

Feb. 18, 1947.

L. M. POTTS

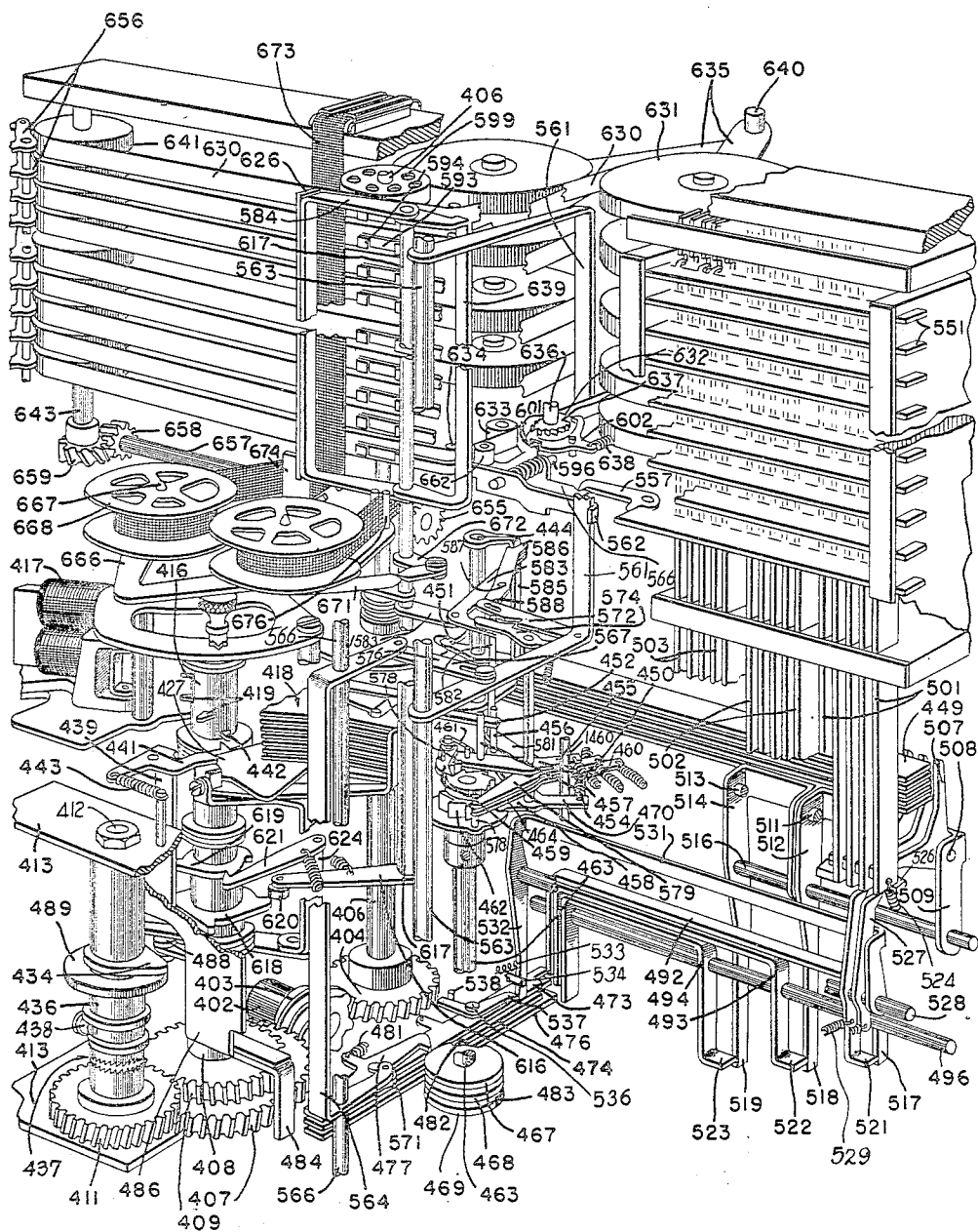
2,415,909

PRINTING TELEGRAPH APPARATUS

Original Filed May 15, 1939

6 Sheets-Sheet 1

FIG. 1



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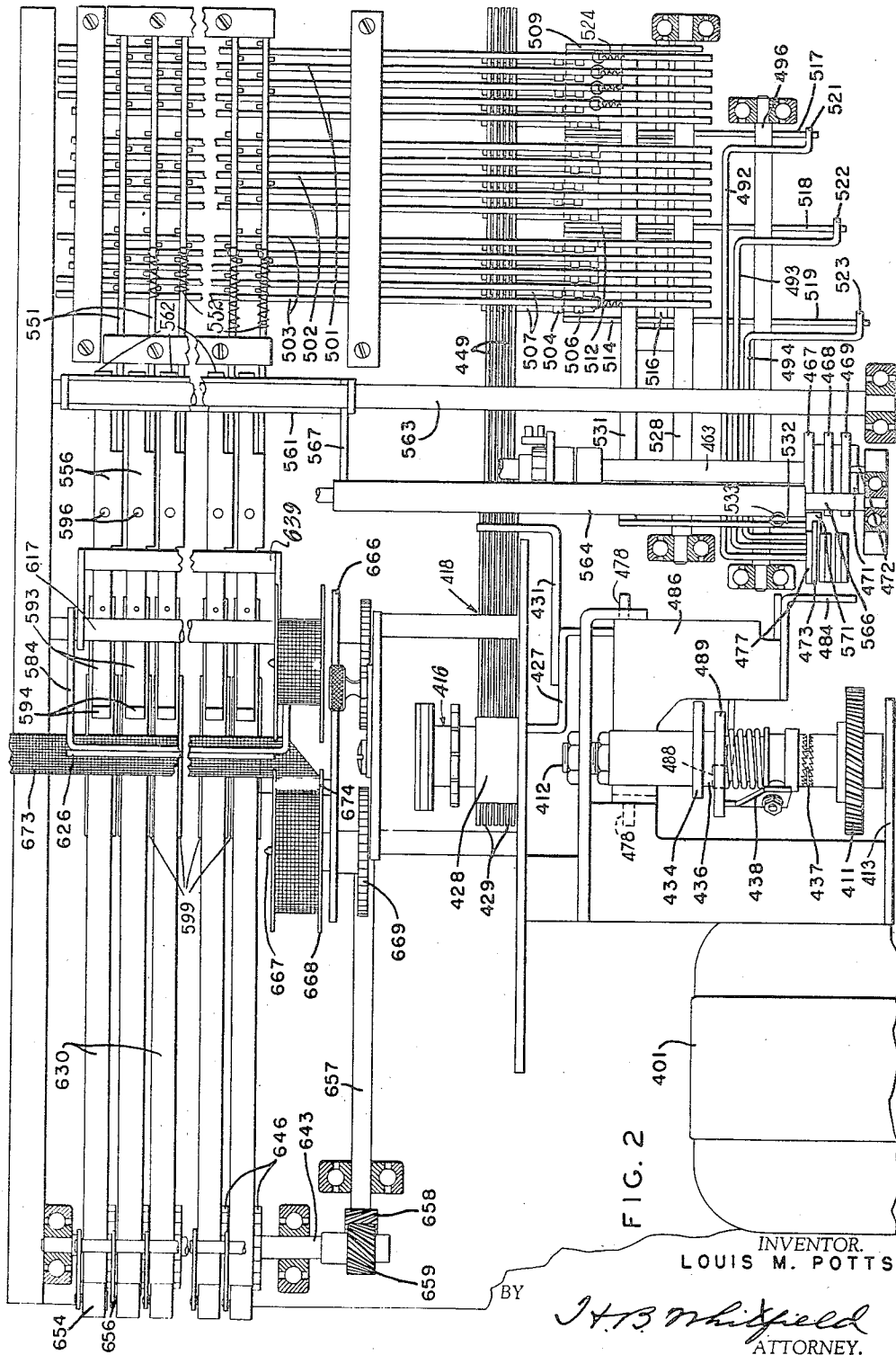
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PRINTING TELEGRAPH APPARATUS

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6 Sheets-Sheet 2



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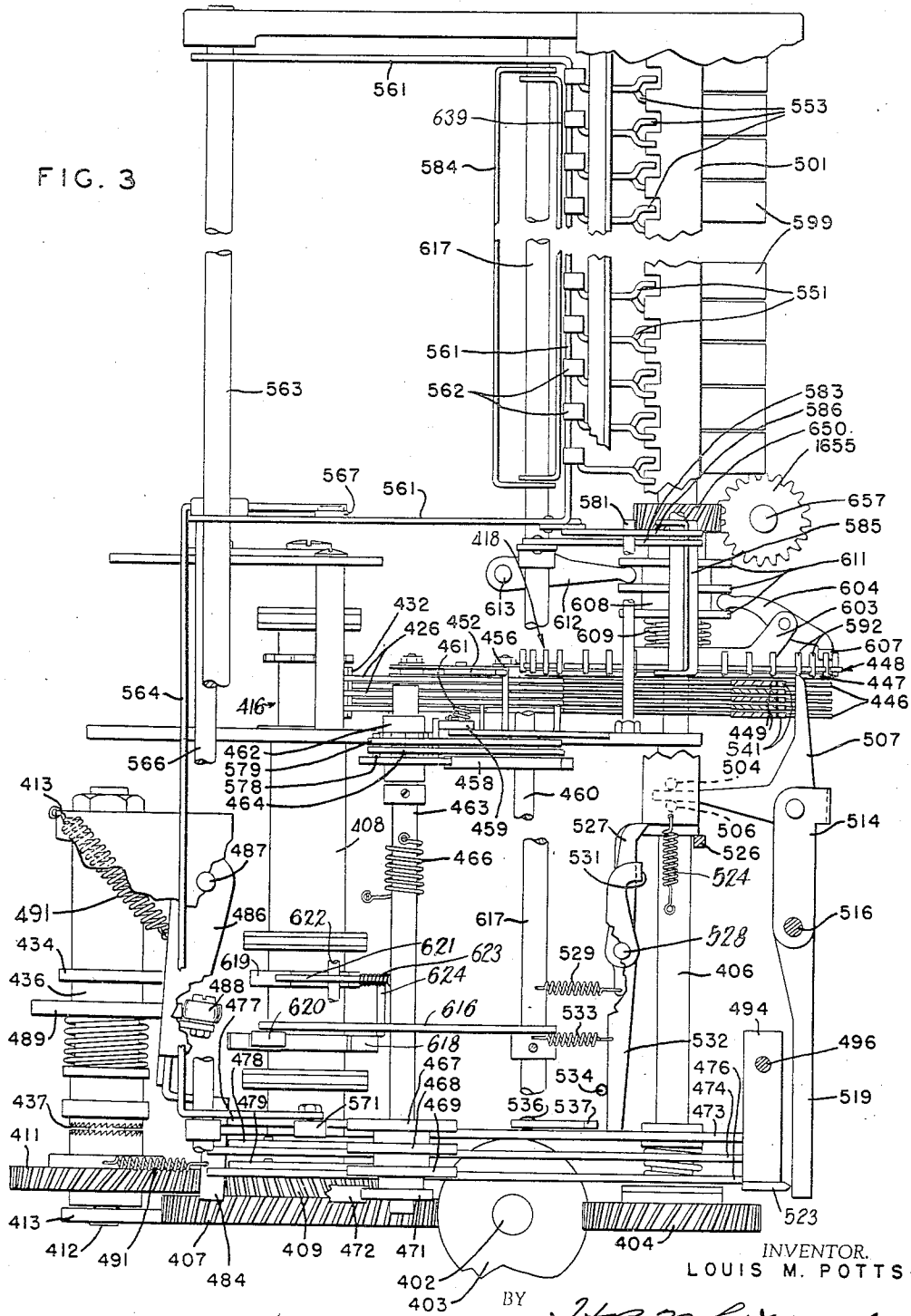
2,415,909

PRINTING TELEGRAPH APPARATUS

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6 Sheets-Sheet 3

FIG. 3



Feb. 18, 1947.

