Nov. 12, 1963 A. W. WALLENS 3,110,766

TYPE PRINTING TELEGRAPH APPARATUS

Filed Aug. 25, 1961 3 Sheets-Sheet 1

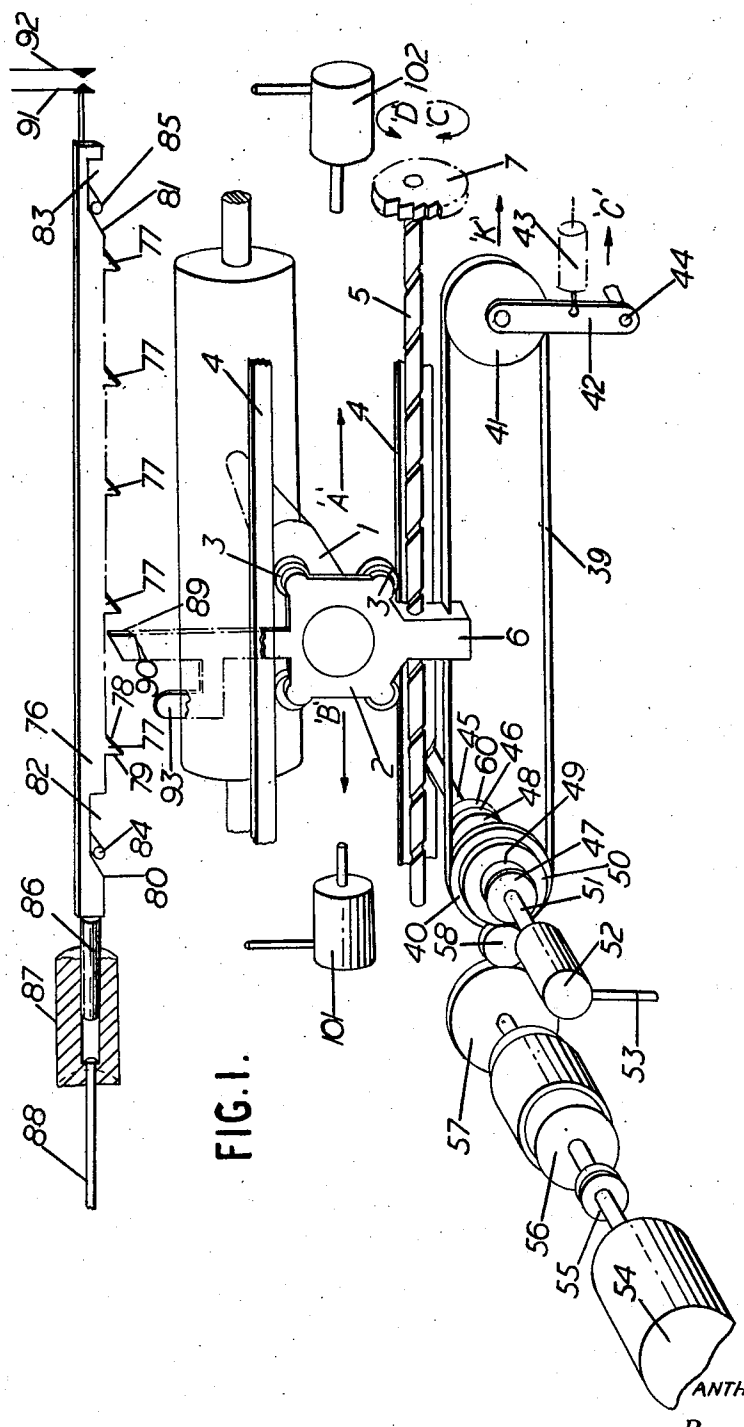


FIG. 1.

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TYPE PRINTING TELEGRAPH APPARATUS

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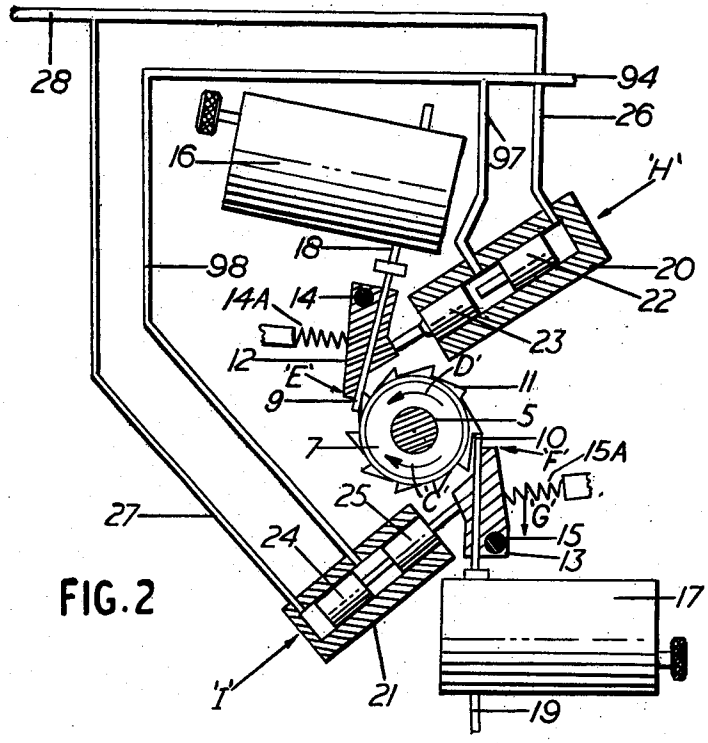


