHANISMS

2.13 The ribbon feed mechanism is a conventional mechanism used on other Teletype equipment. It consists of two ribbon spool ratchets, a feed pawl attached to a drive slide, a check pawl and a reversing arm. The drive slide is connected to a drive link and shaft which transfers motion from the function cam (Fig. 11).

2.14 The tape feed is operated by the same motion as the ribbon feed mechanism through a drive link and shaft. A feed pawl and a detent engage a feed ratchet. A shaft from

the feed ratchet has a knurled feed roller at its opposite end under the tape. A pressure roller attached to a lever and spring applies pressure to the tape on top of the feed roller (Fig. 11).

TAPE CONTAINER

2.15 A tape container equipped with a tape reel retainer and tape guide is mounted at the front of the unit (Fig. 1). A toggle type power switch is conveniently located on the container.

3. PRINCIPLES OF OPERATION

3.01 The function of this tape printer is to receive and print stock market information on one inch wide tape. The information is received over a signal line in the form of 6-level signaling code combinations of marking and spacing intervals. Through action initiated by energization and de-energization of the selector magnets which attracts or releases the armature, the electrical signaling code combinations are transformed into mechanical motion which, when acted upon by rotation of main shaft, prints and advances the tape and ribbon.

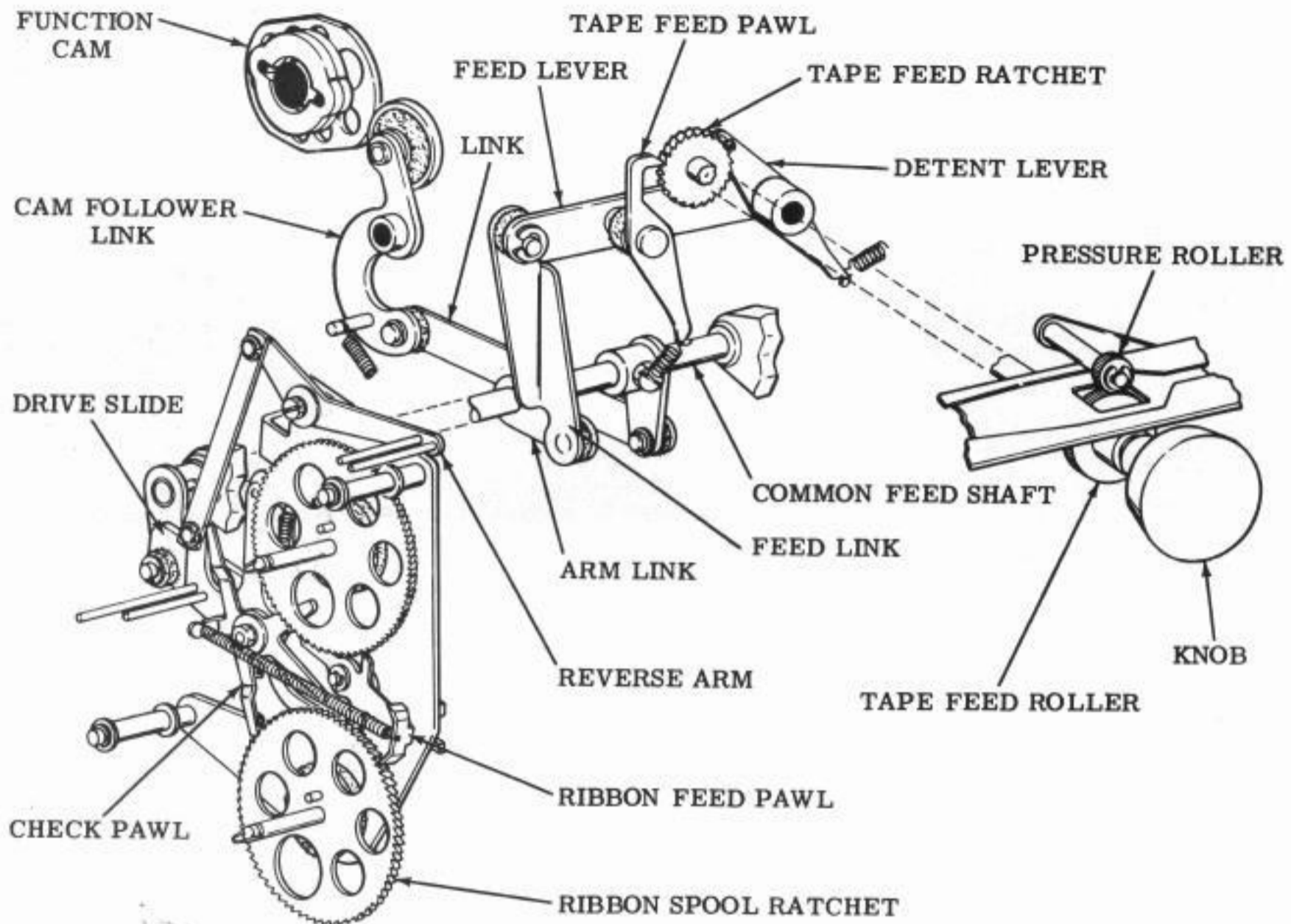


Figure 11 - Tape Feed and Ribbon Feed Mechanism

SIGNALING CODE (Fig. 12)