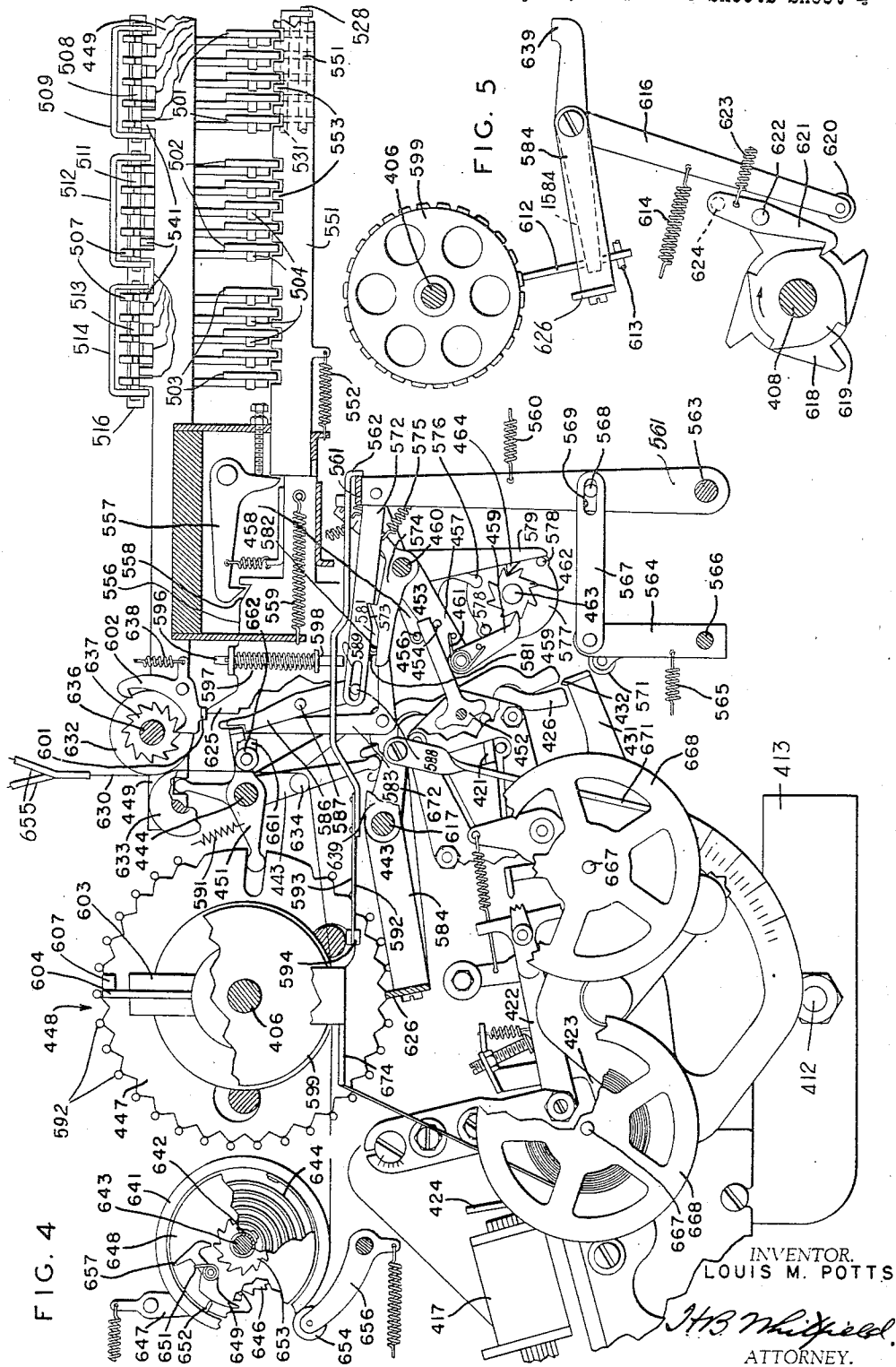
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PRINTING TELEGRAPH APPARATUS

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6 Sheets-Sheet 4



2,415,909

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FIG. 7

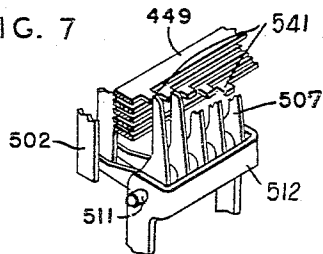


FIG. 8

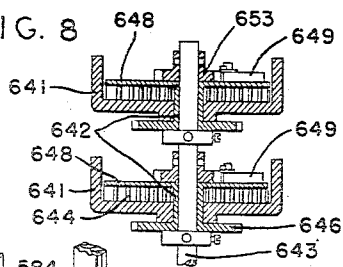


FIG. 6

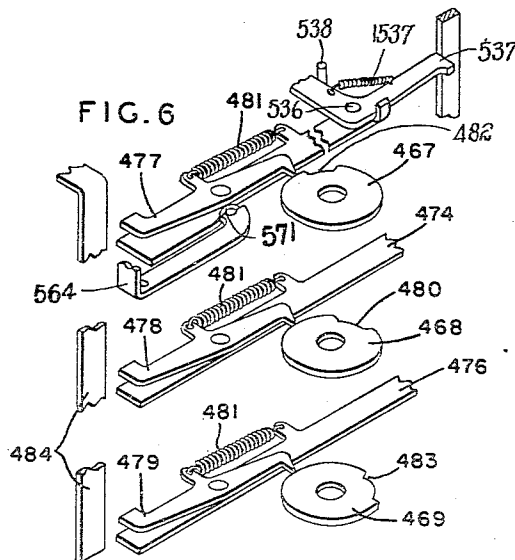
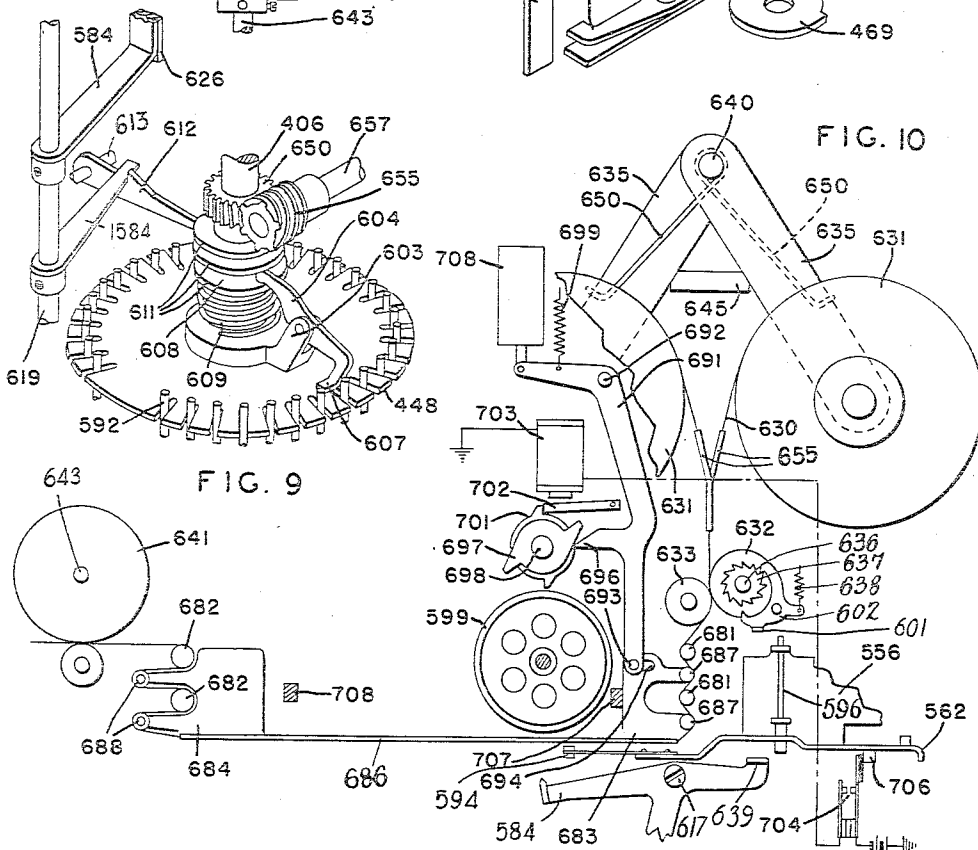


FIG. 10



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PRINTING TELEGRAPH APPARATUS

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6 Sheets-Sheet 6

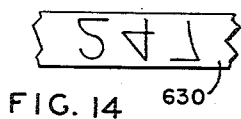
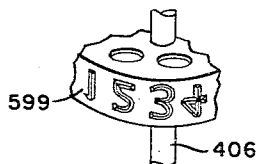
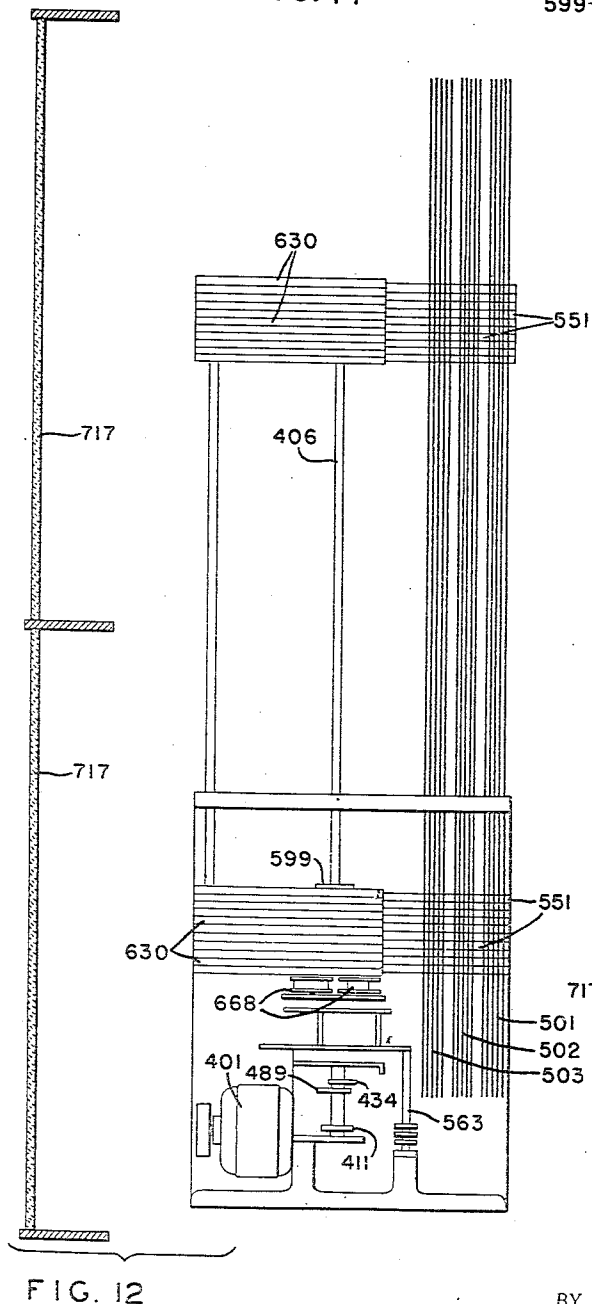
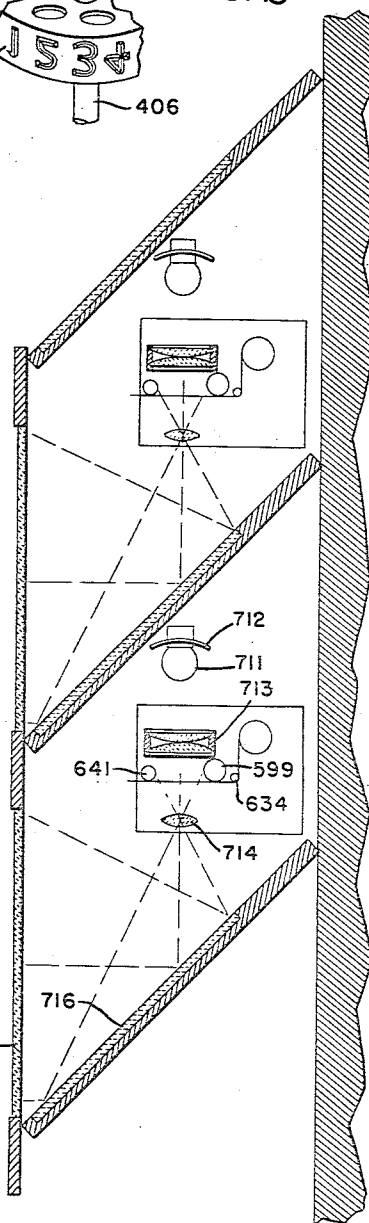


FIG. 11

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UNITED STATES PATENT OFFICE

2,415,909

PRINTING TELEGRAPH APPARATUS

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Original application May 15, 1939, Serial No. 273,672. Divided and this application May 22, 1941, Serial No. 394,662

31 Claims. (Cl. 178—34)

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This invention relates to telegraphic printing and message posting apparatus and particularly to the recording of stock quotations and the projection of images of the quotations for display.

This application is a division of application Serial No. 273,672, filed May 15, 1939, which eventuated into U. S. Patent No. 2,284,681, dated June 2, 1942.

An object of the invention is to record on a plurality of tapes in a printing telegraph apparatus all of the quotations pertaining to a selected group of stocks, each of the tapes being assigned to receive all of the quotations with reference to one of the stocks of the group, and to project on a screen current quotations from portions of a group of tapes.

Another object of the invention is to advance each tape across the field of the projecting apparatus only as an incident to the printing of quotations upon that tape so that the viewing screen will thereby present no blank tape in the projection field but instead at all times there will be displayed images of as many quotations on each tape in the field of its projecting apparatus as the area of that field will accommodate.