FIG.2

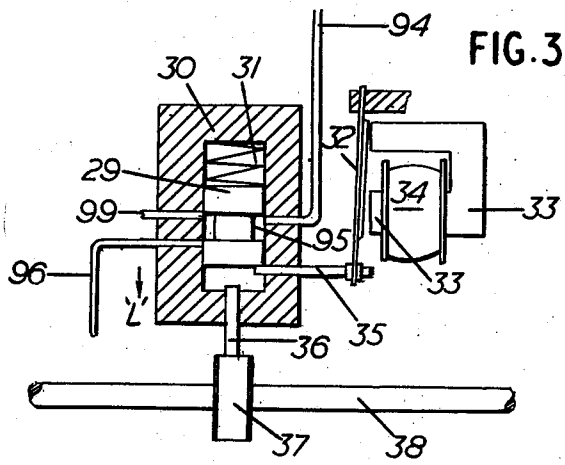


FIG.3.

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TYPE PRINTING TELEGRAPH APPARATUS

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FIG.4.

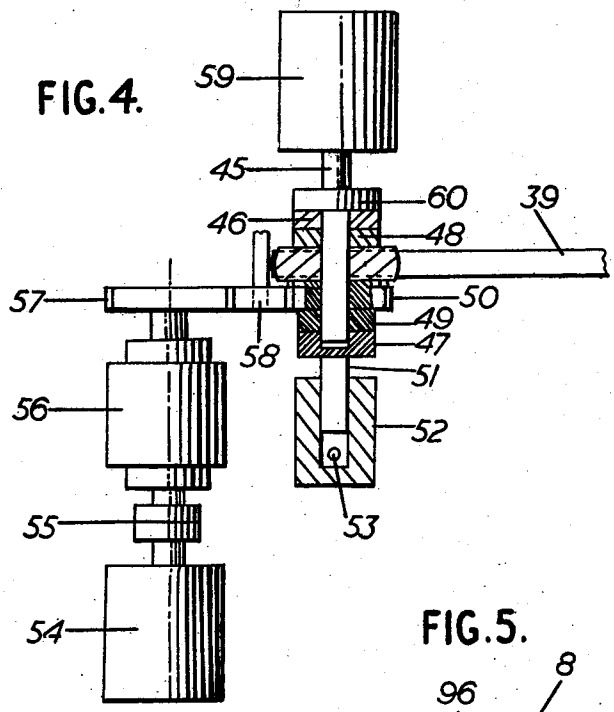
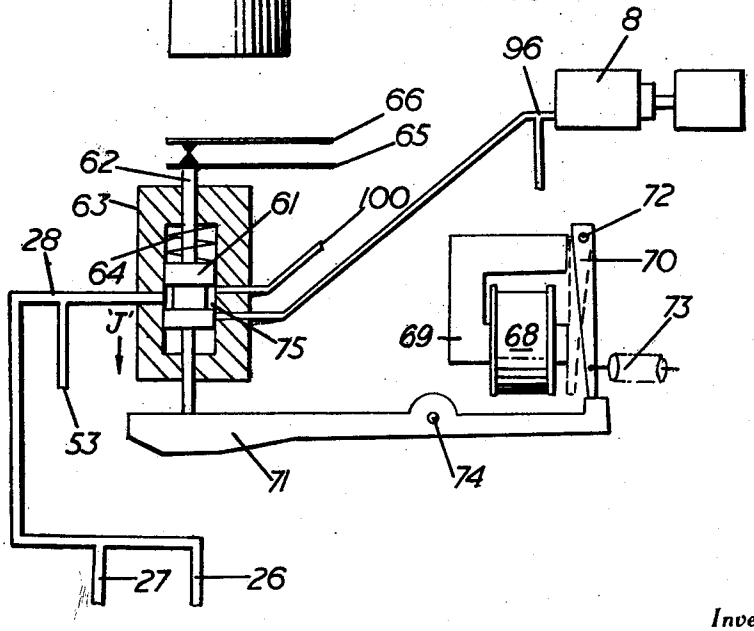


FIG.5.



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TYPE PRINTING TELEGRAPH APPARATUS

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Claims priority, application Great Britain Sept. 2, 1960
16 Claims. (Cl. 178—25)

The present invention relates to type printing telegraph apparatus and more particularly to a type printing telegraph apparatus having a movable type printing head.

An object of the present invention is to provide an improved type printing apparatus wherein the effective mass of the carriage and the printing head thereon is reduced and wherein the carriage and printing head may be moved in predetermined step-by-step fashion.

The type printing head concerned in the present invention includes a type printing head mounted on a carriage, a lead-screw means which is rotatable by the motion of the carriage, a ratchet wheel affixed to the lead screw, pawl means alternately engaging and disengaging said ratchet wheel to permit step-by-step movement of the carriage, and a head-feed selector means for operating said pawl means to permit said step-by-step movement.