3.02 The electrical impulses received by the selector are in the form of a 6-level, 9-bit start-stop signaling code in which each character or function is represented by a sequential combination of current and no-current time intervals. Intervals during which current flows are known as marking intervals; whereas those during which no-current is applied are known as spacing intervals. Each combination consists of six-bits which carry the intelligence, any one of which may be marking or spacing, a start bit and two stop bits. The start bit is always spacing. The two stop bits are always marking. The start and stop bits insure synchronization between the transmitting and receiving units by bringing the receiving unit to a stop for a short interval at the end of each combination until transmission catches up.

MOTIVE POWER (Fig. 6)

3.03 Motive power is provided by a motor which drives the main shaft. Motion derived from the main shaft actuates all mechanisms involved in transforming the electrical impulses received over the signal line to the printed character on the tape. While the motor is running the shaft, together with the four clutch drums, turns continuously. Engagement of the clutches is initiated by the selecting mechanism.

SELECTION

A. General

3.04 The selecting mechanism, made up of a selector, a clutch trip assembly and a two stop cam-clutch (Fig. 3), translates the sig-

naling code combinations into mechanical arrangements which govern tape printing. The electrical pulses comprising each code combination are applied to a magnet of the selector. The magnet, through an armature, controls the clutch trip assembly and the parts associated with translation. The cam-clutch transfers timed motion to the selector and also trips the

function cam-clutch. By means of the range finder assembly, the selecting mechanism can be adjusted to sample the code bits at the most favorable time for optimum operation. The mechanical arrangements produced by the selecting mechanism are passed on through the transfer mechanism to control the positioning and printing mechanisms.