The invention features printing telegraph apparatus having a plurality of tapes movable in parallel paths and a corresponding plurality of type wheels carried by a common shaft for cooperation with said tapes individually. Quotations for stocks not included in the group to be recorded are discarded and have no effect upon any of the printing mechanisms.

The invention also features the division of the horizontally movable tapes in a printer into separated groups, each group having its own source of illumination and optical system, and having images projected therefrom upon its own viewing screen or upon an assigned portion of a large screen independently of the projection of images from other groups of tapes, the several groups of tapes being served by individual type wheels carried by a single type wheel shaft.

In the present embodiment of the invention the type wheels are carried by a single continuously rotatable shaft which extends through and is controlled by a code disc selector mechanism. This mechanism is controlled by a single magnet selector which also controls the setting of code bars. The code bars in turn control the setting of secondary or storage code bars arranged in sets for storing selective conditions identified with the characteristic letters of the stock designations. The storage bars control the selection of printing elements, there being one for each of

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the tapes, and when the sets of storage bars are positioned for a stock designation outside the group to which the printer is adjusted to respond, no printing interponent is selected.

The code disc selector device does not arrest the type wheel but merely trips off a printing mechanism which strikes the selected tape against the rotating type wheel, the selected character being printed while the type wheel is rotating at normal velocity. During the reception and printing of the stock price, the figure shift mechanism disables the storage code bar setting mechanism so that the signals for the price selection cannot interfere with the settings of those bars which have resulted in the selection of a printing interponent.

Tape feeding and ink ribbon feeding operations are performed as an incident to the printing operation. This embodiment of the invention features an arrangement for advancing blank tape past the printing position a sufficient distance to bring the last printed quotation into position for observation or projection, and for subsequently drawing back toward the printing position the projected portion of the tape which had previously been advanced. Accordingly, when a next quotation is to be printed upon a tape which has been moved out for viewing the tape is retracted so as to print the new quotation closely adjacent to the one previously printed in order that as many quotations as possible may be contained in the length of tape that is within the field of observation or of the projecting apparatus.

In accordance with one embodiment a projecting system is employed which features compactness as one of its primary considerations and involves the use of a plane reflector for turning a beam of light through 90 degrees whereby the optical system and the printer may be contained in a housing requiring a minimum of space from front to back.

A complete understanding of the invention may be obtained from the following detailed description, reference being had to the accompanying drawings wherein:

Fig. 1 is a perspective view of a preferred embodiment of a multiple tape printer having incorporated therein features of the present invention;

Fig. 2 is a front elevational view of the printer apparatus shown in Fig. 1;

Fig. 3 is a side elevational view taken from the right-hand end of Fig. 2;

Fig. 4 is a plan sectional view taken with parts broken away to reveal the interior;

Fig. 5 is a detailed view showing the printing bail operating and restoring mechanism;

Fig. 6 is an exploded perspective view of the storage code bar bail selecting and operating mechanism;

Fig. 7 is a detailed perspective view of the letter code transferring mechanism;

Fig. 8 is a sectional detail view of the tape puller mechanism;

Fig. 9 is a detailed perspective view of the print bail releasing mechanism;

Fig. 10 is a schematic illustration of a modified tape advancing and retracting mechanism;

Fig. 11 is a transverse sectional view, showing an arrangement of compact projecting systems;

Fig. 12 is a sectional side view showing the division of tapes of one printer into groups and the provision of a viewing screen individual to each group;

Fig. 13 is a fragmentary perspective view of a type wheel having the types so arranged thereon that from these upright, normal images of figures may be observable on the viewing screen; and

Fig. 14 is a view of a fragment of a tape upon which characters have been printed by means of the type wheel shown in Fig. 13, the tape being viewed from the front.

Referring now to the drawings, a multiple tape stock quotation printer is shown in Figs. 1 to 12, inclusive. This printer is adapted to the projection of enlarged images of the printed tapes upon screens, as shown in Figs. 11 to 14, inclusive. Referring to Figs. 1, 2, and 3, the reference numeral 401 designates a motor, the rotor shaft 402 of which carries a pinion 403. Pinion 403 has direct driving engagement with a gear 404 secured to type wheel shaft 406 and with a gear 407 secured to a combined selector and printing shaft 408. Shafts 406 and 408 are rotatably supported by stationary frame portions of the printer. Gear 407 has secured thereto a gear 409 with which meshes a gear 411 carried by a transfer shaft 412 rotatably supported in brackets 413. The arrangement of shafts and gears is similar to that disclosed in U. S. Patent No. 2,247,408, issued July 1, 1941, to Albert H. Reiber.

Shaft 408 has sleeved thereon at its upper end a selector cam sleeve 416 to which rotation is imparted from shaft 408 by means of cooperating driving and driven discs at the end of sleeve 416, felt, or other resilient discs being interposed between the driving and driven discs. Selector cam sleeve 416, in cooperation with selector magnet 417, controls the setting of sword levers in a sword and T-lever selector mechanism indicated generally by the reference numeral 418. Selector cam sleeve 416 has a plurality of cam projections 419 (Fig. 1) which individually and successively bring sword levers 421 (Fig. 4) into cooperation with a selector lever 422, the selective positions of which are controlled by an armature lever 423 which carries an armature 424 for the selector magnet 417. The single magnet sword and T-lever selector mechanism is well known in the art of printing telegraphy, and the specific embodiment shown herein is disclosed in the hereinbefore mentioned patent of Albert H. Reiber. The sword levers 421 are selectively positioned in extreme clockwise or counterclockwise positions by means of said mechanism and are thereafter moved endwise to establish corresponding selective positions of transfer levers 426 under the control of a transfer mechanism.

The transfer mechanism comprises a bail 427,

Fig. 2, at the upper end of which is secured a bracket 428 which retains a plurality of transfer springs 429. Springs 429 are effective upon the individual sword levers 421 when bail 427 is operated to move the sword levers to their extreme right-hand positions, as viewed in Fig. 4. Bail 427 has secured thereto an arm 431 which is provided with a locking blade 432 which normally locks projecting ends of transfer levers 426 and which is withdrawn due to clockwise rotation of arm 431 when bail 427 is operated to permit the selective resetting of transfer levers 426.

Transfer bail 427 carries a cam follower roller (not shown) which engages a cam 434 secured to a cam sleeve 436, sleeved on the transfer shaft 412. Rotation is imparted to cam sleeve 436 through a spring loaded jaw clutch 437 which is normally held disengaged by a clutch throwout lever 438. Lever 438 is carried at the lower end of a bail 439 which carries at its upper end an operating arm 441 disposed in the path of a cam projection 442 (Fig. 1) included in selector cam assembly 416. A tension spring 443 biases clutch throwout lever 438 into engagement with clutch 437 and the end of operating arm 441 in the path of cam projection 442. Upon each operation of clutch tripping bail 439, cam 434 is released for a single revolution and operates its follower which through arms 431 and 427 unlocks transfer levers 426 and repositions them in accordance with a new signal combination under the control of sword levers 421.

Stock quotation printers are usually operated under the control of a 6-unit code, one impulse of which determines whether figures or letters shall be printed and the remaining five of which select the particular letter or figure to be printed. In conformity with this practice, the printer now being described is provided with five of the transfer levers 426, each of which has disc and slot articulation with an intermediate three-armed lever 443 (Fig. 4) of which there are five disposed one above the other upon pivot 444. Each of the intermediate three-armed levers 443 has one of its arms disposed in a slot in a code disc 446, of which there are five permutation code discs (Fig. 3) and a special blocking disc 447 (Fig. 4) included in a code disc selector mechanism indicated generally by the reference numeral 448 (Figs. 3 and 4). The third arm of each of the three-armed intermediate levers 443 terminates in a disc portion which is disposed in a slot near the end of a code bar 449 of which there are five (Figs. 1 to 4, inclusive). Pivot 444 also supports a lever 451 which is operatively in engagement with special blocking disc 447. The function and control of lever 451 will be described later.

It will be apparent from the foregoing that when transfer levers 426 are set permutatively according to a new signal combination the intermediate levers 443 will be actuated correspondingly to impart corresponding settings to the five code discs 446 and to the five code bars 449.

The sword lever selector mechanism 418 includes the five sword levers 421 which control the setting of the five transfer levers 426, and a sixth sword lever which is controlled according to that impulse of the code combination which identifies the code combination as pertaining to letters or figures. The sixth sword lever is aligned with and controls a T-shaped lever 452 which is pivoted coaxially with the transfer levers 426. The T-shaped lever 452 has its principal arm 453 disposed between pins 454 and 456

carried by lever 457 and bell crank 458, respectively. Lever 457 is pivoted at 460 and carries at its free end a pawl 459 which is biased counterclockwise, as viewed in Fig. 4, by a spring 461, into engagement with a ratchet wheel 462 secured at the upper end of shaft 463. Lever 457 is biased in clockwise direction by spring 450 (Fig. 1) engaging an arm 455 of lever 457 and urging the arm into engagement with a stop post 1460. Bell crank 458 is biased in counterclockwise direction by spring 465 engaging arm 470 of bell crank 458 and urging the arm into engagement with post 1460 on the opposite side from arm 455 of lever 457. Stop post 1460 is so positioned that T-shaped lever 452 is normally retained by the lever 457 and bell crank 458 in a position intermediate the positions to which it may be rocked by its associated sword lever 421. The rocking of T-shaped lever 452 to either of its extreme positions is effected by the transfer bail 427 which moves sword levers 421 endwise rightwardly, as viewed in Fig. 4, and thus momentarily rocks T-shaped lever 452 to extreme clockwise or counterclockwise position while at the same time setting transfer levers 426 permutatively. As the transfer bail 427 returns to normal position, it ceases to exert any effect upon the sword levers 421 and T-shaped lever 452 returns to its normal or intermediate position, being restored by lever 457 in the event that it had rocked that lever counterclockwise or by bell crank 458 in the event that it had rocked that lever clockwise.

The relation of T-lever 452 to incoming signal combinations is such that when the combination pertains to the letters of a stock quotation designation, T-shaped lever 452 is rocked in clockwise direction and, in turn, rocks pawl supporting lever 457 counterclockwise to effect counterclockwise rotation of rock shaft 453 one ratchet step. A holding pawl 464 is urged into engagement with ratchet 462 by a spring (not shown) to hold ratchet wheel 462 in its normal position or in any advanced position to which it may be rotated by pawl 459.

Shaft 463 is biased in clockwise direction, as viewed in Fig. 4, by means of a torsion spring 466 (Fig. 3) and is provided at its lower end with cams 467, 468, and 469 and with a stop disc 471. Stop disc 471 is provided with a shoulder which is engageable with a fixed bracket 472 of the frame of the machine to arrest shaft 463 when ratchet wheel 462 is engaged by neither of the pawls 459 and 464 to determine the rest position thereof.

Cams 467 to 469, inclusive, are provided for controlling the setting of three sets of storage code bars according to permutational settings of the code bars 449. As shown in Figs. 1, 3, and 6, a series of endwise movable bars 473, 474 and 476 is disposed adjacent to the cams 467 to 469, inclusive. Bars 473, 474, and 476 are disposed one above the other corresponding to the spacing of cams 467 to 469, inclusive, and each of the bars pivotally supports an interponent lever 477, 478, and 479, respectively, which levers are aligned horizontally with cams 467, 468, and 469 respectively and are urged into engagement with the cams by springs, such as 481 (Figs. 1 and 6). Cams 467 to 469, inclusive, are provided with recesses as at 482, 480, and 483, respectively (Figs. 1 and 6) which may be entered by the cam engaging ends of interponent levers 477 to 479, respectively, when cams 467 to 469, respectively, have been rotated into position to present their

recesses. The angular disposition of cams 467 to 469, with reference to their individual interponent levers 477 to 479, respectively, is such that when shaft 463 is in normal position with the shoulder of stop disc 471 engaging fixed stop 472, none of the recesses 482, 480, and 483 is presented to an interponent lever. When ratchet 462 has been advanced one step in counterclockwise direction cam 467 is rotated sufficiently to bring its recess 482 into alignment with the cam engaging end of its interponent lever 477, which responds to its spring 481 and enters the recess 482, the interponent 477 thus rotating in clockwise direction, as viewed in Fig. 1. When ratchet 462 is rotated another step in counterclockwise direction by pawl 459, the recess 482 in cam 467 is moved out of registry with the cam engaging end of interponent 477 and the recess 480 in cam 468 is presented to the cam engaging end of interponent 478. Similarly, when shaft 463 is rotated another ratchet step in counterclockwise direction, interponent 478 is restored to its normal position by the movement of the recess 480 in cam 468 out of registry with the interponent, and recess 483 in cam 469 is presented to the cam engaging end of the lowermost interponent 479.

