

June 28, 1960

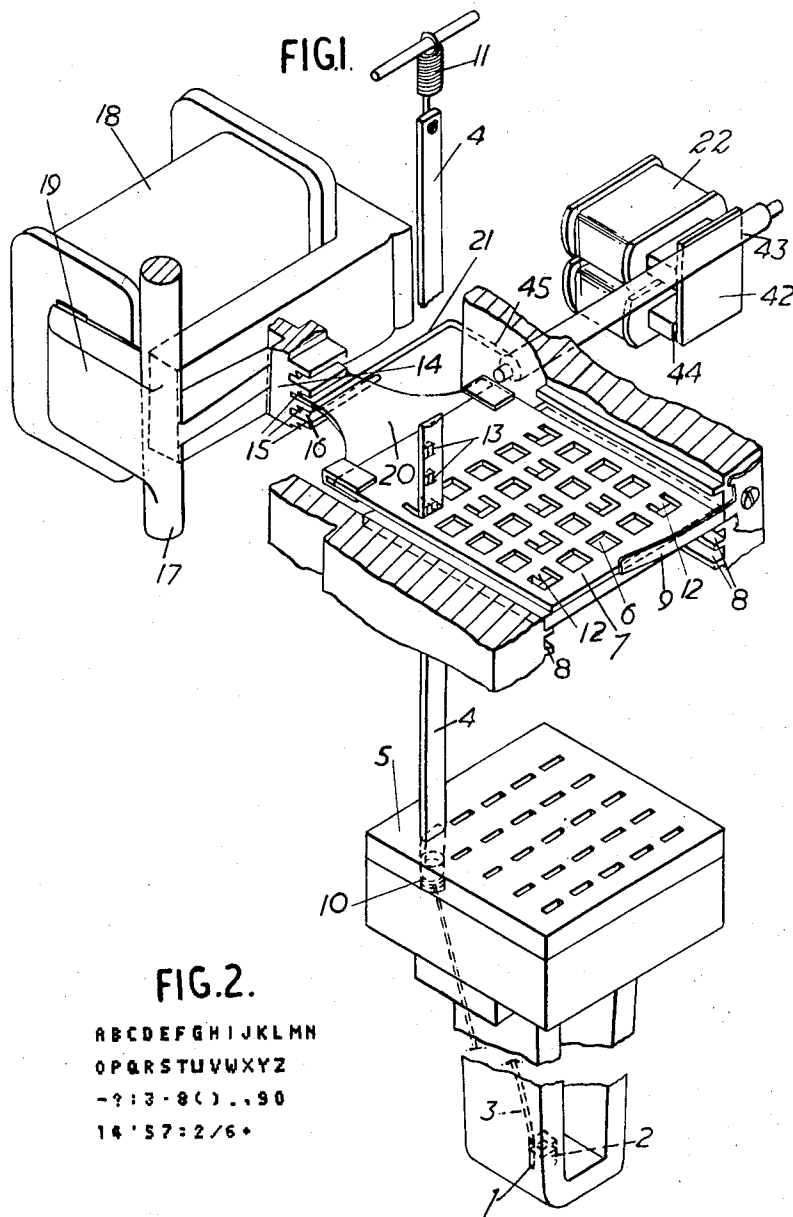
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 1



Inventor

J. HANDLEY

By *R. P. Morris*
 Attorney

June 28, 1960

J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 2

FIG. 3.