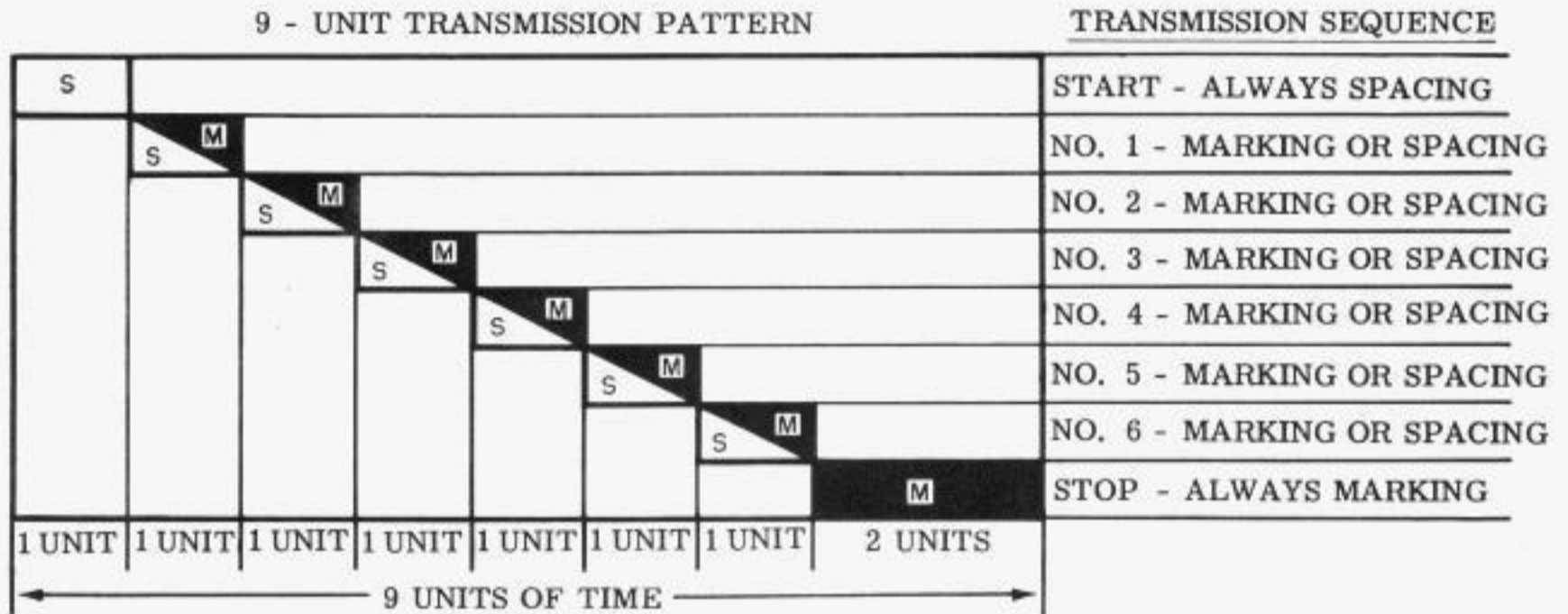


Figure 12 - Signaling Code

1-0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
2-0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
3-0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
4-0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1

5 6																
0 0	Blank	P	W	N	.	I	R	C	E	S	D	F	A	U	J	K
1 0	T	H	O	M	L	P	G	V	Z	Y	B	X	W	Q	&	R
0 1			0	Space	C	9	End Ann	3	5	S	4	6	I	Space Fig. 4	Reg. Ann	Space Fig. 3
1 1	∞	∞	Space Fig. 2	\$	S	S	7	3	7	3	2	5	1	1	B	Rub Out

LEGEND: 1 = MARK
0 = SPACE

Figure 13 - Typebox Arrangement (Viewed from Stem End) and Code Chart

B. Reception and Translation

Selecting Cam-Clutch and Trip Assembly (Figs. 3 and 4)

3.05 The selecting cam-clutch includes (from left to right in Fig. 6) the clutch, the stop arm bail cam, the sixth, fifth and fourth pulse cams, the lock cam, the third, second and first pulse cams, the stripper cam and the trip cam. During the time in which the signal line current is closed (marking), the selector magnet coils are energized and hold the selector armature forward against the magnet pole pieces (Fig. 3). In this position, the armature blocks the start lever, and the cam-clutch is held stationary between the stop arm and latchlever.

3.06 When a code combination is received, the start bit (spacing) de-energizes the magnet, and the selector armature under tension of its spring moves rearward out of the way of the start lever. The start lever turns clockwise under spring pressure and moves the stop arm bail into the indent of the stop arm bail cam (Fig. 3). As the stop arm bail rotates about its pivot point, the attached stop arm is moved out of engagement with the clutch shoe lever. The selecting cam-clutch engages and begins to rotate counterclockwise. The stop arm bail immediately rides to the high part of the cam, where it remains to hold the start lever away from the armature while the intelligence bits of the code are received and processed by the selector.