Adjacent to the left-hand end of the bars 473, 474, and 476, as viewed in Fig. 3, is the depending arm 484 of a bail 486 pivoted at 487. Bail 486 is provided with a cam follower roller 488 which engages a cam 489 included on cam sleeve 490 carried by transfer shaft 412 and driven by clutch mechanism 437. When cam 489 is rotated, bail 486 is rocked counterclockwise, as viewed in Fig. 3, and its depending arm 484 is moved rightwardly a predetermined distance and is then restored to normal position, which is that shown in Fig. 3, by tension spring 491. Bail arm 484 clears the left-hand ends of bars 473, 474, and 476 as it moves rightwardly, but the left-hand end of any of the interponent levers 477, 478, and 479, which is rocked in clockwise direction due to entrance of its cam follower portion into a recess in its corresponding cams 467, 468, or 469, moves into the path of bail arm 484, and as the arm is moved rightwardly, rightward motion is imparted to the bar 473, 474, or 476 by which such interponent is carried. The right-hand ends of bars 473, 474, and 476 are step cut so that they may individually engage depending operating arms of nested bails 492, 493, and 494, respectively, pivoted upon shaft 496.

Previous reference has been made to sets of storage code bars. There are three such sets, the first set being designated 501, the second 502, and the third 503. Storage code bars 501, 502, and 503 are individually supported near their lower ends by being provided with two pins 504 and 506, Fig. 3, between which extend horizontal arms of transfer bell cranks 507, there being a transfer bell crank individual to each of the storage code bars. As the storage code bars are arranged in sets, so also are the transfer bell cranks 507, those individual to the code bars 501 being pivotally supported as at 508 in a transfer bail 509, those individual to code bars 502 being pivoted at 511 in a transfer bail 512 and those individual to the code bars 503 being pivoted at 513 in a transfer bail 514. Bails 509, 512, and 514 are pivoted upon pivot rod 516, and each has a depending operating arm, the arms being designated 517, 518, and 519 for the bails 509, 512, and 514, respectively. Adjacent to the lower ends of the bail arms 517, 518, and 519, bails 492, 493, and 494 are provided with laterally ex-

tending projections 521, 522, and 523, respectively, in the operative path of which the lower ends of bail arms 517, 518, and 519 are disposed. As viewed in Fig. 3 upon the rightward reciprocation of any of the bars 473, 474, and 476, its corresponding bail 492, 493, or 494 will be rocked counterclockwise and will, in turn, impart counterclockwise rocking movement to the corresponding bail 509, 512, or 514 through its depending arm 517, 518, or 519, respectively.

Storage code bars 501, 502, and 503 are individually urged downwardly by means of tension springs 524 (Fig. 3) to seek engagement with a stop rail 526. These bars are movable under the control of transfer bell cranks 507, as will presently be described, from their lowermost positions engaging the stop rail 526, which is one of their selective positions, to an upper and therefore alternative selective position, in which position they are held by individual latches 527 pivoted on a pivot rod 528 and biased in clockwise direction, as viewed in Fig. 3, by individual tension springs 529. The clockwise movement of latches 527 when their individual bars 501, 502, and 503 have been lifted free of those latches is limited by a bail 531 which is also pivoted upon rod 528 and which spans all of the latches 527. When any of the bars 501, 502, and 503 is lifted to its upper selective position, it rests upon its associated latch 527, which has been moved in clockwise direction by its spring 529 and which remains in that position until retracted to permit the storage code bars 501, 502, and 503 to return to normal position.

The retraction of latches 527 is accomplished by bail 531 which has at its left-hand end, as viewed in Fig. 1, a depending arm 532 which terminates close to the upper surface of reciprocable bar 473. Bail 531 is biased clockwise by tension spring 533 (Fig. 3) to engage, in the normal condition, a fixed stop 534. Reciprocable bar 473 has pivoted upon the upper surface thereof as at 536 a trip-off lever 537 (Figs. 1 and 3) which consists of two arms, one extending along bar 473 and terminating adjacent the lower end of latch tripping bail arm 532 which is disposed in its path, and the other extending transversely from bar 473 and having in its path a fixed pin 538 (Fig. 1). A spring 537, Fig. 6, maintains lever 537 in its extreme clockwise position resting against a stop lug integrally formed with the bar 473. Upon rightward reciprocation of bar 473, as viewed in Fig. 3, the end of the arm of trip-off lever 537 which extends along bar 473 engages latch restoring bail arm 532 and rocks the bail counterclockwise to withdraw latches 527 from supporting engagement with any of the storage code bars 501, 502, or 503, that may be in their uppermost selective position. As trip-off lever 537 continues to be carried rightwardly by bar 473, its laterally extending arm engages pin 538 and the trip-off lever is rocked counterclockwise, as viewed in Fig. 1. The counterclockwise rocking of trip-off lever 537 causes it to be withdrawn from engagement with the lower end of latch restoring bail arm 532, and spring 533 restores bail 531 to extreme clockwise position, as viewed in Fig. 3, in engagement with stop 534. Upon retraction of bar 473 to normal position, the trip-off lever 537, after being withdrawn from engagement with bail arm 532, returns to extreme clockwise position, as viewed in Fig. 5, in readiness to rock unlatching bail 531 upon the next operation of reciprocable bar 473.

As shown in Figs. 4 and 7, each of the bars 449

is provided with three lugs projecting from the rear edge thereof, the lugs on a bar being spaced and arranged to block simultaneously or to unblock a corresponding one of the transfer bell cranks 507 in each set 501, 502, or 503. Thus, the uppermost of the bars 449 has projections 541 which will block the first transfer bell crank in each group, counting from the left, as viewed in Fig. 4, and these lugs will be moved out of blocking relation to the particular bell cranks 507 when the uppermost bar 449 is moved to its other selective position. Similarly, the bar 449 next below the top has three lugs 541 which will block the second transfer bell crank 507 in each group counting from the left when the bar is in one selective position and which will not be in the path of those bell cranks when the bar is moved to its other selective position. Fig. 7 shows in detail the relation of the lugs 541 to one set of transfer bell cranks 507. It should be noted that none of the lugs 541 carried by the bars 449 can block one transfer bell crank 507 when in one selective position and another of the bell cranks when in another selective position. The movement of bars 449 from one to another of their selective positions is sufficient only to move its lugs into or out of locking relation with respect to particular transfer bell cranks.

It will be apparent that when latches 527 are withdrawn to their extreme counterclockwise positions, as viewed in Fig. 3, and all of the storage bars 501, 502, and 503 are permitted to rest upon the fixed stop 526, the transfer bell cranks 507 associated with those of the bars 501, 502, and 503 that had been previously elevated will be rocked in counterclockwise direction. Stop 526 is so positioned that the upwardly extending arms of transfer bell cranks 507 cannot thereby rock into engagement with the lugs 541 carried by bars 449, and thus there will be no interference with the setting of these bars by the three-armed intermediate levers 443. As the reciprocable bar 473 moves to its extreme rightward position (Fig. 3), it rocks transfer bail 509 to extreme counterclockwise position, thus carrying the five transfer bell cranks 507 supported thereby to the left. Those of the transfer bell cranks 507 carried by bail 509 that do not encounter lugs 541 are merely moved leftwardly idly, their horizontally extending arms moving between the pins 504 and 506 of storage bars 501 without in any way affecting the storage bars. However, those that encounter lugs 541 have their upwardly extending arms arrested by the lugs and as bail 509 continues to rock in counterclockwise direction, the blocked transfer levers 507 are rocked in clockwise direction to lift their associated storage bars 501 against the tendencies of their individual springs. The bars that are lifted, clear their latches 527 which respond to their springs 529 and move into position to support the lifted storage bars. In this manner, the storage bars 501 are set in positions corresponding to the selective positions of the bars 449.

Storage bars 502 and 503 may be set according to the next two signal combinations in the same manner, the setting of the bars being accomplished by reciprocable bars 474 and 476 under the control of cams 468 and 469. In this manner, there may be stored in the storage bars 501, 502, and 503, code combinations representing three successively received letter codes.

The sets of storage code bars 501, 502, and 503 control the selection of any one of a plurality of selectable slide bars 551 in a manner similar to a

selecting system disclosed in copending application Serial No. 333,161, filed January 17, 1929, by L. M. Potts. Referring now particularly to Fig. 3, it will be observed that the bar 501 seen in elevation is provided with a uniform distribution of notches and lugs. The space occupied by one lug and an adjacent notch corresponds to that required by any one of the plurality of tapes upon which printing is to be effected. In this space is accommodated one of the selectable slide bars 551, there being one such bar for each tape upon which characters are to be printed. All of the bars 501, 502, and 503 are identical with the bar 501 shown in elevation in Fig. 3 in that they are provided with a uniform distribution of notches and lugs. Thus, there is no permutational or other coding inherent in the notchings of the several bars 501, 502, and 503. Slide bars 551 are shown in their extreme right-hand position in Fig. 4, and these bars are slidable leftwardly under circumstances about to be described, the leftward movement being imparted by tension springs 552 individual to each bar 551. Each of the bars 551 is provided with three sets of notches, each set consisting of five notches. The slide bars 551 are so positioned with reference to storage bars 501, 502, and 503 that the front edges of the storage bars are disposed in the notches in bars 551, the front edges of the storage bars being the edges provided with the uniform distribution of notches and lugs. There are thus provided upon bars 551 a plurality of lugs or ears 553. With reference to any of the storage bars 501, 502, and 503, the lugs 553 disposed at the right of individual storage bars, as viewed in Fig. 4, are the ones which may prevent leftward movement of a slide bar 551.

As shown in Fig. 3, the lugs 553 of slide bars 551 are bent upwardly or downwardly according to a permutation code system whereby a bar 501, 502 or 503 may have certain of its lugs interposed in the path of lugs 553 of certain of the slide bars 551 when the storage bar is in its upper selective position and may have others of its lugs interposed in the path of lugs 553 carried by the remainder of the slide bars 551 when the storage bar is in its lower selective position. From this, it will be apparent that for a given permutational setting of the storage bars 501, 502, and 503 in upper and lower selective positions one, and according to the preferred embodiment of the invention only one, of the slide bars 551 will have all of its lugs 553 in alignment with notches in the storage bars whereby the slide bar will have been selected and will be free to move leftwardly, as viewed in Fig. 4. With a different permutational setting of the storage bars 501, 502, and 503, another one or none of the slide bars 551 may be selected for leftward movement.

As is well known in printing telegraph systems operable in accordance with permutation codes, five selecting bars will afford thirty-two usable selective possibilities. This is true of any of the sets of five storage bars 501, 502, and 503. With three such sets jointly controlling the slide bars 551, the number of selective possibilities is very much higher than can possibly be employed in a single printer. This arrangement will permit the coding of the slide bars 551 according to the actual letters of the stock designation. Thus, the bars 501 may be set according to the code combination for the first letter of the stock, bars 502 may be set in accordance with the code combination for the second letter of the stock, and

bars 503 may be set according to the combination of the third letter of the stock designation. Some stock designations are customarily represented by two letters and some by a single letter. For quotations relating to such stocks, it will be necessary to set permutationally only the storage bars 501 and 502 or only the storage bars 501. Since prior to the setting of the bars 501 all of the latches 527 are retracted to permit all of the storage bars to return to their lowermost positions, those quotations which contain no second, or second and third letters will not involve permutational settings of the storage bars 502 or 502 and 503, and those bars will remain in their lowermost positions. For such stocks, the slide bars 551 will necessarily be coded to be selectable when the storage bars 502 and 503 are in their lowermost positions and such slide bars will be blocked when a storage bar from a set for which the stock designation has no identifying letter is raised to the upper selected position. For settings of the storage bars corresponding to designations of stocks other than those for which tapes have been provided in a particular printer, no slide bar 551 will be coded to be selected, and as the printing of a stock price occurs only as a consequence of selection of a slide bar 551, the unwanted quotation will be rejected, as will presently appear.

At the left of each of the slide bars 551, as viewed in Fig. 4, is a combination print hammer and tape feeding control slide 556 and a pivoted latch 557. Each print hammer slide 556 is provided with a notch 558 to be engaged by the latch 557. Print hammer slides 556 are urged leftwardly by springs 559 and are restored to their extreme right-hand position by a bail 561 which is engageable with a hooked arm 562 carried by each of the slides 556, and is biased to seek engagement with the hooked arms 562 by a spring 560 which is very light as compared with the springs 559.

As may be observed by reference to Figs. 1 to 4, inclusive, bail 561 extends transversely of all of the print hammer slide restoring arms 562 and is pivoted at 563. Clockwise rocking movement is imparted to bail 561 to effect the restoration of slides 556 to their extreme right-hand positions, as viewed in Fig. 4, by a bail 564 pivoted at 565 and connected to bail 561 by means of a link 567, the connection between bail 561 and link 567 being a pin 568 and slot 569, as shown in Figs. 1 and 4. Counterclockwise movement is imparted to bail 561 by the individual print hammer slides 556 which are moved leftwardly by their springs 559.