A B C D E F G H I J K L M N
O P Q R S T U V W X Y Z
- . : ; 3 . 8 () . , 9 0
1 4 . 5 7 = 2 / 6 +

Inventor

J. HANDLEY

By *R. Monis*

Attorney

June 28, 1960

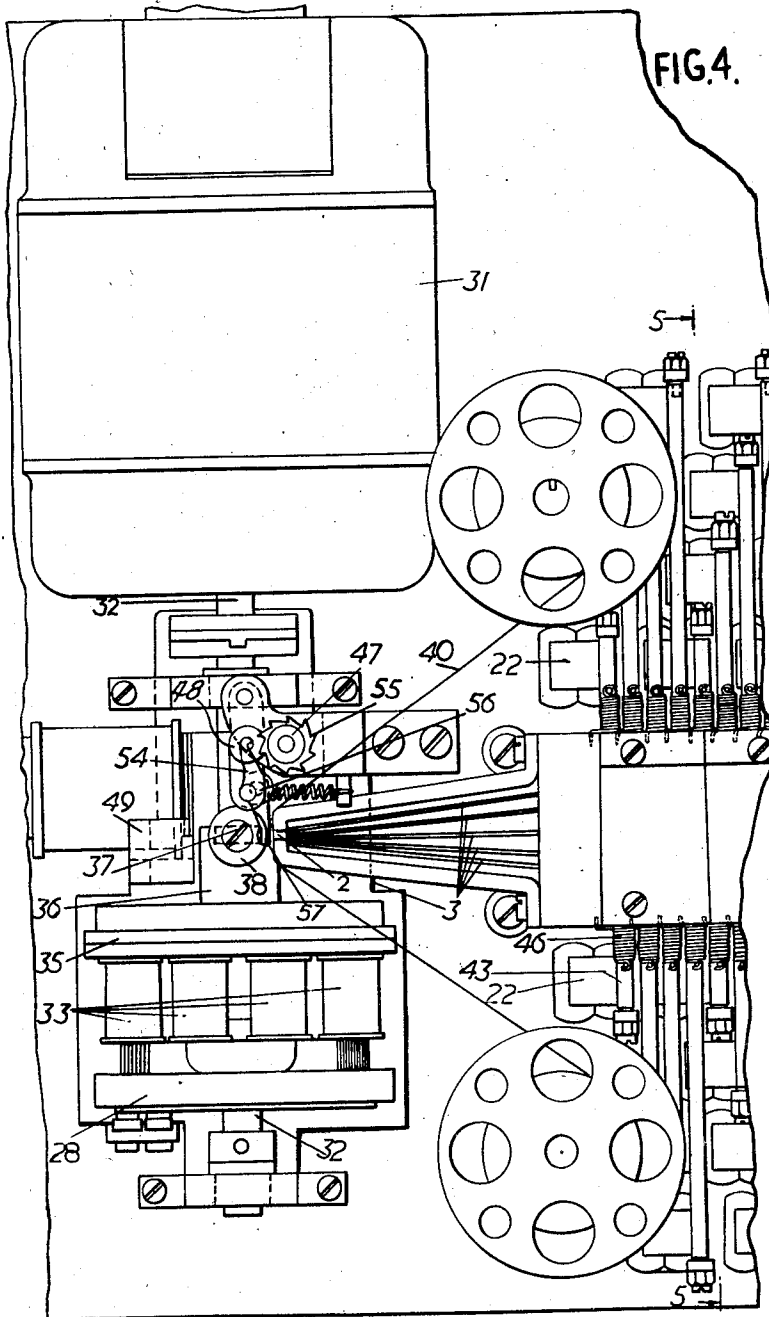
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 3



Inventor

J. HANDLEY

By *P. Monio*
Attorney

June 28, 1960

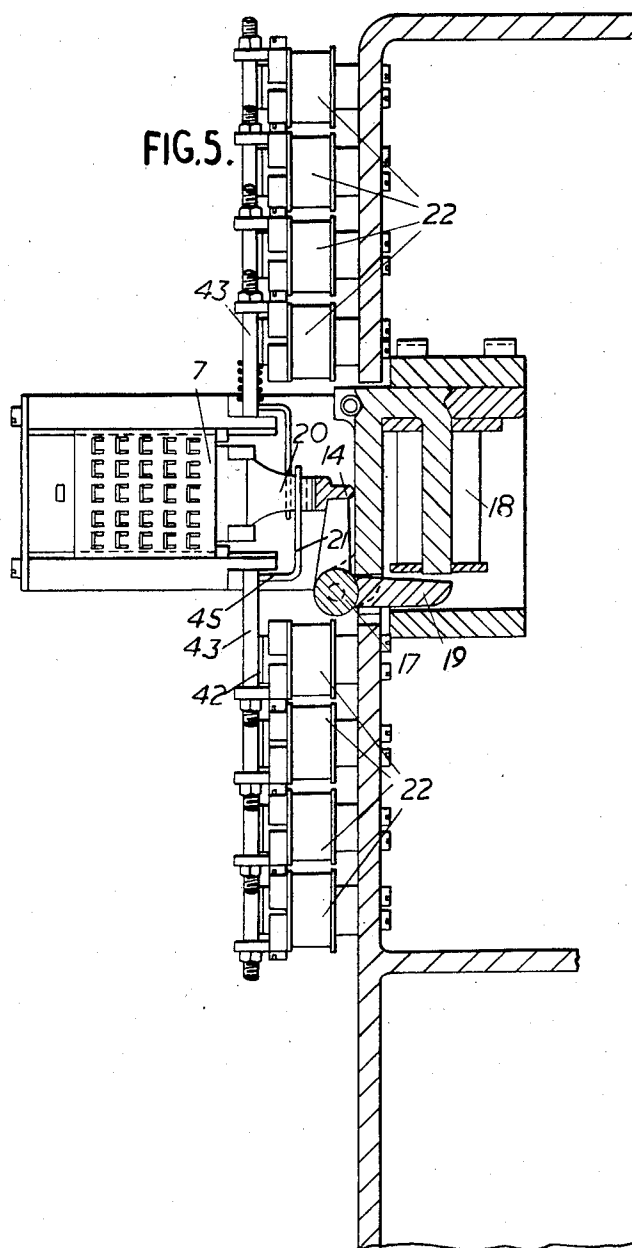
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 4