3.07 When the stop bit at the end of the code combination is received, the armature is pulled forward and blocks the start lever. Thus the stop arm bail is prevented from dropping into the low part of its cam, and the attached stop arm is held in position to stop the clutch shoe lever. When the clutch shoe lever strikes the stop arm, the inertia of a cam disc causes it to continue to turn until its lug makes contact with the clutch shoe lever. At this point, a latchlever drops into an indent in the cam disc, and the clutch is held disengaged until the next code combination is received.

Clutch Operation (Figs. 14 and 15)

3.08 The clutch drum is attached to and rotates in unison with the main shaft (Fig. 6). In the disengaged position, as shown in Figure 14, the clutch shoes do not contact the drum, and the shoes and cam disc are held stationary. Engagement is accomplished by moving the stop

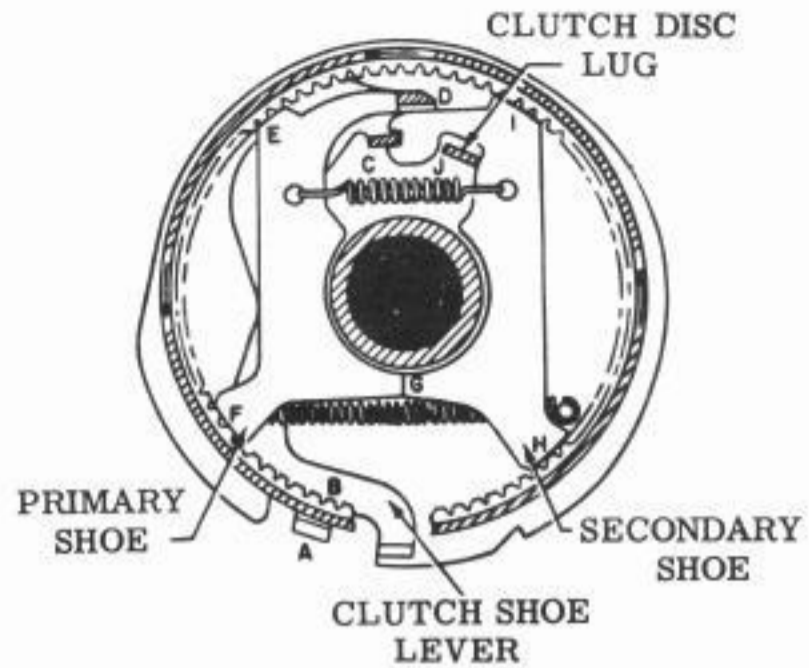


Figure 14 - Clutch, Engaged

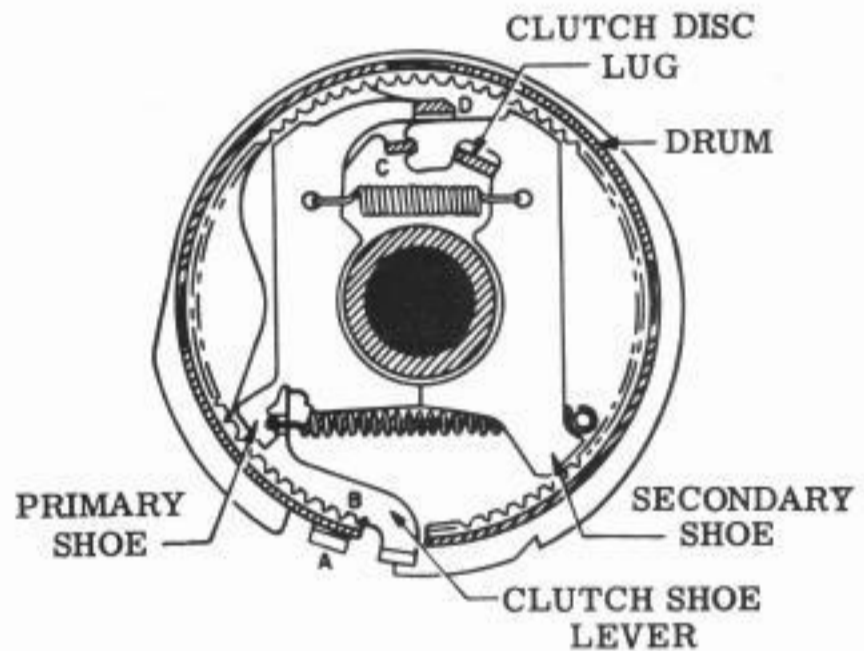


Figure 15 - Clutch, Disengaged

arm (Fig. 3) away from the clutch and thus releasing stop lug A and the lower end of shoe lever B (Fig. 15). The upper end of lever B pivots about its ear C, which bears against the upper end of the secondary shoe, and moves its ear D and the upper end of the primary shoe toward the left until the shoe makes contact with the notched inner surface of the rotating drum at point E. As the drum turns counterclockwise, it drives the primary shoe downward so that it again makes contact with the drum at point F. There, the combined forces acting on

the primary shoe cause it to push against the secondary shoe at point G. The lever end of the secondary shoe then bears against the drum at point H. The drum drives this shoe upward so that it again makes contact with the drum at point I. The forces involved are multiplied at each of the preceding steps. The aggregate force is applied through the shoes to the lug J on the clutch cam disc, and the disc and attached cam turn in unison with the drum.

3.09 Disengagement is effected when the lower end of shoe lever B strikes the stop arm (Fig. 3). Lug A and the lower end of the shoe lever are brought together (Fig. 14), and the upper end of lever B pivots about its ear C and allows its other ear D to move toward the right. The upper spring then pulls the two shoes together and away from the drum. The latchlever seats in the indent in the cam disc and the cam is held in its stop position until the clutch is again engaged.

Selector Operation