The present invention is described with reference to the accompanying drawings in which:

FIG. 1 shows a perspective view of a part of a type printing telegraph apparatus according to the invention.

FIG. 2 shows a part sectioned view of pawl means forming part of the apparatus of FIG. 1.

FIG. 3 shows a part sectioned view of head-feed selector means forming part of the apparatus of FIG. 1, and which is operatively associated with the pawl means of FIG. 2.

FIG. 4 shows in greater detail a part sectioned view of power-driven belt means incorporated in the apparatus of FIG. 1 for driving a carriage and a type printing head mounted thereon.

FIG. 5 shows a part sectioned view of carriage-return selector means forming part of the apparatus of FIG. 1 and which is operatively associated with type-printing head position indicating means of FIG. 1, the power driven belt means of FIGS. 1 and 2, and the pawl means of FIG. 2.

Referring now to FIG. 1 which shows an embodiment of the apparatus according to the present invention, a type printing head 1 is accommodated on a carriage 2 which carriage is arranged to be moved on rollers such as 3 engaging rails 4, in the letter-feed and carriage-return directions indicated by the arrow "A" and "B" respectively, these movements are effected by power-driven belt means which is later to be described.

A lead-screw 5 engages a threaded hole through an extending portion 6 of the carriage 2 and is supported at its ends by means not shown. The helix angle of the thread of the lead-screw 5 and that of the mating thread in the hole through the extending portion 6 of the carriage are such that movement of the carriage in the letter-feed and carriage-return directions, will cause the lead-screw 5, and in consequence a ratchet wheel 7 affixed thereto at one end, to rotate in the directions indicated by the arrows "C" and "D" respectively.

Pawl means such as is shown in part section in FIG. 2 is utilised to permit step-by-step movement of the carriage 2 (FIG. 1) by the power-driven belt means in the letter feed direction. In this figure an end view of the ratchet-wheel 7 is shown in which two pawls 9 and 10 are disposed in the path of teeth such as 11 of the ratchet wheel 7, which ratchet wheel is arranged in such a manner with respect to the pawls that in successive movements of both pawls together into the path of the teeth, the pawls engage a tooth of the ratchet-wheel alternately. The pawls 9 and 10 are housed respectively in carriers 12 and 13 which are arranged to pivot on pins 14 and 15 respectively, compression springs 14A and 15A are provided to engage carriers 12 and 13 respectively for causing the pawls 9 and 10 to be biased to move in the directions indicated by the arrows "E" and "F" respectively, i.e. into the path of the teeth of the ratchet wheel.

Shock absorbing devices 16 and 17 of conventional design may be utilised to absorb the shock of engagement of the pawls 9 and 10 when one or the other of them engages with a tooth of the ratchet wheel. The ends of pawls 9 and 10 are arranged to engage the flanged ends of operating spindles 18 and 19 of the shock absorbing devices with which they are respectively associated. Hydraulic means in the form of cylinders 20 and 21, and pistons 22 and 23 and pistons 24 and 25 slidably accommodated within these cylinders respectively, are associated with pawls 9 and 10 for moving the pawls out of the path of the teeth of the ratchet wheel in directions opposite to those indicated by the arrows "E" and "F" under the influence of a hydraulic medium such as, for example, oil acting on the pistons, and for permitting the pawls to move into the path of the teeth in the directions indicated by the arrows "E" and "F" under the influence of the spring means incorporated in the hinges 14 and 15. The utilised hydraulic medium for causing movement of pawls 9 and 10 out of the path of the teeth of the ratchet wheel is fed to cylinders 20 and 21 under pressure from a pump 8 (FIG. 5), via a primary feed line 96, a cylinder 63 (of the hydraulic valve of a carriage-return selector means later to be described with reference to FIG. 5) a further primary feed line 28, and secondary feed lines 26 and 27 (FIGS. 2 and 5).

The utilized hydraulic medium is also fed to cylinders 20 and 21 under pressure to perform the same functions from the pump 8 via the primary feed line 96, a cylinder 30 (of the hydraulic valve of a head-feed selector means now to be described with reference to the latter mentioned FIG. 3), a further primary feed line 94, and secondary feed lines 97 and 98 (FIG. 2).

The aforementioned head-feed selector means comprises a hydraulic valve and a solenoid; the hydraulic valve comprises a piston 29 slidably arranged within the cylinder 30, and a compression spring 31 which is housed within the cylinder 30 between the upper side of the piston 29 and the upper head of the cylinder 30. The primary feed line 96 is connected between the pump 8 (FIG. 5) and the cylinder 30. Primary feed line 94 is connected between cylinder 30 and secondary feed lines 97 and 98 (FIG. 2). A sump return feed line 99 is also incorporated between cylinder 30 and a sump (not shown) for purposes later to be described. A solenoid 34 is provided with a magnetisable core 33 and an armature 32 to which a pin 35 is affixed at one end, and which pin engages the underside of the piston 29 by way of a hole in the cylinder 30. A pin 36 extends through the base portion of the cylinder 30 to engage with its upper end the underside of the piston 29 and to engage with its lower end a double lobed cam 37 mounted for rotation on a shaft 38 which is driven by a motor (not shown). The number of revolutions per minute of shaft 38 is equal to half the letter-feed rate of the equipment.