Inventor

J. HANDLEY

By *R. Morris*

Attorney

June 28, 1960

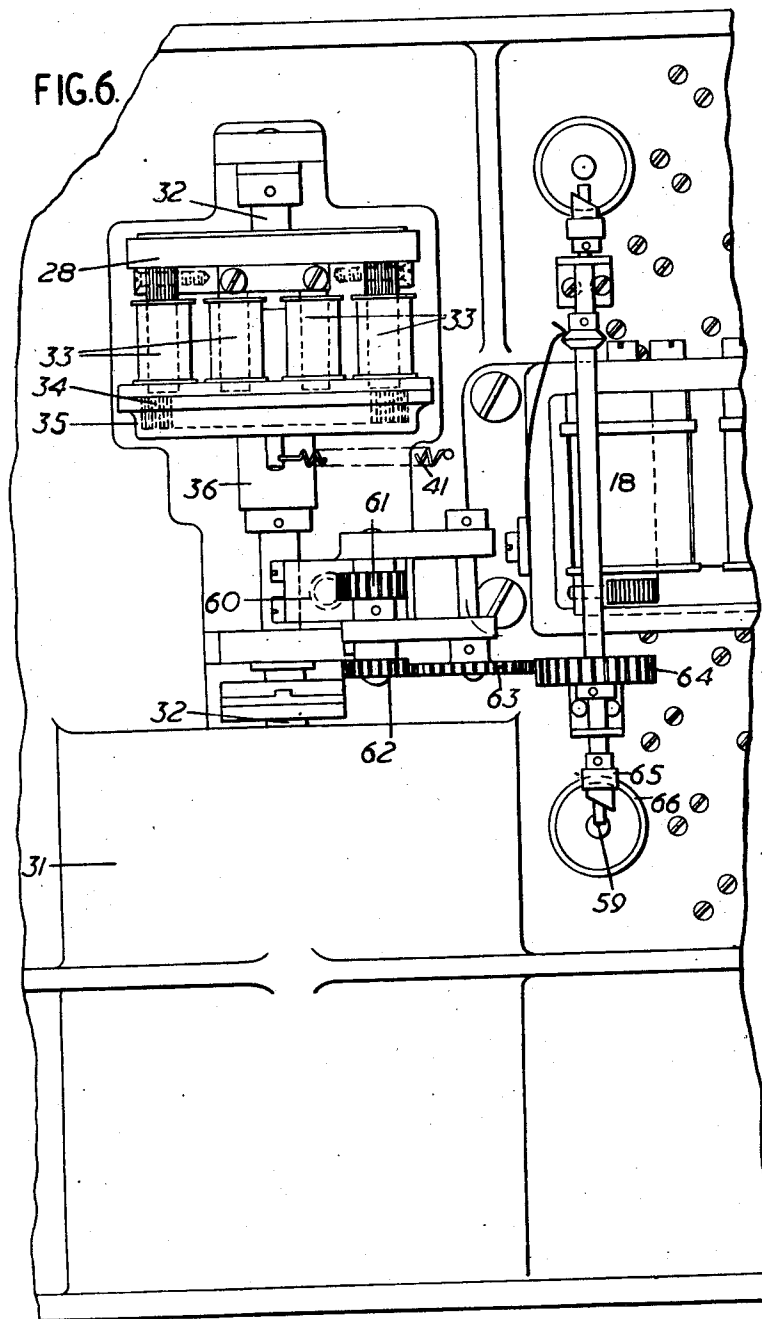
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 5



Inventor

J. HANDLEY

By *R. Morris*

Attorney

June 28, 1960

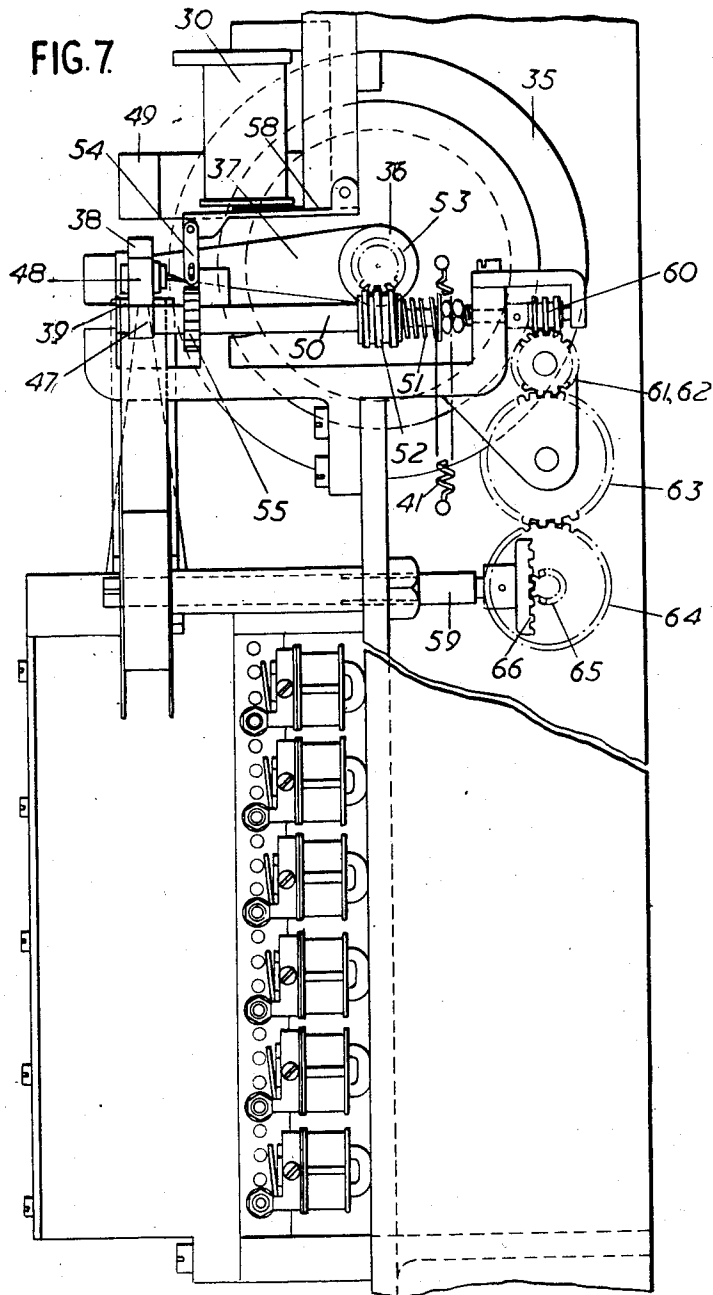
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 6