3.10 The selector assembly consists primarily of two magnet coils (Fig. 3), an armature and associated bails, levers and latches (Fig. 4). Six linkages, each of which consists of a selecting lever, a pushlever, an intermediate arm, and transfer lever, link the selector cam with the codebar mechanism. Since the linkages are identical, only the No. 4 is shown in its entirety in Figure 4. As the selecting bits of the code combination are applied to the magnet, the cam actuates the selecting levers. When a spacing bit is received, a marking locklever is blocked by the end of the armature, and a spacing locklever moves downward to the right of the armature and locks it in the spacing position until the next signal transition occurs. Extensions on the marking locklever prevent the selecting levers from following their cams. When a marking bit is received, the spacing locklever is blocked by the end of the armature, and the marking locklever swings downward to the left of the armature and locks it in the marking position until the next signal transition occurs. During this marking condition, the selecting levers are not blocked by the marking locklever extensions, but are permitted to move against their respective cams. The selecting lever that is opposite the indent in its cam, while the armature maintains a marking condition, swings downward, or to a selected position, while the end of an associated pushlever falls off a step on the selecting lever.

3.11 Each selecting lever has an associated pushlever which is pulled into a notch on the top of the selecting lever when the selecting lever falls into the indent in its cam. As the selector cam clutch rotates, each selecting lever is moved upward as it rides to the high part of its cam. Selected (dropped) pushlevers are also moved upward. Unselected pushlevers remain in the downward position, on top of the notch of the selecting lever. When all code pulses have been received, pushlevers are held in their selected or unselected position until the next start bit is received.

3.12 When the subsequent start pulse is received, the cam clutch is again engaged. The pushlever reset bail, following its cam, unlatches the selected pushlevers. The pushlevers then return to their unselected (downward) position under their spring tension.

C. Orientation

3.13 For optimum performance, the selecting mechanism should be adjusted to sample the signaling code bits at the most favorable time. To make this adjustment, the operating margins are established through the range finder, which provides a means of varying the time of sampling. The obtaining of this optimum setting is referred to as orientation.

3.14 When the range finder knob (Fig. 3) is pushed inward and rotated, its attached range finder gear moves the range finder sector (which supports the stop arm bail, stop arm and latchlever) either clockwise or counterclockwise about the selector cam-clutch. This changes the angular position at which the selector cam-clutch stops with respect to the marking and spacing locklevers. When an optimum setting is obtained, the range finder knob is released. Its inner teeth engage the teeth of the indexing lock stud and hold the range finder mechanism in position. The setting may be read on the range scale opposite a fixed index mark.