Referring again to FIG. 1, the power-driven belt means, previously mentioned, for driving the carriage 2 and type-printing head 1 thereon in the letter-feed and carriage return directions comprises a belt 39 which is affixed by a portion thereof to the member 6 extending from the carriage 2. The belt 39 is supported for movement in the

directions indicated by the arrows "A" and "B" by pulleys 40 and 41.

Belt tensioning pulley 41 is free running on a member 42 which is constrained to move in the direction indicated by the arrows "K" under the influence of tension spring 43 acting on member 42 which is pivoted on a pin 44. Pulley 40 is mounted on a shaft 45 which shaft is coupled to a first motor 59 (FIGURE 4) to drive pulley 40 in an anti-clockwise direction and thus the carriage 2 and type-printing head 1 accommodated thereon in the carriage-return direction. A hydraulically operated clutch for engaging or disengaging the drive between the aforementioned motor and the belt by way of the pulley 40 is constituted by pressure pads 46 and 47, friction pads 48 and 49 all of which are normally free running on shaft 45 and which embrace pulley 40 and a gear wheel 50 affixed thereto, and a piston 51 operable to move within a cylinder 52 under the influence of the utilised hydraulic medium, which is fed to the cylinder 52 under pressure from the pump 8 (FIG. 5) via primary feed line 96, the cylinder 63 of the aforementioned hydraulic valve of the carriage-return selector means, and secondary feed line 53 (FIGS. 1, 4 and 5).

A second motor 54 drives pulley 40, by way of coupling 55, magnetic clutch 56, gear wheels 57, 58 and 59, in a clockwise direction and thus the carriage and type-printing head in the letter-feed direction. The construction of the driving and clutching arrangements will be better understood with reference to FIG. 4, which is a part sectioned view of the integers involved. The shaft 45 has mounted thereon, in the following order, the pressure pad 46 resting against a collar 60 integral with the shaft 45, friction pad 48, pulley 40 and gear wheel 50 affixed thereto, friction pad 49, and pressure pad 47. The exposed end of piston 51 which is operable to move within cylinder 52 is arranged concentric with shaft 45 and further arranged when operated, to engage pressure pad 47.

The aforementioned carriage-return selector means for operating the hydraulic clutch and the magnetic clutch 56 is constituted by a hydraulic valve and electric circuit means respectively which co-act in operation. Such means are shown in part section in FIG. 5, the hydraulic valve comprises a piston 61 supported by a spindle 62 for movement within the cylinder 63 of the hydraulic valve, and a compression spring 64 which is housed within the cylinder 63 and disposed between the upper side of piston 61 and upper head of the cylinder 63. It is the purpose of the compression spring 64 to effect self-actuation of the hydraulic valve downward when permitted, in the direction indicated by the arrow "J," from a first condition of operation to a second condition of operation, by means and in a manner later to be described. In FIG. 5, the hydraulic valve is shown in its non-actuated or first condition of operation.

Connection between the pump 8 and the cylinders 63 and 30 (FIG. 3) of the carriage-return and head-feed selector means respectively are established as previously stated by primary feed line 96. A sump return feed line 100 the purpose of which is later to be described is also incorporated between cylinder 63 and a sump (not shown).

The electric circuit means is constituted by a pair of spring contacts 65 and 66, and these contacts are electrically connected in series with the magnetic clutch 56 (FIGS. 1 and 4) and a source of power for operating the magnetic clutch. The aforementioned contacts are disposed above the spindle 62 supporting piston 61. The lower contact 65 is always engaged by the upper end of spindle 62 so that in the non-actuated condition of the hydraulic valve i.e. in a first condition of operation, electrical connection exists between contacts 65 and 66 through their engagement. A solenoid 68 comprising a magnetisable core 69 and an armature 70 and a lever 71 are utilised to permit the hydraulic valve and the electrical circuit means to selfactuate from their first conditions of operation to their second conditions of operation in response to a carriage-return signal. Referring now to FIG. 1 the means for indicating a predetermined position of the type printing head 1 during its movement with the carriage 2 in a letter feed direction comprises a bail 76 having a number of projections 77 extending from a side thereof and each of which projections has an inclined planar surface such as 78 disposed toward the right hand end of the apparatus and a vertical surface such as 79 disposed toward the left hand end of the apparatus. The bail 76 is suitably mounted by means not shown to be slidable in the letter-feed and carriage-return directions indicated by the arrows "A" and "B" respectively. Further inclined planar surfaces 80 and 81 are incorporated at the ends of slots 82 and 83 respectively in the bail 76 and are arranged to be engaged by rollers 84 and 85 which are rotatably affixed to the apparatus frame by means not shown.