Inventor
J. HANDLEY
By *R. Morris*
Attorney

June 28, 1960

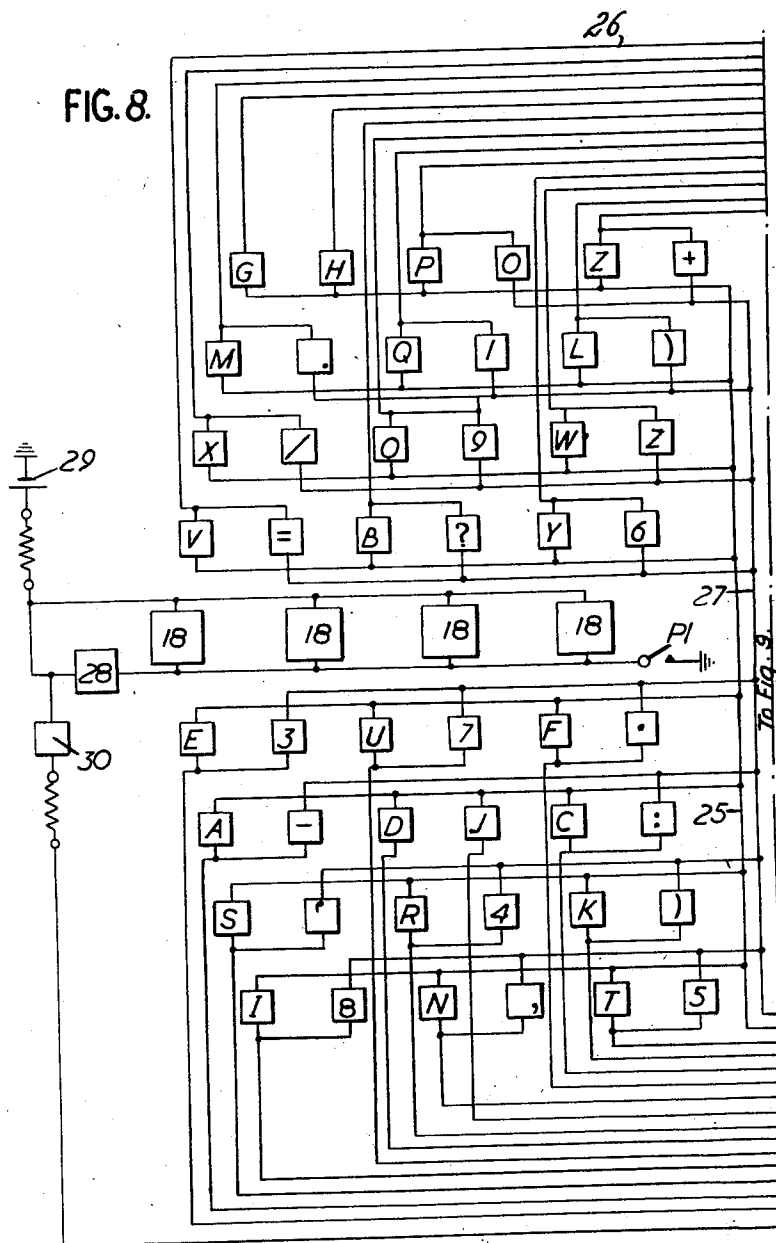
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 7