CODEBAR MECHANISM

A. Positioning

3.15 The character printed or the function performed by the typing unit is basically determined by the codebar mechanism, to which the input signal intelligence, translated into mechanical form, is transmitted from the selecting mechanism pushlevers. The codebars are positioned by codebar shiftbars which move

to the left for marking and to the right for spacing. The shiftbars, positioned downward for marking and upward for spacing, are pushed into marking position by selected pushbars through an intermediate arm and transfer lever linkage.

3.16 Power to position the selected codebar shiftbars, and through them the codebars, is supplied by the codebar clutch. The codebar clutch is tripped and engaged by motion from its cam on the selector cam clutch.

B. Operation

3.17 Each selector pushlever has an associated intermediate arm, transfer lever and codebar shiftbar (Fig. 5). In addition, there is a common transfer lever with its codebar shiftbar. When a pushlever is downward (spacing) its associated intermediate arm and transfer lever are pulled toward each other by a spring. The upper end of the transfer lever is held downward (spacing), holding the codebar shiftbar in spacing position. When a pushlever is moved upward (marking), it rotates the intermediate arm counterclockwise, positioning the transfer lever downward (marking) and holding the codebar shiftbar in marking position.

3.18 As the two-stop selector cam clutch completes a half revolution, the trip shaft operating lever rides to the peak of the codebar clutch trip cam. This causes the shaft to turn slightly (counterclockwise, viewed from the left) to move the codebar clutch trip lever away from the clutch stop lug and engage the clutch. Rotation of the clutch and its cam operates a cam follower attached to the shift lever drive and its shaft, shift lever drive arm and shift lever drive link. The drive link moves two codebar shift levers in a scissors like action, the upper lever moving to the right, the lower lever moving to the left. Any codebar shiftbar in marking position (right) during the previous operating cycle is moved to spacing position (left) by the forward shift lever, unless the transfer lever is once again holding that bar down (marking). The lower shift lever, as it moves to the right (Fig. 5) carries with it any codebar shiftbar held in the marking position, completing the transfer of intelligence from the selecting mechanism to the codebars.

3.19 At the end of a one-half revolution, the codebar clutch trip lever strikes the clutch shoe lever. Inertia of the cam disc assembly causes it to continue to turn to permit the latchlever to drop into the indent in the cam disc, and the clutch is held disengaged. The

codebars, codebar shiftbars and shift levers are held in the selected position, but the transfer levers and intermediate arms are free to position the shiftbars forward or to the rear in response to new input signal intelligence from the selector.

C. Arrangement

3.20 Six codebars which may be shifted in either marking (right) or spacing (left) position convey mechanically translated signal intelligence to the typing and function mechanisms. The codebars are arranged from front to rear as follows: Number 6 makes the selection of the two print hammers. If shifted to marking position the front print hammer operates. Number 5 determines whether the typebox is shifted to front or rear position. If marking, the typebox will be shifted to the rear. Numbers 4, 3, 2, and 1 codebars each control the two stop positions of the clutches in the aggregate motion positioning mechanism.

TYPEBOX POSITIONING

A. General

3.21 In order to print any character selected by the selecting mechanism, the typebox must be positioned so that the character in the typebox is directly over the desired location on the tape. The typebox is carried in a typebox carriage to a front or rear position, and to 16 horizontal positions. The front or rear positioning is controlled by the marking or spacing selection of the No. 5 codebar through the typebox clutch. The 16 horizontal positions are controlled by the marking or spacing selection of the Nos. 1, 2, 3, and 4 codebars through the corresponding clutches in the aggregate motion mechanism.

B. Front to Rear Positioning

3.22 The typebox carriage rides a track which is attached to two racks; one just outside each side frame (Fig. 10). These racks extend toward the rear of the unit where they mesh with two pinion gears attached to a typebox shaft that extends horizontally across the unit. An eccentric cam on the typebox clutch drives the typebox shaft through a drive link. The one-cycle typebox clutch is controlled by a dual stop slide with stop lugs located at opposite sides of the clutch.