The lowermost end of bail 564 is disposed adjacent to the right-hand edge of the uppermost reciprocable bar 473 and the bail is provided with a roller 571 in the horizontal plane of the reciprocable bar 473. As shown in Fig. 6, bar 473 has a portion at its left-hand end of greater width than the main body portion of the bar, and when the bar is in its normal or unoperated position, roller 571 engages the edge of bar 473 in the main body or narrow portion thereof. When bar 473 is moved rightwardly, as viewed in Fig. 3, in the manner previously described, roller 571 rides up the slope between the narrow and the wide portions of bar 473 whereby clockwise movement is imparted to bail 564 and through link 567 to bail 561, by engagement of the left-hand end of slot 569 with pin 568. This movement of bail 561 by means of said bar 473 thereupon causes the movement of any hammer interponent as-

sembly 556 which had been released, restoring it to its latched position as shown in Fig. 4.

Adjacent to the portion of bail 561 which engages print hammer slide restoring arms 562, the lower arm of the bail pivotally engages a link 572 which has intermediate its ends a notch 573. A latch 574 pivoted at 460 and biased in clockwise direction by a tension spring 575 enters notch 573 in link 572 when bail 561 has been rocked to extreme clockwise position and retains the bail in that position. The slides 556 are held in their extreme right-hand positions, as viewed in Fig. 4, by their latches 557 and by the latched bail 561. Tension springs 552 urge slide bars 551 into engagement with their associated slides 556 so that when a previously selected slide 556 is restored to its extreme right-hand position, its associated slide bar 551 will also be restored to extreme right-hand position. As reciprocable bar 473 returns to its normal position, bail 564 is moved by its restoration spring 565 to its extreme counterclockwise position with its roller 571 engaging the narrow portion, the pin and slot connection between link 567 and bail 561 permitting this independent movement.

The release of bail 561 to permit a selected one of the slide bars 551 to trip its associated latch 557 and thereby release its associated print hammer slide 556 for leftward movement, as viewed in Fig. 4, is controlled by the previously identified T-lever 452. Upon the reception of a code combination which contains an impulse to control the printing of figures, T-lever 452 is rocked counterclockwise, as viewed in Fig. 4, and through pin 456 it rocks bell crank 458 clockwise. Bell crank 458 has an arm 576, the free end of which is disposed in a slot in disc 577 which is sleeved on shaft 463 below ratchet 462. Disc 577 supports upstanding pins 578, one of which is adjacent to pawl 459 and the other of which is disposed adjacent to holding pawl 464 and to an arm of a bell crank 579 disposed above and extending parallel to holding pawl 464, the bell crank 579 and pawl 464 both being pivoted at 460. When bell crank 458 is rocked clockwise by T-lever 452, disc 577 is rotated counterclockwise a sufficient distance to cause pins 578 to withdraw operating pawl 459 and check pawl 464 from engagement with ratchet 462. Bell crank 579 is rocked counterclockwise through the same angular distance as is pawl 464. Upon the release of the pawls 459 and 464, spring 466, Fig. 3, restores shaft 463 to normal position with the shoulder on stop disc 471 engaging fixed stop 472.

Bell crank 579 has an arm 581 which carries a pin 582 disposed adjacent to the end of latch 574 which holds bail 561 in extreme clockwise position. Pin 582 also engages one arm of a bell crank 583 which is pivotally supported upon an arm 1583 of shaft 617 in association with a printing bail 584, the structure and operation of which will be described later. The free end of the other arm of bell crank 583 is provided with a latching shoulder which engages an extension 585 of the lever 451 which controls special blocking code disc 447, and the latching shoulder normally holds the lever 451 in extreme counterclockwise position whereby disc 447 is normally presented in extreme clockwise position. Latching bell crank 583 is disengaged from the extension 585 of disc controlling lever 451 by pin 582 as bell crank 579 is rocked counterclockwise, but lever 451 is not thereby released for the reason that it is held by a second latch 586 pivoted at a fixed point 587. At its foremost end, as viewed in Fig. 4, latch 586

carries a pin 588 which is disposed in a slot 589 in the left-hand end of link 572. Since link 572 is moved leftwardly with bail 561 when the latter is moved counterclockwise by a selected and released print hammer slide 556 upon the release of latch 574 it moves idly with respect to pin 588 carried by latch 586 until the right-hand end of slot 589 engages the pin 588. Further leftward movement of link 572 causes latch 586 to be withdrawn from engagement with lever 451 which, being biased in clockwise direction by a spring 591, rotates its associated disc 447 in counterclockwise direction.

Disc 447 is provided with notches spaced according to the spacing of selectable pins 592 of code disc selector mechanism 448 (Fig. 4). When disc 447 is in extreme clockwise position it blocks all of the pins 592 and prevents any one which may otherwise have been selected by code discs 446 from moving inwardly radially of code disc selector mechanism 448. When disc 447 is rocked to extreme counterclockwise position upon release of latches 583 and 586, it presents its notches to all of the selectable pins 592 and any such pin to which an alignment of notches is presented by the five code discs 446 is permitted to move inwardly radially of selector mechanism 448.

The two latches 583 and 586 are provided because the control of blocking disc 447 involves several factors. Latch 583 is released upon the transfer of a signal combination in which the sixth pulse is of marking nature. Due to the association of latch 583 with the printing bail, the latch is reengaged with and relatches the lever which controls disc 447 after each printing operation, the purpose of this being to prevent a second printing of a character in response to one selection of that character. Latch 586 is released by the latch link 572 of bail 561 at the time that bail is moved into its extreme counterclockwise position by a selected print hammer slide 556, the slide having moved into effective position at that time. It thus delays the unblocking of the printing control pins 592 to insure the operation of the print hammer slide. The latch 586 remains released until the selected slide 556 is retracted to ineffective position. The restoration of any one of said slides 556 is effected through the operation of bail 561 as has already been stated.

The movement of bail 561 in a clockwise direction about its pivot 563 is preceded by the operation of printing bail 584 which member, in effecting printing, rotates clockwise about its shaft 617 until bail blade 626 is brought sharply against the interponent hammer 594 of the particularly selected slide 556, whereby printing is effected through percussion engagement with an associated type wheel 599. Upon the restoration of printing bail 584, however, which result is effected by a cam 618 acting against follower roller 620, shaft 617 and all of its integrally associated elements is rocked counterclockwise, and as an incident thereto aforementioned arm 1583, Fig. 1, which carries a latching bell crank 583 and which had been retracted during the printing motion of bail 584 is now rocked counterclockwise as bail 584 is retracted so that the shoulder of bell crank 583 may again engage portion 585 of blocking disc operating arm 451 and rock the latter in a counterclockwise direction about its shaft 444 returning the selector blocking disc 447 to its effective position as indicated in Fig. 4. Latch 586 is also effective to prevent the operation of the printing bail 584 when stock

price signal combinations are received for stocks for which no coded slide bars or recording tapes have been provided. There will be no print hammer slide selected or released when the identifying letter signals for such stocks are received, and therefore bail 561 will not be rocked counterclockwise nor latch 586 be tripped when the figure signals are received. Blocking disc 447 will therefore be retained in blocking relation to pins 592, one of which must be selected in order to cause operation of the printing bail. Preferably latch 583 holds extension 585 of lever 451 slightly farther counterclockwise than does latch 586, as the latter is required to engage and hold the extension, after the release of latch 583, in such position that should latch 583 return to normal position before the release of latch 586, the latch 583 cannot relatch the extension nor otherwise deprive latch 585 of its proper control over blocking disc 447.

Each of the print hammer slides 556 carries a flexible arm 593 at the left-hand end of which (Fig. 4) is a print hammer head 594. Intermediate the ends of each slide 556 a spacing control pin 596 is reciprocally supported, the pin being maintained in retracted position by a compression spring 597 which is compressed between one of the supports for pin 596 and a flange 598 carried by the pin. The movement of print hammer slide 556 leftwardly, as viewed in Fig. 4, when permitted by the release of bail 561 and by the release of the latch 587 under the control of a selected slide bar 551, is sufficient to bring the print hammer head 594 into printing position between the type wheel 599 and print hammer operating blade 626 of print bail 584, and to bring the spacing control pin 596 into alignment with the operating lug 601 of a spacing pawl 602. The apparatus is now in readiness for the printing of the figures of a stock quotation, the stock designating letters having served to effect the selection of a particular print hammer slide 556 and during the reception of the letters code combinations, the code disc selector pins 592 having been blocked and prevented from responding to the letters selections by means of the special blocking disc 447.

The type wheels 599 are secured to type wheel shaft 406, which is continuously rotatable. Adjacent to the top of code disc selector mechanism 448, type wheel shaft 406 carries in fixed angular relation to the type wheel an arm 603 (Figs. 3 and 9). At its outer end arm 603 pivotally supports a print bail controlling lever 604. Lever 604 is provided at its outer end with an obliquely directed extension 607 which trails the lever 604 as arm 603 rotates. Extension 607 of lever 604 revolves about the axis of shaft 406 just inside the alignment of selectable pins 592 when those pins are in their outermost or unselected positions. When all of the selectable pins 592 are blocked by the special disc 447, arm 603 and lever 604 revolve idly as shaft 406 rotates and the trailing extension 607 of lever 604 does not come into engagement with any of the pins 592. However, upon the selection of one of the pins 592, its upper end is moved into the path of obliquely disposed extension 607 of lever 604 and when the trailing extension comes into engagement with the selected pin, it rides over the top of the pin, thus rocking lever 604 counterclockwise, as viewed in Fig. 3, and thereafter drops off, permitting the lever to return to normal position.

Above the code disc selector mechanism 448, shaft 406 carries a sleeve 608 which is urged up-

wardly by a compression spring 609. Sleeve 608 is provided with spaced flanges 611. The inner end of lever 604 is disposed between two of the flanges 611 so that when lever 604 is rocked counterclockwise (as viewed in Fig. 9) by one of the selectable pins 592, sleeve 608 is moved downwardly along shaft 406, thereby compressing spring 609. The free end of a latch 612 pivoted at 613 is disposed between two of the discs 611 so that when sleeve 608 is moved downwardly, latch 612 will be rocked clockwise, as viewed in Fig. 3.

Latch 612 is provided with a shoulder which normally holds printing bail arm 1584 in the position shown in Figs. 4 and 5, the bail being biased in clockwise direction against the shoulder by a tension spring 614 (Fig. 5) connected to an arm 616 secured to the shaft 617 to which printing bail 584 is secured. Arm 616 is disposed in the same horizontal plane as a bail restoring cam 618 which is carried by main shaft 406 and is connected to the shaft through a friction clutch. Above the cam 618 and connected thereto for controlling the rotation is a stop disc 619 which is provided with stop shoulders equal in number and spacing to the number of bail restoring apices with which cam 618 is provided. A stop pawl 621 is pivoted at 622 in the same horizontal plane as stop disc 619 and is urged by tension spring 623 into engagement with the stop disc. At the opposite end from that which engages stop disc 619, stop lever 621 is provided with a depending pin 624 which is disposed in the path of printing bail arm 616 when the latter is rocked in clockwise direction.

Upon the release of latch 612, printing bail 584 is rocked in clockwise direction by spring 614 to cause blade 626 carried by bail 584 to strike a selected print hammer head 594 to cause it to strike against type wheel 599, a tape upon which printing is to be effected and an ink ribbon being interposed between print hammer head 594 and type wheel 599, as will appear hereinafter.

As the printing stroke is performed, a roller 620 carried by the free end of bail restoring arm 616 is brought into engagement with restoring cam 618. Restoring arm 616 in moving to its extreme clockwise position rocks stop lever 621 counterclockwise, as viewed in Fig. 4, due to engagement with its depending pin 624. Stop lever 621 is thus withdrawn from engagement with a shoulder of stop disc 619 and rotation is imparted to cam 618 and disc 619 by shaft 406. The rotation of shaft 406 is in clockwise direction, as viewed in Fig. 5, and cam 618 rocks lever arm 616 and therefore bail 584 counterclockwise a distance greater than that required to re-engage it with latch 612, the overtravel in counterclockwise direction being provided for the control of tape spacing as will presently be described. As bail restoring arm 616 is rocked counterclockwise, it is withdrawn from engagement with depending pin 624 of stop lever 621 which is thus enabled to return to engagement with stop disc 619 to arrest the disc by engagement with the next succeeding shoulder thereby. Cam 618 and disc 619 are not arrested until after a restoring apex of cam 618 has passed and moved free of roller 620 whereby arm 616 returns in clockwise direction from its limit of overtravel until bail arm 1584 engages the shoulder on latch 612. The bail 584 is thus prepared for the next release of latch 612 when it can be rocked in clockwise direction by spring 614, printing thus being by spring and restoration by cam, from which roller 620 is held disengaged in normal or idle condition.