Inventor
J. HANDLEY
By *RP Morris*
Attorney

June 28, 1960

J. HANDLEY

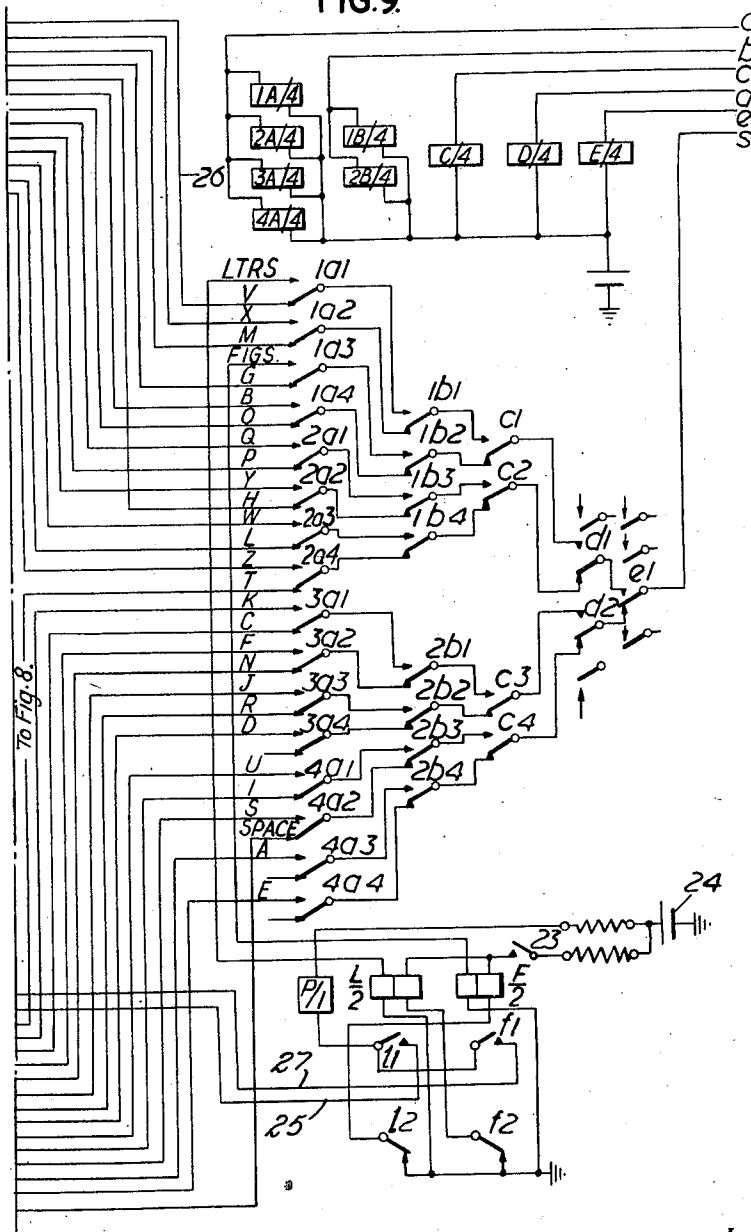
2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 8

FIG. 9



Inventor

J. HANDLEY

By *APM*

Attorney

June 28, 1960

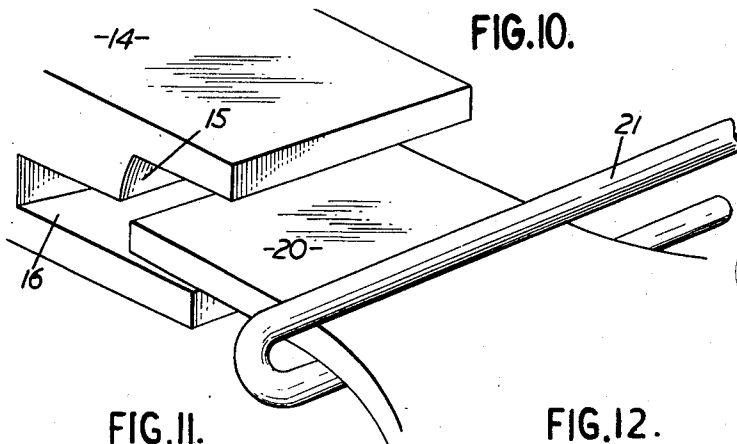
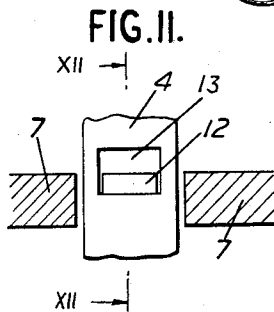
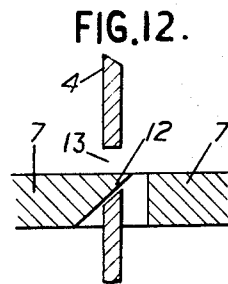
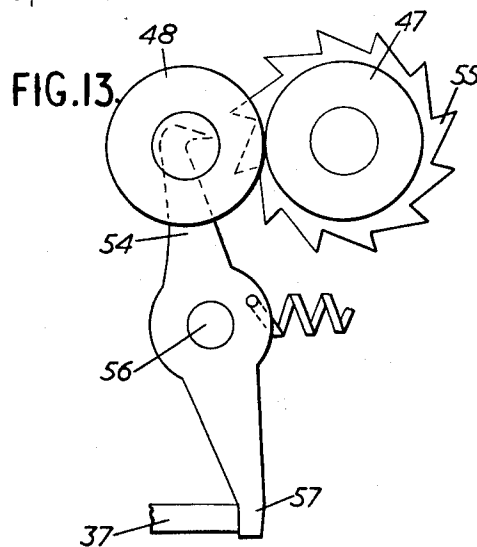
J. HANDLEY

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

Filed Dec. 19, 1955

9 Sheets-Sheet 9



Inventor
J. Handley
By *R. H. Morris*
Attorney

1

2,943,150

TYPE-PRINTING TELEGRAPH APPARATUS

John Handley, Little Marland, Briar Hill,
Purley, England

Filed Dec. 19, 1955, Ser. No. 554,009

Claims priority, application Great Britain Dec. 23, 1954

5 Claims. (Cl. 178—30)

The present invention relates to type printing telegraph apparatus.

Type printing telegraph apparatus has been proposed in which the ends of a group of printing wires are pressed against a record sheet to form selected character patterns, a device being moved in two coordinates to select the required pattern of wires to be operated and then moved to operate said selected pattern.

Such apparatus is inherently slow in printing speeds, since appreciable time is required to move the device which selects and prints the pattern.