3.23 A marking selection of the No. 5 codebar shifts the codebar toward the right side of the unit. The movement of the codebar to the

marking position (right) actuates a bellcrank lever which in turn moves the front end of a stop-slide lever downward. The opposite end of the stop-slide lever is attached to the upper end of the stop slide and consequently the slide moves upward releasing the clutch. The clutch turns counterclockwise, viewed from the selector end, and, through its eccentric drive plate, and link turns the typebox shaft clockwise. Through gears attached to the typebox shaft the racks and typebox carriage track are pulled to their rear position during a one-half revolution of the typebox clutch. With the typebox in its rear position, a print hammer (Fig. 9) will strike a type pallet in the first (front row) or third row of pallets depending on which print hammer (front or rear) is selected. Theory of print hammer selection follows. Since the movement of the clutch trip slide was upward at the beginning of the marking selection, the clutch stop lever was released by the upper end of the stop slide and the lower end was moved into blocking position for the clutch shoe lever. If the following selection for the No. 5 codebar is also marking, the clutch remains disengaged at its lower position. If the following selection for the No. 5 codebar is spacing, the codebar shifts to the left and, through its associated levers, releases the clutch from its lower position to disengage it at its upper position. This movement of the clutch rotates the typebox shaft counterclockwise to push the typebox carriage to its forward position.

HORIZONTAL POSITIONING OF TYPEBOX

A. Clutch Operation

3.24 The four clutches of the positioning mechanism are one-stop type with provision for stopping at opposite sides of the clutch. These four clutches are controlled by the Nos. 1, 2, 3, and 4 codebars. Each clutch is disengaged on opposite sides by lugs on a clutch stop slide (Figs. 7 and 8). The position at which each clutch is disengaged depends on the marking or spacing position of its respective codebar. Each codebar has an upward extension which transfers motion through a bellcrank bail or lever to the clutch stop slide. Each clutch has a drive link attached to its eccentric cam. The opposite end of the drive link is attached to an aggregate motion linkage (Fig. 8). When a codebar is moved to marking position, it releases its clutch on the one side and prepares to disengage it at the opposite side since the lug on the opposite end of the clutch stop slide has moved into the path of the clutch shoe lever. The motion developed by the eccentric is trans-

ferred to the aggregate motion linkage. When the clutch is released from its marking position by a spacing selection, it returns to be disengaged at its spacing position and motion is applied to the aggregate motion linkage in the opposite direction.

B. Aggregate Motion Linkage

3.25 The aggregate motion linkage consists of a system of three levers of double design pivoted one on the other by precision miniature ball bearings and terminating with a single simple linkage to the typebox carriage (Fig. 8). The linkage is arranged in such a pattern that the four input motions of the drive links which originate at the eccentric on each clutch are made to position the typebox in 16 horizontal positions as dictated by combinations of marking and spacing selections of the Nos. 1 through 4 codebars. For example, if the four codebars are in their spacing position during one-half revolution of the main shaft, the four positioning clutches will remain disengaged at their spacing stop position. The typebox will remain in its extreme right hand position while a print hammer strikes a type pallet in the extreme left hand row of the typebox (Fig. 7). If the next code combination contains No. 1, 2, 3, and 4 marking pulse, the four codebars will trip all four positioning clutches, which turn one-half revolution and, through their eccentrics, apply sufficient motion to the aggregate motion linkage to move the typebox carriage all the way to the left. A print hammer will then strike a type pallet in the extreme left hand end of the typebox (Fig. 8). Assuming that a third selection is a combination containing a No. 3 spacing pulse (all others marking), the No. 3 clutch will be tripped and rotate 180 degrees to its spacing stop position. Since this eccentric motion is applied to a different leverage in the linkage, the typebox is moved one type space farther to the right and a print hammer will strike in the second row from the right (see Code Chart Fig. 13). Similarly all of the other horizontal positions are reached by additions and subtractions of positions in the aggregate motion linkage created by marking and spacing combinations of the four codebars as directed by the selecting mechanism.