As previously stated, each of the type wheels carried by shaft 406 has associated with it a tape upon which quotations are to be printed. The tapes, identified by reference numeral 630, are supplied from individual tape rolls 631, each of which is supported, as shown in Fig. 10, on an individual arm 635 pivotally supported on a vertically disposed post 640. Adjacent arms 635 on post 640 extend on opposite sides of a limit bar 645 against which they are biased by individual springs 650, the leftwardly extending arms in counterclockwise direction and the rightwardly extending arms in clockwise direction. Tape guides 655 may be provided for guiding the individual tapes from their respective supply reels to their tape feed control rollers 632 with which the tapes are frictionally engaged by pressure rollers 633.

With the arrangement described in the foregoing paragraph two vertical alignments of tape supply rolls are provided, a space intervening any two adjacent supply rolls on one side of limit bar 645, due to the alternate disposition of successive supply rolls on opposite sides of bar 645. The space provided affords access to individual supply roll supports, and an exhausted supply of tape may be replenished by swinging the particular arm 635 away from limit bar 645 and clear of the other supply rolls on the same side of bar 645. Thus, the supply rolls are individually and independently supported, and may be replenished without disturbing any other supply rolls.

The tape feed controlling rollers 632 are mounted one above the other on a stationary shaft 636 and are individually rotatable upon the shaft. Each feed roller 632 has secured thereto a ratchet wheel 637 which is engaged by the previously identified escapement pawl 602. Each of the pawls 602 is biased to extreme counterclockwise position by a spring 638. As shown in Figs. 1, 2, 5 and 10, shaft 617 to which printing bail 584 is secured also has fixed thereto a spacing bail 639. The free end of bail 639 is in alignment with the operating lug 601 carried by escapement pawl 602, and when print hammer slide 556 is moved to the left, as viewed in Figs. 1 and 4, the reciprocable pin 596 becomes aligned with lug 601 and with spacing bail 639. Upon the release of printing bail 584 by latch 612 (Fig. 5) and during the movement of printing blade 626 through its printing stroke, spacing bail 639 is drawn away from the end of pin 596. Reciprocation of pin 596 to effect clockwise movement of escapement pawl 602 is accomplished during that portion of the counterclockwise movement of bail arm 616 which was previously identified as overtravel beyond the position for latching of bail 584. When pawl 602 is rocked, ratchet wheel 637 escapes for rotation through a distance equal to one character space and the tape, which is pressed against roller 632 by pressure roller 633, is advanced by the tape puller drum. Before cam 618 is arrested, follower roller 620 drops off the apex of cam 618, as previously described, and spring 614 withdraws bail 639 from engagement with pin 596, thereby permitting spring 597 to retract the pin to normal position and spring 638 to restore pawl 602 to its normal or extreme counterclockwise position.

The spacing mechanism provided in the printer herein described includes mechanism for automatically inserting a space between any two consecutive quotations on a tape. Thus, no tape spacing signal need be transmitted to effect separation of the quotations. This mechanism is shown in Fig. 4 and comprises a cam projection

625 on print hammer slide 556 which engages operating lug 601 of spacing pawl 602 and holds the pawl in clockwise position when slide 556 is latched in its right-hand position, the pawl being released and permitted to rock to counterclockwise position when slide 556 moves to the left. As previously described, one cycle of oscillation of pawl 602 results in the advancement of tape 630 one character space. By the retraction of the print hammer slide following the printing of a stock price, and the release of the slide preparatory to the printing of another quotation relating to the same stock, the pawl 602 is oscillated through one complete cycle, and therefore the tape will be advanced one character space, the advancement being accomplished in two steps. The first step, representing part of one tooth distance on the ratchet wheel 637, occurs following the printing of a stock price, and the second step, representing the remainder of one tooth distance, occurs before the printing of the next quotation on the same tape. During the printing of a quotation, cam projection 625 is clear of pawl 602, so that it does not interfere with the operation of the pawl by pin 596.

A simple modification of cam projection 625 will permit the apparatus to interpose two character spaces between any two quotations on a tape. This may be accomplished by providing a cam slope on the left-hand edge as well as on the right-hand edge of cam projection 625, and by relocating it so that it is at the right of pawl projection 601 when slide 556 is at extreme right, and is at the left when slide 556 is at extreme left. With this arrangement, cam projection 625 operates and releases pawl 602 upon being retracted, whereby the tape 630 is caused by roller 632 to advance one character step, and also operates and releases pawl 602 upon movement to effective position preparatory to printing, whereby the tape is advanced another character step.

The tape puller drums 641 are rotatably mounted upon hub sleeves 642 carried by shaft 643. Continuous rotation is imparted to shaft 643 from type wheel shaft 406 through gear 650 carried by type wheel shaft 406 (Fig. 3), gears 655 and 658 carried by an intermediate shaft 657, and gear 659 carried by shaft 643 (Fig. 1). Drum 641 is capable of rotation with respect to hub sleeve 642 and the drum and sleeve are both normally stationary while shaft 643 by which they are supported rotates continuously. One end of a flat coiled spring 644 is secured to the inner annular surface of drum 641, and the other end is secured to hub sleeve 642. The hub sleeve 642 has secured thereto a check ratchet wheel 646 which is checked against counterclockwise rotation by spring biased check pawl 647. Hub sleeve 642 also has secured thereto a disc 648 on which is pivotally mounted a spring winding pawl 649 biased in clockwise direction by spring 651. On the inner annular surface of drum 641 is a pin 652 which normally holds pawl 649 out of engagement with a ratchet 653 secured to and continuously driven by shaft 643.

Spring 644 furnishes the necessary torque for advancing the tape, which is held in frictional engagement with drum 641 by pressure roller 654 carried by spring biased pressure roller arm 656. As drum 641 rotates clockwise in advancing the tape, it advances its pin 652 until the pin is moved out of engagement with the tail cam of pawl 649, which is thus urged by its spring 651 into engagement with continuously driven ratchet 653.

Rotation is thus imparted from ratchet 653 through pawl 649, disc 648, and hub sleeve 642 to rewind spring 644. During this rewinding, check ratchet 646 advances tooth-by-tooth with respect to check pawl 647 and holds hub sleeve 642 against reverse rotation upon the disengagement of pawl 649 from ratchet 653. The rewinding of spring 644 is terminated when the tail cam of pawl 649 overtakes and engages drum pin 652. The pin engages the cam and withdraws pawl 649 from engagement with ratchet 653, whereupon the clockwise rotation of hub sleeve 642 is arrested. The head of pawl 649 is provided with a finger 657, the end of which is disposed in close proximity to the inner annular surface of drum 641 when pawl 649 is held out of engagement with ratchet 653 by pin 652. Finger 657 blocks the path of pin 652 whether pawl 649 is engaged with or disengaged from ratchet 653 and assures engagement of the pawl with the ratchet as well as prevents unwinding of spring 644 by limiting the amount of clockwise rotation of drum 641 relative to hub sleeve 642.

Since the driving torque is applied to drum 641 solely through spring 644, it will be apparent that there is no restraint upon counterclockwise rotation of the drum and, therefore, that the tape may be retracted, if desired, without necessitating slipping of the tape with respect to drum 641. Use is made of this feature of the present invention by providing means for effecting a retraction of the tape prior to the printing of a stock quotation and permitting the tape to advance the distance that it was retracted, following the printing of the quotation. The necessary concentration of certain elements at the printing point, such as, the printing bail, ink ribbon, and type wheel, may cause the last character or last few characters to be obscured by elements of the printer and to become visible only after the tape has been advanced several character spaces. When the printed characters are to be projected upon a viewing screen, a greater number of the most recently printed characters on the tape may be outside the field of the optical system, due to the presence of structural elements of the printer at the printing point. The advancement of the tape a sufficient distance to bring the last character printed into position to be observed directly may not be sufficient to bring it into the field of the projecting system. Merely to advance the tape several character spaces following the printing of each quotation has certain disadvantages among which is the relatively wide blank space that appears between quotations on the tape with the result that only a small number of quotations may occupy positions in the projecting field at one time, the wide spaces between quotations on a tape being entirely wasted. To overcome these disadvantages, the present invention has been provided with means for forming a loop in the tape between the supply roll and the printing position prior to the printing of a quotation, the loop being formed by moving the tape backward against the torque supplied by spring 644 to the tape feed drum 641, the tape between the point of formation of the loop and the supply roll being held stationary by the tape feed controlling roller 632.

Referring particularly to Fig. 4, it will be observed that print hammer slide 556 has been provided with a leftwardly extending arm 661 at the free end of which is a roller 662. The length of arm 661 is such that when the slides 556 are held in their extreme right-hand positions, as

viewed in Fig. 4, the tape will be permitted to occupy an approximately straight path between tape feeding control rollers 632 and idler rollers 634. However, when a print hammer slide 556 is released for leftward movement by the tripping of its latch 557 by a selected slide bar 551, the roller 662 will be moved leftwardly and will increase the length of the path between the point of engagement of the tape with rollers 632 and 633 and the point of its engagement with idler roller 634. The tape required to increase the length of the path will be supplied by rightward movement of the tape past the printing position, as viewed in Fig. 4, tape feed drum 641 rotating counterclockwise as the tape is retracted. Thus, the most recently printed quotation on the tape will be moved back toward the printing position, thereby reducing to a predetermined low amount the blank tape intervening adjacent quotations. Printing of the figures of the quotation may then proceed in the normal manner, the tape being advanced one character space for each character printed, by the tape feed controlling roller 632. After the last character of the quotation has been printed, and upon the next clockwise movement of bail 561 to its latched position, the print hammer slide 556, which has been selected, will be restored to its extreme right-hand position and roller 662 will be retracted to permit the tape to assume an approximately straight path between rollers 632 and 634. The reduction in the length of the path between these two points will result in slack tape which will be taken up by tape feed drum 641, thus advancing the last quotation printed from the printing position by the distance that the path is reduced. In order that the retraction of the tape, which causes counterclockwise rotation of drum 641, shall not draw pin 652 off the counterclockwise end of the tail cam of pawl 649, whereby the pawl would escape from control by the pin, the tail cam should be of sufficient length to accommodate retraction of the tape while maintaining pawl 649 disengaged from ratchet 653.

An ink ribbon supporting and feeding mechanism is provided for passing an ink ribbon, such as is used on typewriters and various forms of printing telegraph apparatus, between the tapes 639 and the print hammer heads 594 when the latter are moved into printing position. The ribbon spool supporting and driving mechanism is similar to that shown in copending application Serial No. 77,796, filed May 4, 1936, by Albert H. Reiber. As shown in Figs. 1, 2, and 4, a ribbon feed mechanism supporting plate 666 is mounted above the primary selector mechanism and is provided with spindles 667 upon which ribbon spools 668 are adapted to be mounted. Each of the spindles 667 has secured thereto a ribbon feed ratchet 669, as shown in Fig. 2. A ratchet feed pawl (not shown) is provided in accordance with the disclosure of copending application Serial No. 77,796 for imparting rotation alternatively to either of the spools 668 and, in the present adaptation of the apparatus, the pawl is operated by a link 671 which is pivoted to a lever arm 672 secured to shaft 617 which carries printing bail 584 and tape spacing bail 639. Upon each operation of printing bail 584, clockwise rotation is imparted to shaft 617 by the printing spring 614 and counterclockwise rotation is then imparted to the shaft by restoring cam 618. Link 671 is then moved endwise and is retracted to effect rotation of whichever of the ratchets 669 the ribbon feeding pawl engages.

From the left-hand of the spools 668, ink ribbon 673 passes behind the ribbon guide 674, and around the obliquely cut right-hand end of the guide 674, whereby the path of the ribbon is changed from horizontal to vertical. The ribbon extends upwardly past all of the tapes 630 and across a horizontally disposed guide mounted above the uppermost of the type wheels by which the ribbon is directed rearwardly of the printer. From this point, the ribbon extends downwardly behind all of the type wheels to a point below the lowermost of the type wheels where there is located a guide similar to the guide 674 for changing the direction of travel of the ribbon from vertical to horizontal. The ribbon is then brought forwardly to the right of the printing position, being guided by means of pins 676, and is engaged with the right-hand spool 668. By virtue of the provision of two ratchets 669, the direction of travel of the tape may be reversed. Thus, at times the ribbon 673 may pass upwardly in front of the tapes and at other times may pass downwardly, being alternately transferred from the right-hand to the left-hand spool and from the left-hand to the right-hand spool.

The multiple tape printer, hereinbefore described, is shown in all figures in the normal or idle condition with the single exception of print hammer slide restoring bail 561. This bail is not restored to extreme clockwise position as an incident to the printing of a stock quotation, but remains in its extreme counterclockwise position, permitting a selected print hammer slide 556 to remain in its extreme left-hand position, as viewed in Fig. 4, until the reception of the next signal combination transmitted, which would ordinarily be the signal combination relating to the first stock designating letters of the next stock quotation.