It is the main object of the present invention to provide type printing telegraph apparatus which is capable of printing a much larger number of characters per second, than is possible with existing types of apparatus.

To this end the apparatus according to the invention uses the built-up character principles, but embodies means by which the selection of the required impression forming devices can be made substantially instantaneously. Each character is represented by a control plate and the control plate representing the required character is selected by operation of a single electromagnetic device. The selected control plate is then moved in its own plane, such movement causing the required character to be set up on a plurality of impression-forming sections.

In the present invention there is accordingly provided type printing telegraph apparatus comprising a series of character-determining plates, means for selecting one of said character-determining plates representative of a desired character means for moving said selected plate in its own plane, and further means consequent upon such movement for setting up the desired character on a plurality of impression-forming sections.

In the description and claims of the present invention the term character is to be construed as covering any letter, figure or sign which it may be desired to print.

The invention will be better understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 shows schematically a mechanism for selecting and projecting different combinations of punches to form characters,

Fig. 2 shows the approximate size of characters printed by apparatus according to the invention,

Fig. 3 shows the characters of Fig. 2 but considerably magnified to show their structure,

Fig. 4 shows a plan view of a printer incorporating the selecting mechanism of Fig. 1,

Fig. 5 shows a sectional view of the printer of Fig. 4 taken along the line 5—5,

Fig. 6 shows a view of the printer of Fig. 4 from underneath,

Fig. 7 shows a side view of the printer of Fig. 4 with the motor removed,

Figs. 8 and 9 show diagrammatically a circuit suitable for operating the printer of Fig. 4,

Figs. 10 to 12 show enlarged detail portions of Fig. 1, and

2

Fig. 13 shows in an enlarged form a detail of Fig. 4.

Referring first to Fig. 1, there is shown a punch 1 which passes through a small rectangular guide aperture 2 and is supported by an arm 3. Any suitable number of punches may be used to form the characters for printing, but twenty-five, arranged in five rows of five, has been found convenient. However, in order that the details of the arrangements as shown in Fig. 1 may be clear, only one of each item is shown.

All the twenty-five punches such as 1 pass through the guide aperture 2 and their associated arms 3 spread out from the guide aperture 2 to engage corresponding selector bars such as 4. Each selector bar 4 passes through one of twenty-five apertures in a guide plate 5 and a corresponding one of a similar number of apertures 6 in each of a series of character-determining or control plates such as 7. A control plate 7 is provided for each character to be printed and, in the preferred embodiment of the invention, forty-eight are used to cover the alphabet, figures and symbols. The forty-eight characters selected are shown in Figs. 2 and 3 of the drawings, Fig. 2 showing the approximate size of the characters printed, while Fig. 3 shows them enlarged in order that the selection of punches used to form them may be clearly seen.

The forty-eight control plates 7 (only one of which is shown in Fig. 1) are mounted side by side in parallel grooves 8, so that they may be moved at right angles to the selector bars. A spring 9 maintains each control plate 7 in its rest position. Springs 10 and 11 are provided to return each selector bar 4, arm 3 and punch 1 to the rest position after operation. The spring 11 is under tension and pulls the upper end (as seen in Fig. 1) of the selector bar 4 upwards, while the spring 10 is in compression between the lower end of the selector bar 4 and a portion of the guide plate 5.

Certain of the apertures 6 in control plate 7 have a bevelled projection 12 on one side of them, as shown in Figs. 1, 11 and 12. Fig. 11 is a view of a selector bar 4 passing through an aperture 6 in a control plate 7 which contains a projection 12, the view being taken from the right of Fig. 1 and the part of the control plate 7 on that side of the aperture being cut away. Fig. 12 is a section through Fig. 11 taken on the line XII—XII. This projection 12 is provided in cases where the appropriate punch is required to form the character, and is arranged to protrude into a hole such as 13 in the appropriate control bar 4. Then lateral movement of the control plate 7 against the action of its spring 9 will cause the bevelled projection 12 to engage with the lower edge of a hole such as 13, and the corresponding punch 1 will be moved downward. Thus, for the particular control plate 7 shown in Fig. 1, punches will be moved downward to form the letter X which is that allotted to this control plate.

The operation of any selected control plate 7 in the embodiment shown is made by a common striker 14 which has four parts each carrying twelve teeth 15 and a corresponding number of gaps 16. There are thus forty-eight teeth 15 interspersed with a corresponding number of gaps 16. Each part of the striker 14 is fixed on a pivoted rod 17 to which the armature 19 of an electromagnet 18 is also fixed so that there will also be four electromagnets 18. Thus when the electromagnets 18 are energised and the armatures 19 move to close the magnetic circuit, the striker moves forward to operate the selected control plate against the action of its spring 9. The striker 14 may however be replaced by a cam sleeve with a series of cam followers, a selected one of which is allowed to operate the desired control plate 7.

The selection of a particular control plate is made by moving a tongue 20 (see Figs. 1 and 10) attached to the control plate 7 from its unselected position opposite a

3

gap 16 in the striker (as shown in Fig. 10) to a selected position opposite a tooth 15. For this purpose a selecting finger 21 under the control of a selecting relay 22 (Fig. 1) is provided.

The operation of a printing mechanism according to the invention will now be described in detail.