The bail is arranged to be moved during a carriage-return movement of the carriage 2, from a first position of operation to a second position of operation in the direction indicated by the arrow "A" by a piston 86 which is moved in a fixed cylinder 87 under the influence of the utilised hydraulic medium which is fed to the cylinder 87 by way of the secondary feed line 88 connected to the primary feed line 28 (FIG. 5) from the hydraulic valve of the carriage-return selector means of FIG. 5. The vertical surface 89 of a projections 90 extending vertically upward from the carriage 2 is arranged to engage, during movement of the carriage 2 in a letter-feed direction, the vertical surface such as 79 of one or more projections 77 extending from the bail 76 so that for each engagement the bail is moved to the second position of operation to cause a spring contact 91 to engage a second spring contact 92 to establish an electric circuit to an indicating means. The indicating means proper (not shown) may comprise, for example, an electro-magnetically operated rotary switch which is arranged to step from one contact making position to another contact making position for each operating pulse applied thereto via contact 91 and 92. Selected contact positions may be arranged to give visual or aural indications that predetermined positions of the type-printing head 1 have been reached. Shock absorbing devices 101 and 102 may be utilised to retard and arrest the motion of the carriage 2 toward the termination of its movements in the letter-feed and carriage-return directions.

It is now proposed to describe the co-action of component units of the apparatus in operation.

In the rest condition of the apparatus, the carriage 2 (FIG. 1) and the type printing head 1 accommodated thereon are fully to the left of the apparatus prepared for a letter feed operation, or operations, having been brought to rest at the end of a previous carriage-return operation, in a manner later to be described, so that the hydraulic valve and electric circuit means constituted by contacts 65 and 66 of the carriage-return selector means (FIG. 5) have been set to their first conditions of operation. In the first condition of operation of the hydraulic valve the hydraulic clutch is rendered ineffective to engage the drive between motor 59 and pulley wheel 40, since the piston 61 of the hydraulic valve is so positioned within the cylinder 63 that the inlet port to this cylinder from a feed line 96 and the pump 8 is blocked off by the lower end of the piston and the utilised hydraulic medium fed under pressure from the pump is prevented from passing through the cylinder 63 to cylinder 52 (FIGS. 4 and 5) of the hydraulic clutch by way of feed line 53, but permitted to flow back to a sump via sump return feed line 100. There is therefore no pressure of hydraulic medium exerted on piston 51 within cylinder 52 and in consequence no thrust is exerted by the piston 51 on the other integers constituting the hydraulic clutch to lock pulley 40 onto shaft 45, the drive between motor 59 (FIG. 4) and the pulley 40 is therefore disengaged. However, in

this first condition of operation of the electric circuit means, electrical connection is established between contacts 65 and 66 thereof, and the magnetic clutch 56 will be energised to engage the drive between motor 54 and pulley wheel 40 by way of coupling 55 and gear wheels 57, 58, and 50. The carriage 2 (FIG. 1) and the type-printing head would therefore tend to be moved in the letter feed direction by the belt 39 driven by pulley wheel 40. This movement is however prevented through the action of whichever one of pawls 9 and 10 (FIG. 2) is in engagement with a tooth such as 11 of the ratchet wheel 7 and through slippage of magnetic clutch 56 the degree of energisation of which is such that although slippage occurs when restraint is applied to lead-screw 5, sufficient power is transmitted by the magnetic clutch 56 to drive the carriage 2 (FIG. 1) and type-printing head 1 when there is no such restraint. When at some later time a letter-feed signal is applied to the solenoid 34 (FIG. 3) of the head-feed selector, the armature 32 is attracted by the magnetisable core 33, and pin 35 is withdrawn from engagement with the underside of piston 29 in cylinder 30 which piston is then self-actuating from a first condition of operation to a second condition of operation in the direction indicated by the arrow "L" under the influence of compression spring 31. The utilised hydraulic medium is then permitted to flow under pressure from the pump 8 (FIG. 5) via the primary feed line 96, cylinder 30, the annular groove 95 in piston 29 within cylinder 30, primary feed line 94 and secondary feed lines 97 and 98 (FIG. 2) to cylinders 20 and 21. This flow of hydraulic medium causes pistons 25 and 23 to move in the directions indicated by the arrows "H" and "I" to move pawl 9 and 10 out of the path of the teeth such as 11 of the ratchet wheel 7 by way of their carriers 12 and 13 respectively, and against the influence of springs 14A and 15A. Thus whichever one of pawls 9 and 10 is in engagement with a tooth of the ratchet wheel 7 that particular pawl is withdrawn clear of the tooth, and since restraint on the lead-screw 5 is removed the carriage 2 (FIG. 1) and the type printing head 1 are permitted to move a step in the letter-feed direction. Termination of the step movement is effected by the action of the pin 36 (FIG. 3) of the head-feed selector means, which pin is caused to move upward by the cam 37 on shaft 38 and which cam is continuously rotating to cause the pin 36 to reciprocate at a rate commensurate with the letter-feed rate. The upward movement of the pin 36 causes piston 29 to move in the same direction against the influence of compression spring 31, whereupon the lower end of piston 29 blocks off the port to cylinder 30 from primary feed line 96 and the pump 8 (FIG. 1) and maintains the exit port from cylinder 30 to primary feed line 94 open with respect to a sump return feed line 99 via annular groove 95 in piston 29. Pawls 9 and 10, by way of their carriers, are then enabled to pivot on pins 14 and 15 respectively and move back in the directions indicated by the arrows "E" and "F" into the path of the teeth of the ratchet wheel 7 under the influence of springs 14A and 15A. This movement of pawls 9 and 10 and their carriers 12 and 13 cause pistons 23 and 25 to move in the same directions, and the utilised hydraulic medium fed to cylinders 20 and 21 is then forced back through secondary feed lines 26 and 27 and primary feed line 94 to the sump return feed line 99 (FIG. 3), via the annular groove 95 in piston 29. It will be readily understood that as long as a letter-feed signal is applied to solenoid 34 (FIG. 3) the combined effects of the reciprocation of pin 36 and compression spring 31 on piston 29 will result in reciprocation of the piston to alternately expose and block off the ports in the cylinder 30 for the passage of the utilised hydraulic medium from the pump 8 (FIG. 5) to cylinders 20 and 21, and step-by-step movement of the carriage 2 (FIG. 1) and the type-printing head 1 will result. Cam means (not shown) may be incorporated on shaft 38 for the generation of, by well known means, a series of clock pulses which are utilised to permit the application of a series of letter-feed signals to be applied to solenoid 34, and also to permit application of signals to the operating means for selecting a combination of impression forming sections of a mosaic type-printing head which forms no part of the present invention.