Upon the reception of the first code combination representing a designating letter of the stock for which a quotation is to be printed, the sword levers 421 are set according to the code combination, the transfer levers are unlocked and are set in correspondence with the received code combination by the transfer bail, which also rocks the T-lever 452 in clockwise direction, due to the fact that the code combination represents a letter and the impulse which distinguishes between letters and figures is of spacing condition. The T-lever 452 is not provided with a locking extension to be locked by the bail which locks transfer levers 426, for the reason that it performs the functions for which it is provided merely by rocking to its clockwise or counterclockwise position, and it is not necessary and may not be desirable to lock it in those positions. The T-lever operates pawl lever 457 to effect the rotation of ratchet wheel 462 and shaft 463 one step. The uppermost of the reciprocable bars 473 is thereby conditioned for operation by bail 486.

In timed relation to the unlocking of transfer levers 426 and the setting of discs 446 and bars 449, reciprocable bar 473 is operated to effect the restoration of bail 561 to latched position, whereby the previously selected print hammer slide 556 and all of the other slides 556 as well are retracted to extreme right-hand position, as viewed in Fig. 4 thereby; to operate bail 531 to disengage all of the latches 527 from the transfer bars 501 to permit those bars to drop to their lowermost position; and to operate bail 492 to effect the setting of storage bars 501 in accordance with the setting of bars 449 through the agency of trans-

fer bell cranks 507 carried by bail 509. During this time, all of the selectable pins 592 are blocked from being selected by special blocking disc 447 which is latched in extreme clockwise position by latch 583, which is pivoted on an arm 1583 carried by printing bail shaft 617 and which is, therefore, operated to restore disc 447 to blocking relation to selectable pins 592 following each printing operation. Thus, none of the pins 592 can move into selected position during the reception of stock designating letter combinations and the print bail 564 cannot be released for operation.

The second and third letters of the stock designation are received, transferred, and stored in the same manner as the first letter code, pawl 459 being operated by T-lever 452 for each letter code to advance ratchet 462 and shaft 463 to its second and third positions, whereby first the bar 474 and then the bar 476 will be actuated by bail 486 to effect the operation of bail 493 and 494 to store in bars 502 and 503 the successive selective conditions of bars 449.

If the stock designation should consist of only one letter or of two letters, the bars 502 and 503, or the bars 503, respectively, will not be set but will remain in their lowermost positions, to which they were restored by their springs upon the operation of bail 531 in connection with the transfer of the first received code combination.

If any stock designation should contain more than three letters, or if message material such as news bulletins should be received by the selector, the letter codes in excess of three will have no effect on the signal storage mechanism. They will merely attempt to step ratchet 462, and as the ratchet has four notches in addition to that which is engaged by pawl 459 in the rest position of the ratchet, as shown in Fig. 1, it can be stepped only until cam 469 has been carried one step beyond its effective position.

Following the last letter of the stock designation, whether the designation has consisted of one, two, or three letters, the signal combination representing the first figure of the price quotation will be received. In this signal combination, the impulse which determines that it pertains to a figure will be of marking nature, and the T-lever 452 will be rocked in counterclockwise direction. This determines that the last of the letters of the stock designation has already been received and no idle interval, representing the time for setting the storage bars 502 and 503, need be interposed between the last letter code of a stock designation consisting of less than three letters and the first figure code of the price.

The counterclockwise rocking of T-lever 452 causes pawls 459 and 464 to be stripped from engagement with ratchet 462 which permits shaft 463 to return to normal position. Bell crank 579 is rocked counterclockwise as holding pawl 464 is disengaged from ratchet 462, the rocking of bell crank 579 resulting in the release of printing hammer slide restoring bail 561 and the simultaneous release of one of the latches holding the special blocking disc 447 in blocking position with respect to selectable pins 592. As bail 561 rocks to counterclockwise position, it takes up the lost motion afforded by slot 559, and thus becomes closely coupled to bail 564 for subsequent restoration to extreme clockwise position. Thus, one of the print hammer slides 556, corresponding to the slide bar 551, which had been released as a result of the setting of storage bars 501, 502, and 503 according to the code combinations repre-

senting a stock combination, becomes unlatched and is moved by its spring 559 to present its print hammer head 594 in printing position. This movement causes loop forming roller 662 to form a loop in the tape upon which the quotation is to be printed, and the tape is thereby retracted to reduce the blank space between the last printed quotation and the printing position.

At the end of the counterclockwise travel of bail 561, secondary latch 536 for blocking disc 447 is released and this latch will remain released until bail 561 is restored to extreme clockwise position, which operation will occur in connection with the reception of the code combination representing the first letter of the next stock quotation. Upon the release of disc 447 all of the selectable pins 592 are unblocked and the pin corresponding to the code combination of the first figure of the price moves into the path of printing control lever 604 and rocks that lever to effect the release of printing bail latch 612, whereupon the bail blade 626 strikes the print hammer head 594 which is presented in its path and causes the figure corresponding to the selected pin 592 to be impressed upon the tape by the continuously rotatable type wheel. Upon the restoration of printing bail 524 to normal position, spacing ratchet escapement 602 is operated to permit the tape to be advanced one step and primary latch 583 for blocking disc 447 is re-engaged with the disc controlling lever 451 and is actuated to restore the disc to blocking relation to selectable pins 592.

The code combination representing the next figure in the price also contains a marking impulse indicating that the code combination pertains to a figure, which again causes bell crank 453 to be rocked in clockwise direction. Pawls 459 and 464 are again disengaged from ratchet 462, but since this ratchet has already returned to normal position the operation is idle. Lever 579 is operated along with holding pawl 464, as before, but this operation is not idle, the latch 583 being thereby again disengaged from blocking disc controlling lever 451. Latch 583 is released and disc 447 is rocked to its extreme counterclockwise position, thus permitting a selectable pin 592 to move into the path of the type wheel shaft arm, whereby the next figure of the stock quotation price is printed. The type wheels may be provided with fractions and any marks of punctuation and special characters ordinarily used with or as part of stock quotation prices. During the printing of the several figures of the stock price, the code bars 449 are set in accordance with the setting of the code discs 446, but since ratchet 462 is not operated in response to signal combinations containing an impulse pertaining to the selection of figures, the transfer bails 509, 512, and 514 are not operated.

By means of the apparatus hereinbefore described, quotations from selected stocks may be printed upon individual tapes identified with the stocks so that the stock designation letters are not printed but are used for selecting the tape upon which the quotation is to be printed. A much larger number of quotations may thus be displayed or projected than there could be if the stock designation letters accompanied each quotation on the tape. Furthermore, the latest quotation with reference to any stock is moved out into position to be observed or projected as soon as a code combination in which the sixth pulse is of spacing nature has been received, such a code combination causing the stock slide last se-

lected to be retracted. When a price is to be printed upon any tape, the tape is retracted so that the quotation is printed in proximity to the next preceding quotation, thus further increasing the number of quotations that may be applied to a given length of tape.

The printer hereinbefore described may, if desired, be employed directly as a quotation board, by printing on relatively wide tapes with sufficiently large characters to enable them to be read at distances from which quotation boards may ordinarily be observed. This requires considerably larger type wheels than those employed in ordinary type wheel telegraph printers. The fact that the type wheels of the printer according to the present invention are rotated continuously renders the printer particularly adapted to the use of large type wheels because the inertia effects which would interfere with the arrestment of all of the type wheels for each printing operation are avoided.

A modified form of tape retracting and releasing mechanism is shown in Fig. 10, other elements of the printer which have already been identified in the foregoing description being designated by the same reference numerals. In the modified form of tape controlling mechanism, print hammer slides 553 are not provided with tape loop forming rollers as in the previously described apparatus. Additional fixedly located idler rollers are provided, however, there being two designated by the reference numeral 631 to be engaged by the right-hand face of the tape as it passes from the tape feed roller 632, that face being the front of the tape, and two rollers 682 to be engaged by the same face of the tape just in advance of the point of engagement of tape 630 with the tape puller drum 641.

A loop forming device which comprises roller supporting platforms 633 and 634 joined by a connecting bar 625 which must be as small as possible and as close to the tape as possible to avoid interference with a light beam when a projecting system is used with the printer is supported for endwise movement adjacent to each tape. Platform 633 supports loop forming rollers 687. The rollers 687 are so positioned with respect to the rollers 631 that they may move through the plane defined by the rollers 631 as platform 633 is moved rightwardly. Similarly, platform 634 is provided with rollers 688 so positioned with reference to rollers 632 that they may move through the plane defined by the rollers 632 when platform 634 is moved to the right. Rollers 687 and 688 engage the rear surface of the tape and the rollers 689 are disposed a substantial distance to the left of the rollers 682 so that the tape follows a tortuous path around rollers 688 and 682 alternately to reach tape puller drum 641. Thus, the rollers 633 form loops of substantial dimensions in the tape beyond the printing point.

When the tape loop controlling device which comprises platforms 633 and 634 and connecting bar 625 is moved rightwardly, as viewed in Fig. 10, the loops of tape formed by rollers 683 are gradually reduced in size until left-hand platform 634 engages stop 703. As rollers 683 are carried rightwardly and the loops formed thereby are diminished, the rollers 687 pass through the plane defined by the axes of rollers 631 and continue rightwardly thereof to form loops in the tape at the right-hand end of the tape loop controlling device. The transference of tape loops from the left-hand end to the right-hand end of the tape

loop controlling device is accompanied by movement rightwardly past the printing position of a section of tape which had previously moved leftwardly past that position. Thus, the retraction of the tape to permit the printing of a stock quotation price in close proximity to the previously printed price which had been drawn out into viewing or projecting position and the drawing out of the printed quotation into printing or viewing position following the printing operation results solely from the transference of slack accumulated in the form of loops from one side of the printing position to the other without necessitating movement of the tape past the point of engagement with tape feed controlling roller 632 or tape advancing drum 641. Since four passes of tape form the loops around rollers 682 and 683, the tape loop forming device need be moved only one-fourth of the distance that tape 639 is to be retracted or advanced by the transference of loops from one side of the printing position to the other.

For moving the tape loop device to the right, as viewed in Fig. 10, to retract the tape toward the printing position, there has been provided a lever 691 pivoted at 692 and carrying a pin 693 which is disposed in a slot 694 in platform 683. Lever 691 is provided with a cam follower projection 696 engageable with a cam 697 carried by a shaft 693 and driven therefrom through a friction clutch. A tension spring 699 biases lever 691 in clockwise direction to maintain engagement of cam follower projection 696 with cam 697. A stop disc 701 is provided with shoulders engageable with the armature 702 of an electromagnet 703 when the magnet is deenergized. The circuit of electromagnet 703 includes a pair of contacts 704 adapted to be closed by a lug 706 carried by print hammer slide 556 when the print hammer slide moves to its extreme left-hand position. Upon energization, electromagnet 703 withdraws its armature 702 from blocking engagement with stop disc 701, whereby cam 697 is released for rotation and continues to rotate until the print hammer slide 556 is restored to its extreme right-hand position which, as previously described, occurs upon reception of the first signal combination of the next stock quotation identification. As cam 697 rotates, it rocks lever 691 to its extreme counterclockwise position in opposition to its biasing spring 699. As lever 691 is rocked to that position, it takes up the lost motion afforded by slot 694 and then moves the tape loop device to its extreme right-hand position, slot 694 being wider at its right-hand end than at its left-hand end to permit the tape loop device to move in a straight line while lever 691 moves in an arc. Stops 707 and 708 are provided for limiting the movement of the tape loop device in right-hand and left-hand directions, respectively. It is important that stop 708 shall be so positioned as to afford the tape loop device sufficient movement to the right to permit cam follower projection 696 of lever 691 to clear the cam projection of cam 697.

As cam follower projection 696 escapes from each of the projections of cam 697, spring 699 attempts to restore lever 691 to its normal position. However, the clockwise motion of lever 691 is retarded by a dashpot device 708 which prevents lever 691 from rotating clockwise a sufficient distance to take up the lost motion afforded by slot 694 during the rotation of cam 697 the distance of 180° between its cam projection. Lever 691 may move a short distance in

clockwise direction between cam projections, but it will be restored to extreme counterclockwise position immediately and the result will be a slight oscillation of lever 691 which, however, will not be imparted to the tape loop device which comprises platforms 683 and 684 connected by bar 686.