In Figs. 8 and 9 there is shown diagrammatically a circuit which controls the printing mechanism to print characters in accordance with information supplied from a computer. In the circuit shown the information is supplied as a combination of marks and spaces according to a telegraph code, the combination being delivered on five lines simultaneously, together with a start element. The circuit may, however, be used to print information stored on perforated tape or adapted to receive consecutive marks and spaces if desired.

The circuit of Figs. 8 and 9 is a tree of electrical contacts which selects a particular route for the start element. The contacts associated with the various relays are shown in their rest conditions. When operation of the printer is to be started the contact 23 is closed, thus applying battery 24 to relays L/2 and F/2. In the rest condition of the circuit contacts *l2* and *f2* are both closed so that either relay L/2 or relay F/2 can be operated by the closing of contact 23. The stronger or faster relay of the two will be operated and will lock up, and it will be considered here that the one to do this is F/2. Contact *f1* will therefore be closed and contact *f2* opened, the latter operation keeping relay L/2 unoperated until a letter signal appears on the five code lines *a*, *b*, *c*, *d*, *e*. Because all information passed into the printer from a computer or from perforated telegraph tape will be preceded by a letter signal or a figure signal, it does not matter which of the relays L/2, F/2 locks up when contact 23 is closed.

Let it be supposed that the first combination received on code lines *a*, *b*, *c*, *d*, *e*, is the all mark or letters combination. These lines are then all earthed and all the relays 1A/4 to E/4 are energised. Simultaneously a pulse is applied to the start line *s*. The pulse on the line *s* is therefore routed via contacts *e1*, *d1*, *c1*, *1b1*, *1a1*, to the letters relay L/2 which operates, closing contact *l1* and opening contact *l2*. The opening of contact *l2* causes relay F/2 to be de-energised so that contact *f1* opens and contact *f2* closes. The closing of contact *f2* causes relay L/2 to lock up so that it remains operated.

The closing of contact *l1* effects electrical connection from conductor 25 through contact *l1*, relay P/1 and battery 24 to earth.

Now let it be supposed that a signal marking code elements *b*, *c*, *d*, *e*, is sent, then relays 1B/4 to E/4 will be energised, and the pulse which appears simultaneously on the start line *s* is routed via contacts *e1*, *d1*, *c1*, *1b1*, *1a1* to conductor 26 and thence to the two selector relays for the V and = characters. (In Fig. 8 each rectangle containing a character represents a selector relay 22 associated with a control plate 7 for that particular character. Where a pulse from line *s* is routed to two selector relays, these are associated with characters in opposite cases of the code, but having the same code combination). However, as a letters combination had immediately preceded this signal, the only path to earth for the start pulse is through the selector relay for the character V which is thus energised.

The subsequent appearance of a figures combination marking code elements *a*, *b*, *d*, *e*, will route the simultaneous pulse on start line *s* through contacts *e1*, *d1*, *c1*, *1b2*, *1a3* to operate relay F/2, thus closing contact *f1* and opening contact *f2*. Relay L/2 is therefore de-energised, contact *l1* opening, and contact *l2* closing to lock up relay F/2. There is now an earth connection on conductor 27 via contact *f1*, relay P/1 and battery 24. Any pulse which appears on start line *s* and is routed to a pair of selector relays as shown will now operate the selector relay corresponding to the figure character in the pair.

4

At the same time that each start pulse operates the particular selector relay, it also operates relay P/1. Contact *p1* is therefore closed for the duration of the start pulse and the four striker magnets 18 and clutch 28 are energised from battery 29 for the same period. Each of the four striker magnets 18 carries twelve teeth such as 15 (Fig. 1).

When a space signal is sent marking code element *c* only, relay C/4 operates and the start signal is routed over contacts *e1*, *d2*, *c4*, *2b3*, *4a2* to operate space magnet 30. The operation of space magnet 30 causes the paper to be advanced in a manner which will be described later, but no printing takes place as no control plate has been selected and the striker magnets 18 are not energised.

Referring now to Figs. 4 and 6, a motor 31 drives a shaft 32 on which is mounted clutch 28. Clutch 28 comprises four electromagnets 33 which can complete their magnetic circuits through a laminated ring 34 (Fig. 6). Ring 34 is mounted in striker ring 35 which is coaxial with shaft 32 but separate therefrom. Integral with striker ring 35 is a sleeve 36 on which is mounted an arm 37 carrying a platen 38 (Figs. 4 and 7). When clutch 28 is energised (as described with reference to Fig. 8), the four electromagnets 33 complete their magnetic circuits through ring 34 which is therefore attracted towards the rotating clutch 28 and caused to rotate with the clutch for the duration of the period in which electro-magnets 33 are energised. Striker ring 35 is therefore rotated a fraction of a revolution anticlockwise as seen in Fig. 7, so that platen 38 strikes the paper 39 against ribbon 40 (Fig. 4) and any punches which have been selected and are projecting through the rectangular guide aperture 2. When the electromagnets 33 are de-energised arm 37, platen 38 and striker ring 35 are returned to their rest position by spring 41 (Figs. 6 and 7). In the rest position platen 38 is in contact with stop 49 (Fig. 4).