During step-by-step movement of the carriage 2 and type-printing head 1 in the letter-feed direction the vertical surface 89 of a projection 90 extending vertically upward from the carriage 2 engages the vertical surface such as 79 of one or more projections 77 extending from the bail 76 so that for each engagement the bail is moved to the second position of operation to cause spring contact 91 to engage a second spring contact 92 to establish an electric circuit to the aforementioned indicating means (not shown). Movement of the bail, on each engagement between the projections 77 extending therefrom and the projection 90 extending from the carriage 2, results in movement of the bail upward by way of the inclined planar surfaces 80 and 81 moving with respect to the rollers 84 and 85 rotatably affixed to the frame of the apparatus. The latter mentioned movement of the bail results in disengagement occurring between a projection 77 extending from the bail and the projection 90 extending from the carriage 2. The natural resilience of the spring contact 91 and the weight of the bail 76 causes the bail to move toward the left hand end of the apparatus whereupon disengagement between spring contacts 91 and 92 occurs, and the electrical contact to the indicating means is disestablished. Toward the end of movement of the carriage 2 in the letter feed direction, the piston 86 is operated to move in the direction indicated by the arrow "A" under the influence of the utilised hydraulic medium, the bail 76 therefore moves in the same direction and the projections 77 extending therefrom are raised clear of the projection 90 extending from the carriage 2, to allow for free movement of the carriage 2 and the type printing head 1 in the carriage-return direction.

On the cessation of the application of the letter-feed signal to solenoid 34 (FIG. 3), the armature 32 of the solenoid will move clear of the core 33 under the influence of a leaf-spring portion of the armature. The pin 36 extending from the armature is therefore interposed into the path of the reciprocating piston 29 which is then held up by the pin 36 in its non-actuated position and the pawls 9 and 10 are in consequence interposed into the path of the teeth of the ratchet wheel 7. As a result, one or the other of the pawls engages with a tooth of the ratchet wheel 7 and arrests further movement of the carriage 2 (FIG. 1) and the type printing head 1 in the letter-feed direction. Toward the end of the latter mentioned movement and in response to a carriage-return signal, solenoid 68 (FIG. 5) of the carriage-return selector means is energised and the armature 70 thereof is attracted in a clockwise direction about the axis of pin 72 and against the influence of tension spring 73 to assume the position shown in dotted lines. The lower end of the armature is thus withdrawn from contact with a projection extending from the upper side of the righthand end of lever 71, which lever then pivots in an anti-clockwise direction about the axis of the pin 74. In consequence of this pivoting action of lever 71, compression spring 64 causes self-actuation of both the hydraulic valve and electric circuit means co-acting therewith to their second conditions of operation. In the second condition of operation of the electric circuit means, the electrical connection between spring contacts 65 and 66 is disestablished and the magnetic clutch 56 (FIGS. 1 and 4) is deenergised. The drive between motor 54 and pulley 40 is in consequence disengaged, and movement of the upper portion of the belt 39, the carriage 2 (FIG. 1) and the type printing head 1 in the letter-feed direction ceases.

In the second condition of operation of the hydraulic valve, the drive between motor 59 (FIG. 4) and the pulley 40 (FIGS. 1 and 4) is engaged through the movement