PRINT HAMMER OPERATION

A. Selection

3.26 Each of the two print hammers serves two horizontal rows of type pallets as the typebox is shifted forward or rearward. The hammer selected to strike a type pallet is

determined by the marking or spacing position of the No. 6 codebar. This codebar has an upward extension which fits in a slot of a connecting arm (Fig. 9). The connecting arm pivots about its center and actuates a selecting slide, attached to its opposite end, to the right or left as the No. 6 codebar shifts into marking or spacing position. A selecting shaft with a roller at each end is attached to the selecting slide underneath the accelerating levers. The selecting slide, through action of marking or spacing position of the codebar, is detented to right or left. This movement places a roller under one of the two accelerating levers for cocking a print hammer when motion is received from the operating mechanism.

B. Operation

3.27 Motion for operating the print hammer mechanism is derived from a cam on the function clutch. A cam follower that rides this function cam rotates a shaft with an arm. This arm operates a print hammer shaft link which is connected to the print hammer shaft through a short link on its left end. Through this chain of linkage the motion is transferred from the function cam to the print hammer shaft.

3.28 A selecting shaft block which carries the selecting shaft is attached to the print hammer shaft between the accelerator levers. The print hammer shaft provides motion for operating the print hammers. After selection of a print hammer, the print hammer shaft rotates counterclockwise and carries with it the selecting shaft block and selecting shaft. A roller of the selecting shaft lifts the selected accelerator lever until it becomes latched. This places the selected print hammer in a spring-loaded position. The return movement of the print hammer shaft (clockwise, as the function cam follower returns to the low part of the function cam) presses a trip screw against the latch until it is pulled from underneath the accelerator lever. As the spring loaded accelerator lever is snapped downward, it pulls the print hammer with a striking blow on a type pallet.

TAPE FEED

3.29 Motion for driving the tape feed and ribbon feed mechanisms is derived from the function cam on the function clutch (Fig. 11). A cam follower link that rides the function cam transfers motion to a common feed shaft through a link. The common feed shaft serves a dual

purpose by actuating both the tape feed mechanism and the ribbon feed mechanism. Through an arm link, a feed link, feed lever and pawl, a tape feed ratchet is stepped one character space for each half revolution of the function cam. The feed ratchet turns a tape feed shaft and knurled feed wheel. A detent lever and roller also rides the feed ratchet to insure that the feed wheel stops in the proper position for equal spacing between characters. A pressure roller, lever and spring are used to apply pressure to the tape on top of the feed wheel.

RIBBON FEED

3.30 The ribbon feed mechanism is driven by the function cam through the common feed shaft. A ribbon drive link at the left end of the shaft is connected to a ribbon feed drive slide which provides motion for operation of the ribbon feed mechanism.

3.31 The characters are printed in ink supplied by an inked ribbon which is held between the tape and the typebox by a guide and advanced by the ribbon feed mechanism (Fig. 11). The path of the ribbon is to the left off the lower spool, under a lower roller, through the lower pins on the reversing arm, over corner rollers on the tape chute, through the upper pins on the reversing arm, over the upper roller and to the right side of the upper spool.

3.32 During each one-half revolution of the function cam, the drive slide pushes the feed pawl to the right over a tooth on the spool ratchet. As the drive slide returns by action of its drive shaft, a spring tension pulls the feed pawl to advance the ribbon spool one tooth. A retaining pawl under spring tension detents the ratchet. During each operation, the ribbon is advanced in this manner until the ribbon feed mechanism is reversed.

3.33 When a spool is almost depleted, a ratchet in the ribbon encounters the pins on the reversing arm. Stress applied through the ribbon as it is rolled onto the other spool pivots the arm. As the pawl assembly is moved to the left at the end of the next operation, an extension strikes the reversing arm to shift the pawl over against the other ribbon spool ratchet. The left extension of the pawl pivots a reversing lever which shifts the retaining pawl so that it engages the opposite ratchet. The ribbon will then feed in the opposite direction until again reversed. A detent holds the reversing arm in position until its next reversal.