At the same time that the electromagnets 33 in clutch 28 are energised, the selector relay 22 for the particular character to be printed is also energised. Referring to Figs. 1 and 5 the plate 42 of magnetic material pivoted on shaft 43 is moved to complete the magnetic circuit of selector relay 22 by closing the gap 44. This movement causes shaft 43 to move in a clockwise direction against its return spring 46 (Fig. 4) so that selecting finger 21 (Figs. 1 and 5) which is mounted on an arm 45 attached to shaft 43 moves upwards as seen in Figs. 1 and 10. Tongue 20 is therefore drawn upward by selecting finger 21 and is in the path of a tooth 15 of striker 14.

As already described the electromagnets 18 are also energised at this time, and the forty-eight teeth 15 all move forward together. The selected tongue 20 is the only one in the path of any of these teeth 15, so the control plate 7 associated with that tongue 20 is moved in its groove 8 against the action of its spring 9. The punches 1 to form the selected character are therefore moved downwards in Fig. 1 by appropriate projections 12 to be struck by the platen 38. When electromagnets 18 are de-energised, spring 9 returns control plate 7 to its unoperated position, releasing the selected punches 1 which are withdrawn by springs 10 and 11. At the same time spring 46 of the operated selecting apparatus returns the selected members to their unselected position.

Referring now to Figs. 4, 7 and 13, there are provided friction rollers 47 and 48 between which the paper 39 passes. Roller 47 is mounted on shaft 50 which is continuously urged in the direction of its length by spring 51 (i.e. to the left as seen in Fig. 7). Also mounted on shaft 50 is a helical gear 52 which engages another helical gear 53. The gear 53 is maintained in a fixed stationary position so that it cannot rotate. The urging of the shaft 50 in the direction of its length by spring 51 sets up a rotational movement in gear 52 and also in the shaft 50 due to the engagement of gear 52 by fixed gear 53. However the turning of shaft 50 is normally prevented

5

by pawl 54 which is spring-urged into engagement with ratchet wheel 55 which is also mounted on shaft 50.

Pawl 54 is pivoted on a pin 56 (Figs. 4 and 13) and has a projection 57 integral with it. As the arm 37, which carries platen 38, moves forward in the striking movement, it strikes projection 57 and releases pawl 54 from engagement with ratchet wheel 55 and allows shaft 50 to turn, thus feeding the paper. This is the position shown in Figs. 4, 7 and 13.

When a space signal is sent, space magnet 30 is energised as already described in connection with Figs. 8 and 9. Space magnet 30 (Fig. 7) then completes its magnetic circuit by drawing arm 58 upwards as shown. Arm 58 is attached to pawl 54, which is therefore also drawn upward, releasing ratchet wheel 55 to allow paper feed without any printing stroke.

Shaft 50 is also used for the ribbon feed. Each time the shaft 50 is allowed to move for paper feed, it causes shaft 59 on which the ribbon spool is mounted to turn, the action being transmitted through gears 60, 61, 62, 63, 64, 65 and 66 (Figs. 6 and 7).

While the principles of the invention have been described above in connection with specific embodiments and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

What I claim is:

1. Type printing telegraph apparatus comprising a plurality of impression-forming sections, a selector bar for each section, a series of character-determining plates, all said plates having apertures through which all said selector bars pass in a direction perpendicular to the plane thereof, a plurality of electromagnetic devices, each said electromagnetic device directly controlling the selection of a respective character-determining plate, means for selecting one electromagnetic device and the associated character-determining plate for operation, means for moving said selected plate in its own plane, and means in each said plate for causing movement thereof to move said selector bars in the said direction perpendicular to the plane of the plate in the desired combination to cause the desired character to be printed.

2. Type printing telegraph apparatus as claimed in

6

claim 1, in which each character-determining plate has a tongue associated therewith, and in which the selection of one of said plates is made by moving the tongue of the desired plate, into register with a tooth of a common striker.

3. Type printing telegraph apparatus as claimed in claim 1, in which the means in each plate for causing the operation of a combination of said selector bars comprises the provision of projections on the edges of the apertures of each character-determining plate corresponding to the arrangement of impression-forming sections representing that character, and means on all said selector bars for co-operation with said projections.

4. Type printing telegraph apparatus as claimed in claim 1, further comprising an electric circuit consisting of a tree of electrical contacts, whereby simultaneous reception of all mark and space elements of a signal representing a desired character causes operation of the electromagnetic device for that character.

5. Type printing telegraph apparatus comprising a plurality of impression-forming sections, a selector bar for each section, a plurality of guides, a series of character-determining plates arranged in parallel to each other and each adapted to move in a respective one of the said guides, all the said plates having apertures through which all the said selector bars pass in a direction perpendicular to the planes thereof, a series of electromagnetic devices, each device directly controlling the selection of a respective one of the said plates, means for moving a selected plate in its guide, and projecting means on the edges of the apertures of each character-determining plate corresponding to the arrangement of impression-forming sections representing that character, each said projecting means being adapted to cause movement of the corresponding selector bar in the said direction perpendicular to the plane of the said plate on movement of the said plate in its guide.

References Cited in the file of this patent

UNITED STATES PATENTS

356,245	Greene et al.	Jan. 18, 1887
1,028,037	Lilleberg	May 28, 1912
2,757,604	Von Glahn	Aug. 7, 1956
2,766,322	Martindell	Oct. 9, 1956