of piston 51 in cylinder 52 under the influence of the utilised hydraulic medium, which medium is allowed to flow under pressure from the pump 8 (FIG. 1) to cylinder 52 via primary feed line 96 (FIG. 5) annular groove 75 in piston 61, primary feed line 28 and secondary feed line 53. Movement of piston 51 causes it to engage pressure pad 47 to exert a thrust on this pressure pad and also friction pad 49, pulley 40 and gear wheel 50 affixed thereto, friction pad 48 and pressure pad 46. The integral collar 60 on shaft 45 opposes this thrust and in effect locks pulley 40 and gear wheel 50 affixed thereto to the shaft 45. In consequence of this locking action, motor 59, which is running continuously during operation of the apparatus, drives pulley 40 in an anti-clockwise direction which in turn drives the upper portion of belt 39 in the direction indicated by the arrow "B" so as to move the carriage 2 (FIG. 1) and the type-printing head in the carriage-return direction. On the changeover from first condition of operation to second condition of operation of the hydraulic valve and electric circuit means of the carriage-return selector means, the utilised hydraulic medium is also allowed to flow under pressure from the pump 8 via primary feed line 96, the cylinder 63 by way of the annular groove 75 in piston 68, primary feed line 28, and thence to secondary feed lines 26 and 27 (FIGS. 2 and 5) and secondary feed line 88 (FIGS. 1 and 2). Secondary feed line 88 is connected to cylinder 87 (FIG. 1) and thus piston 86 is operated in the direction indicated by the arrow "A" and since it is in engagement with the end of the bail 76, the bail is moved in the same direction and upward so that all of the projections 77 extending therefore are held clear of projection 90 extending from the carriage 2 for the whole of the period of movement of the carriage in the carriage-return direction. Since secondary feed lines 26 and 27 (FIGS. 2 and 5) are connected to cylinders 20 and 21 (FIG. 2), pistons 23 and 25, via pistons 22 and 24, are operated in the directions indicated by the arrows "H" and "I" respectively. Movement of these pistons cause pawls 9 and 10 to be moved by way of their respective carriers 12 and 13 against the influence of the springs 14A and 15A in the directions reverse to those indicated by the arrows "E" and "F" respectively, clear of the path of the teeth of the ratchet wheel 7 so that there is no restraint on movement of the carriage 2 (FIG. 1) and the type-printing head 1 in the carriage-return direction.

Movement of the carriage 2 (FIG. 1) and the type-printing head 2 in the carriage-return direction continues until the projection 93 on the carriage 2 engages with the under side of the left hand end of the lever 71 (FIG. 5). The lever 71 is then caused to pivot about the axis of pin 74 to move the spindle 62 and piston 61 of the hydraulic valve upward. The hydraulic valve and electric circuit means are therefore returned to their first conditions of operation and in which conditions the drive between motor 59 and pulley 40 is disengaged, and the spring contact 65 is brought into engagement with spring contact 66. Engagement of contacts 65 and 66 energise magnetic clutch 56 (FIGS. 1 and 4) which clutch then engages the drive between motor 54 and pulley wheel 40 via gears 57, 58 and 50. However, movement of the carriage 2 (FIG. 1) and the type-printing head 1 in the letter feed direction is prevented since in the first condition of operation of the hydraulic valve, the lower end of piston 61 (FIG. 5) blocks off the port to cylinder 63 from primary feed line 96 and maintains the exit port from cylinder 63 to primary feed line 28 open with respect to a sump feed line 100 to the sump (not shown). The pressure of the utilised hydraulic medium, acting on pistons 23 and 25 (FIG. 2) by way of pistons 22 and 24 via secondary feed lines 26 and 27, is therefore removed and pawls 9 and 10 move into the path of the teeth of ratchet wheel 7 under the influence of the springs 14A and 15A, one or the other of the pawls therefore engages a tooth of the ratchet wheel, and the lead-screw 5 is restrained from rotation and movement of the carriage 2 (FIG. 1) and the type printing head 1 in the letter-feed direction is prevented, since in the first condition of operation of the hydraulic valve, the lower end of piston 61 (FIG. 5) blocks off the port to cylinder 63 from primary feed line 96 and maintains the exit port from cylinder 63 to primary feed line 28 open with respect to a sump feed line 100 to the sump (not shown). The pressure of the utilised hydraulic medium, acting on pistons 23 and 25 (FIG. 2) by way of pistons 22 and 24 via secondary feed lines 26 and 27, is therefore removed and pawls 9 and 10 move into the path of the teeth of ratchet wheel 7 under the influence of the springs 14A and 15A one or the other of the pawls therefore engages a tooth of the ratchet wheel, and the lead-screw 5 is restrained from rotation and movement of the carriage 2 (FIG. 1) and the type printing head 1 in the letter-feed direction is prevented.

The hydraulic valve and electric circuit means of the carriage-return selector means are meanwhile maintained in their first conditions of operation by lever 71 (FIG. 5) which during its pivoting action in the clockwise direction about the axis of pin 74 permtited the armature 70 to pivot about the axis of pin 72 so that it moved back to its original position, shown in full lines, under the influence of compression spring 73. In this position, the lower end of the armature 70 engages with the projection extending from the upper side of the right hand end of lever 71 and maintains the lever pivoted in the clockwise direction.

Return of the hydraulic valve of the carriage-return selector means to its first condition of operation permits the utilised hydraulic medium to flow back from cylinders 20 and 21 (FIG. 2), from cylinder 87 (FIG. 1), and from cylinder 52 (FIGS. 1 and 4) via their respective secondary feed lines, primary feed lines 28, cylinder 63 and sump return feed line 100 to the sump (not shown). Release of pressure of the utilised hydraulic medium on piston 86 in cylinder 87 (FIG. 1) permits the piston 86 to move within the cylinder 87 to the left of the apparatus under the influence of the moving mass of the bail 76 of the indicating means which then returns to its first condition of operation.

It is to be understood that the foregoing description of specific examples of this invention is not to be considered as a limitation on its scope.

What we claim is:

1. Type printing telegraph apparatus including a type printing head mounted on a carriage, power driven means for traversing the said carriage, lead-screw means rotatable by the said carriage during its traverse, a ratchet wheel affixed to said lead-screw, pawl means alternately engaging and disengaging said ratchet wheel to permit step-by-step movement of the said carriage in the letter-feed direction, and head-feed selector means for operating said pawl-means to permit said step-by-step movement.