Fig. 11 shows in schematic form an arrangement for projecting real images of the stock quotations printed on multiple tapes upon a viewing screen. The multiple tape printed is indicated merely by a diagrammatic showing of a tape supply roll, a tape idler roller, a type wheel, and the tape puller drum. At the rear of the printer are located a lamp 711, which is backed by a reflector 712 for concentrating and focusing the illumination, and a condenser lens system 713. In front of the printed tapes is located an objective lens 714 by which the beam of light passing through the tape may be focused upon a plane reflector 716. Plane reflector 716 turns the beam of light through 90° and directs it to the rear of a translucent viewing screen 717 from the front of which the images of quotations printed on the tape of the printer may be observed. The transmission of light through the tape from the rear and the use of a single objective lens and a plane reflector necessitates the printing of figures upon the tape in the position shown in Fig. 14, the tape being viewed from the front. With the characters thus printed, the image inversion and rotation taking place at objective lens 714 and reflector 716 will produce upon viewing screen 717, when viewed from the front of the screen, erect real images of the printed characters moving from right to left as the tape is advanced, which is the actual direction of movement of the tape from the printing position. Since the type wheels are located behind the tapes but the inking ribbons and the print hammers are in front of the tapes, the characters will be arranged on the type wheel according to the showing of Fig. 13. It is to be noted that printed characters viewed from the front of the tape, which is the side upon which they are printed, appear in the same relative positions that they do on the type wheel. For this type of image projection, it is desirable to use transparent tape for the printing of the quotations in order that the translucent viewing screen shall be brightly illuminated to cause the dark type impressions to stand out distinctly.

It will be apparent from Fig. 11 that the projecting system hereinbefore described is readily adapted to duplication along a wall with important advantages from the standpoint of space economy, less depth being occupied than would be required if the projecting elements from lamp to viewing screen should be arranged in a straight line 3 extending from the back wall to the viewing screen. Also, a plurality of projecting compartments may be formed by a plurality of spaced plane reflector supports, arranged parallel to each other and obliquely to the back wall, and a plurality of viewing screens parallel to the wall.

In order to keep the projection distance a minimum and in order to employ the most economical optical arrangement, the tapes are divided into groups and short focal-length, inexpensive condenser and projecting lenses are used with each group of tapes, in place of a lesser number of long-focus and much more expensive condenser and projecting lenses. The importance of keeping the projection distances low is to reduce the total space occupied so that the board can

be used where space is very limited or is expensive. This arrangement is shown in Fig. 12, wherein a single type wheel shaft 406 and single set of each of the storage bars 501, 502, and 503 serves to control the printing upon two or more sets of tapes spaced according to the vertical dimensions of the tape images.

It should be noted that the optical system of each group of tapes inverts, in the image, the order of the tapes in that group, causing the uppermost tape of a group to appear at the bottom of the image of the group upon the screen. Such inversion of individual groups causes to be brought into adjacency on the screen the uppermost tape of one group and the lowermost tape of the group next below it. This necessitates that if the tape images are to appear on the screen in a particular order, a different order of coding the print hammer selecting slides, having reference to the group inversion, must be established in the printer. Thus, if an alphabetical order of tape images is desired, the order of tapes in the printer must be from bottom to top of the uppermost group, then from bottom to top of the second group, then from bottom to top of the third group, and similarly down to and including the lowermost group of tapes.

Although certain specific embodiments of the present invention have been shown and described herein, it is to be understood that the invention is not limited to such embodiments, but is capable of modification, rearrangement, and substitution of parts and elements without departing from the spirit of the invention, and within the scope of the appended claims.

What is claimed is:

1. In a printing telegraph apparatus, a rotatable shaft, a plurality of type carriers fixed to said shaft, a print hammer for each of said type carriers, means for selecting a print hammer to be actuated, a bail common to all of said hammers for actuating any selected one, signal responsive means for controlling said bail, and means effective while a print hammer is being selected for rendering said bail controlling means ineffective to control said bail.

2. In a printing telegraph apparatus, a rotatable shaft, a plurality of type carriers fixed to said shaft, a print hammer for each of said type carriers, signal storage means for selecting a print hammer, a bail common to all of said hammers for actuating any selected one, means for operating said bail, selectively operable means for releasing said bail for operation, and means effective during the selection of a print hammer by said storage means for rendering said selectively operable means ineffective to release said bail.

3. In a printing telegraph apparatus, a rotatable shaft, a plurality of type carriers supported by said shaft, a print hammer for each of said type carriers, a selectable slide member by which each print hammer is supported, a plurality of sets of code storage bars for selecting said slide members individually, signal responsive means for controlling said sets of storage bars successively, and other signal responsive means for effecting cooperation of a selected print hammer with its type carrier.

4. In a printing telegraph apparatus, a single magnet selector mechanism, a plurality of permutation mechanisms controlled concurrently by said selector mechanism, a plurality of individually selectable print hammers, an operating bail common to all of said print hammers, means controlled by one of said permutation mechanisms

for selecting any one of said print hammers for operation, and means responsive to another of said permutation mechanisms for controlling the operation of said bail.

5. In a printing telegraph apparatus, a single magnet selector mechanism having a plurality of signal responsive elements, a plurality of permutation mechanisms controlled concurrently by said selector mechanism according to the setting of said elements, a signal responsive element in said selector mechanism additional to those first recited, and means controlled by said additional signal responsive element for supervising the operation of said permutation mechanisms.

6. In a printing telegraph apparatus, a single magnet selector mechanism, a plurality of permutation mechanisms controlled concurrently by said selector mechanism, a printing mechanism controlled by one of said permutation mechanisms, a plurality of sets of storage bars controlled successively by another of said permutation mechanisms, a plurality of print hammers, and means controlled by said storage bars for selecting any one of said print hammers for actuation by said printing mechanism.

7. In a printing telegraph apparatus, a continuously rotatable shaft, a type wheel fixed to said shaft, a printing instrumentality, a selector mechanism having a plurality of selectable elements, an arm carried by said shaft, means carried by said arm and controlled by a selected one of said selectable elements for controlling said printing instrumentality to effect printing from said type wheel, and means for preventing the selection of said selectable elements whereby said first recited means is rendered ineffective to control said printing instrumentality.

8. In a printing telegraph apparatus, a selector mechanism having a plurality of selectable elements, means for normally holding all of said elements in unselected position, means for latching said holding means in effective position, a continuously rotating shaft associated with said selector mechanism, a type wheel fixed to said shaft, a printing instrumentality, an arm carried by said shaft, means carried by said arm to be actuated by a selected one of said elements for controlling said printing instrumentality, means for disabling said latching means to permit the selection of one of said elements, and means associated with said printing instrumentality for restoring said holding means to effective position and relatching said holding means in said position.

9. In a printing telegraph apparatus for printing on a plurality of tapes, a type wheel shaft, a plurality of type wheels carried thereby, one of said type wheels being associated with each of the tapes, a plurality of character spacing control mechanisms, one of said mechanisms being associated with each of the tapes, a printing bail common to all of said type wheels, a spacing bail common to all of said spacing control mechanisms, a print hammer for each of said type wheels, a spacing interponent for each of said spacing control mechanisms, and selectively operable means for presenting a print hammer and corresponding spacing interponent into effective positions relative to their respective bails.

10. In a printing telegraph apparatus for recording on a plurality of tapes message items having identifying symbols, a single magnet selector mechanism for receiving codes representing the identifying symbols and the message items, means for storing the identifying symbol codes,

means associated with each tape for printing message items thereon, and means controlled by said storing means for selecting the printing means to be effective.

11. In a printing telegraph apparatus for recording market quotations, a single magnet selector mechanism responsive to signals representing stock designations and stock prices, means for storing signals representing stock designations, means for printing stock prices, and means included in said single magnet selector mechanism for disabling said printing mechanism during setting of said storing means and for leaving said storing means quiescent during printing.

12. In a printing telegraph apparatus for printing on a plurality of tapes, a plurality of printing instrumentalities, a selectable member individual to each of said instrumentalities, means for storing one or a plurality of code signal combinations for selecting said selectable members, a single magnet selector mechanism, and means controlled by said selector mechanism for controlling the storing of successively received code signal combinations in said storing means.

13. In a printing telegraph apparatus, a first selector mechanism having a plurality of selectable elements, means for normally holding all of said elements in unselected position, a second selector mechanism having a plurality of selectable elements, and means operable upon selection of any one of the selectable elements of said second selector mechanism for rendering said holding means ineffective to hold said elements in unselected position.

14. In a printing telegraph apparatus, a plurality of permutation devices, a signal receiving mechanism, means for bringing the permutation devices singly under the mechanical control of said signal receiving mechanism, and printing mechanism mechanically controlled by said permutation devices.

15. In a printing telegraph apparatus, a plurality of permutation devices, a signal receiving mechanism including a single magnet responsive to all of the signals received by said printing telegraph apparatus, means for bringing the permutation devices singly under the mechanical control of said signal receiving mechanism.

16. In a printing telegraph apparatus, a plurality of storage permutation devices, an additional permutation device for controlling printing, a signal receiving mechanism including a single magnet responsive to all of the signals received by said printing telegraph apparatus, and means for bringing the permutation devices singly under the mechanical control of said signal receiving mechanism.

17. In a printing telegraph apparatus for printing on a plurality of record mediums, a single magnet responsive to all of the signals received by said printing telegraph apparatus, a printing mechanism, a plurality of permutation devices, means controlled according to received signals for associating any one of said permutation devices with said single magnet and setting the permutation device according to the signal, means controlled by certain of the permutation devices for selecting the record medium upon which printing is to be effected, and means controlled by another of the permutation devices for controlling the printing mechanism.

18. In a printing telegraph apparatus, a single magnet means responsive to permutation code

signals, a plurality of permutation devices, a sequence mechanism to select by its positions the permutation devices singly for control by the single magnet means, and means controlled by the single magnet means for advancing the sequence device step by step.

19. In a printing telegraph apparatus, a single magnet means responsive to permutation code signals, a plurality of permutation devices, a sequence mechanism to select by its positions the permutation devices singly for control by the single magnet means, means controlled by the single magnet means for advancing the sequence device step by step, and means also controlled by the single magnet means for restoring the sequence device to normal position.

20. In a signaling system, means to transmit a message comprising a predetermined number of groups of signal impulses, a plurality of selecting devices, and means to determine a selecting device of said plurality to be controlled by any given group of said predetermined number in accordance with an impulse of said group.

21. In a signaling system, means to transmit a plurality of groups of signal impulses comprising a message, a plurality of selecting devices, and means controlled by an impulse accompanying a group to determine the selecting device controlled.

22. In a signaling system, a plurality of functional selecting apparatuses, a set of impulse controlled selectors, transfer mechanism for communicating a set of impulses from said set of selectors to one of said functional selecting apparatuses, and means responsive to a routing impulse accompanying each set of impulses for supervising the communicating performance of said transfer mechanism.

23. In a telegraph system responsive to permuted impulse signals, a plurality of recorders, a plurality of impression elements in each recorder, and a selector mechanism comprising means responsive to the composition of a signal for determining whether it is to select a recorder or an impression element of said plurality of recorders.

24. In a telegraph system, a plurality of primary devices to be selected, a series of secondary devices associated with each of said primary devices, and a selector mechanism responsive to each of a plurality of signals for determining whether said signal supervises the selection of one of the primary devices or whether it supervises the selection of one of the secondary devices.

25. In a printing telegraph system, a plurality of recorders, a series of recording elements in each recorder, and a selector mechanism responsive to telegraph signals for determining whether said signal supervises the selection of a recorder or supervises the selection of a recording element.

26. In a signaling system, means to transmit groups of permutation code signals, a plurality of selecting devices, and means controlled by the nature of a code signal to determine the selecting device controlled by any given code signal.

27. In a signaling system, two functional selecting apparatuses, a set of impulse controlled selectors, transfer mechanism for communicating the permuted condition of a set of impulses from said set of selectors alternatively to one or the other of said two functional selecting apparatuses, and means responsive to a routing impulse accompanying each set of impulses for supervising the alternative response of said transfer mechanism.

28. In a printing telegraph system, a plurality of printers, a plurality of characters on each printer, and a selector mechanism comprising means responsive to the composition of a signal for determining whether it is to select a printer or a character of said pluralities of printers and characters.

29. In a telegraph receiving apparatus, a series of signal impulse elements of which certain are related to character selection and others to allocation, a plurality of recording units under the common supervision of said receiving apparatus, means for choosing certain among said recording units for operation in accordance with a condition of said character selection impulse elements, means for choosing a printing position of said recording units in accordance with a condition of said character selection impulse elements, and directing means responsive to the nature of said allocation impulse elements for determining whether associated character selection impulses are to affect said unit choosing means or printing position choosing means.

30. In a telegraph printing system, a plurality of typing units each having an individual paper feed mechanism, a selector apparatus responsive to character impulses to select for operation certain of said units and the paper feed mechanism associated therewith, and means for disabling the paper feed mechanism of a previously se-

lected typing unit upon the receipt of succeeding type unit selecting impulses.

31. In a printing telegraph system, a plurality of type carrying print units each having a sequence of character elements, a permutation code selector mechanism comprising selectors responsive to code impulses and selectors responsive to alternative control impulses, apparatus responsive to said code impulse responsive selectors for electing a print unit for operation or for electing a character of said sequence, and apparatus responsive to said alternative control impulses for determining one of said print unit or character electing responses for each set of associated code impulses.

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