2. Type printing telegraph apparatus as claimed in claim 1, including carriage-return selector means for operating said pawl means to permit said movement of the carriage in the carriage-return direction, and for reversing the direction of drive of said power driven means on termination of said step-by-step and carriage return movements respectively.

3. Type printing telegraph apparatus as claimed in claim 2 in which said power driven means includes a belt, pulley means for supporting said belt for movement in the said letter-feed and carriage-return directions, means for driving said belt and carriage in said letter feed and carriage-return directions respectively, by way of said pulley means and first and second clutch means, means operable by said carriage-return selector means to simultaneously cause the engagement of one of said clutches and the disengagement of the other of said clutches.

4. Type printing telegraph apparatus as claimed in

claim 3 in which said first and second clutches are electrically and hydraulically operated respectively.

5. Type printing telegraph apparatus as claimed in claim 4 in which the said carriage-return selector means includes electric circuit means and hydraulic valve means co-acting in first conditions of operation thereof, to cause said electrically operated clutch means to be effective and said hydraulically operated clutch means to be ineffective to effect movement of said carriage in the letter-feed direction, and co-acting in second conditions of operation in response to a carriage-return signal to cause said hydraulically operated clutch means to be effective and said electrically operated clutch means to be ineffective to effect movement of said carriage in the carriage-return direction, lever means operated by said carriage towards the end of the movement thereof in the carriage-return direction to actuate said hydraulic valve means and said electric circuit means to said first conditions of operation, and solenoid means operating in response to a carriage-return signal and co-acting with said lever means to permit actuation of said hydraulic valve means and electric circuit means to said second conditions of operation.

6. Type printing telegraph apparatus as claimed in claim 5 in which said pawl means comprises two pawls, separate spring means for moving each said pawl into the path of teeth of said ratchet wheel, means operable during the movement of said carriage in the letter feed direction for moving both said pawls simultaneously into and clear of the path of said ratchet wheel and means operable for the movement of said carriage in the carriage-return direction for holding both said pawls clear of said ratchet wheel.

7. Type printing telegraph apparatus as claimed in claim 6 in which said ratchet wheel is arranged with respect to said pawls so that during successive movements of said pawls into the path of the teeth of said ratchet wheel the said pawls alternately engage a tooth of the ratchet wheel.

8. Type printing telegraph apparatus as claimed in claim 7 in which hydraulic shock absorbing means is provided for each said pawl to absorb the shock of engagement of the said pawl with a tooth of the said ratchet wheel.

9. Type printing telegraph apparatus as claimed in claim 8 comprising hydraulically operable means controlled by said head-feed selector means for moving said pawls clear of said ratchet wheel and allowing their movement into the path of said ratchet wheel, and controlled by said carriage-return selector means for moving said pawls clear of said ratchet wheel.

10. Type printing telegraph apparatus as claimed in claim 9 in which said head-feed selector means comprises a solenoid in response to any signal involving a step movement of said carriage, a cam, a hydraulic valve so connected to said solenoid as to be operative from a first operating condition to a second operating condition on operation of said pawls, and means for operating said hydraulic valve by said cam to a second operating condition to allow movement of said pawls into the path of said ratchet wheel.

11. Type printing telegraph apparatus as claimed in claim 10 including means for indicating a predetermined position of the said type printing head in its movement in the said letter-feed direction.

12. Type printing telegraph apparatus as claimed in claim 11 in which said indicating means comprises a bail having a plurality of projections extending therefrom each of which projections is particular to a predetermined position of said type printing head in its movement with said carriage in the letter-feed direction and which bail is arranged in a first position to permit said projections extending therefrom to engage a portion of said type printing head, means for causing said bail and the projections extending therefrom to move to a second position clear of said portion of the type printing head each time a projection engages with said portion and for allowing said bail to return to said first position, electric contact means operated by said bail each time an engagement takes place between a projection extending therefrom and said portion of the type printing head, and means for counting and indicating a predetermined number of operations of said electric contact means.

13. Type printing telegraph apparatus as claimed in claim 12 in which said means for causing said bail and the projections extending therefrom to move clear of said portion of said type printing head comprises a plurality of rollers rotatably mounted on said apparatus each of which rollers is arranged to engage one of a plurality of inclined planar surfaces of said bail and in which engagement of said type printing head causes said bail to move from said first position to said second position by way of said inclined planar surfaces moving with respect to said rollers.

14. Type printing telegraph apparatus as claimed in claim 13 in which hydraulic means is provided operable to move said bail to and maintain said bail in said second position during movement of said type printing head with said carriage in the said carriage-return direction.

15. Type printing telegraph apparatus as claimed in claim 14 in which said hydraulic means comprises a piston slidably mounted within a cylinder and engaging said bail and in which operation of said piston in one direction causes said bail to move from said first position to said second position and operation of which in the reverse direction permits said bail to return to the said second position.

16. Type printing telegraph apparatus as claimed in claim 15 in which said piston is operated in said one direction and permitted to return in said reverse direction by said hydraulic valve means of said carriage-return selector means operating in said second and first conditions of operation respectively.

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