

June 2, 1925.

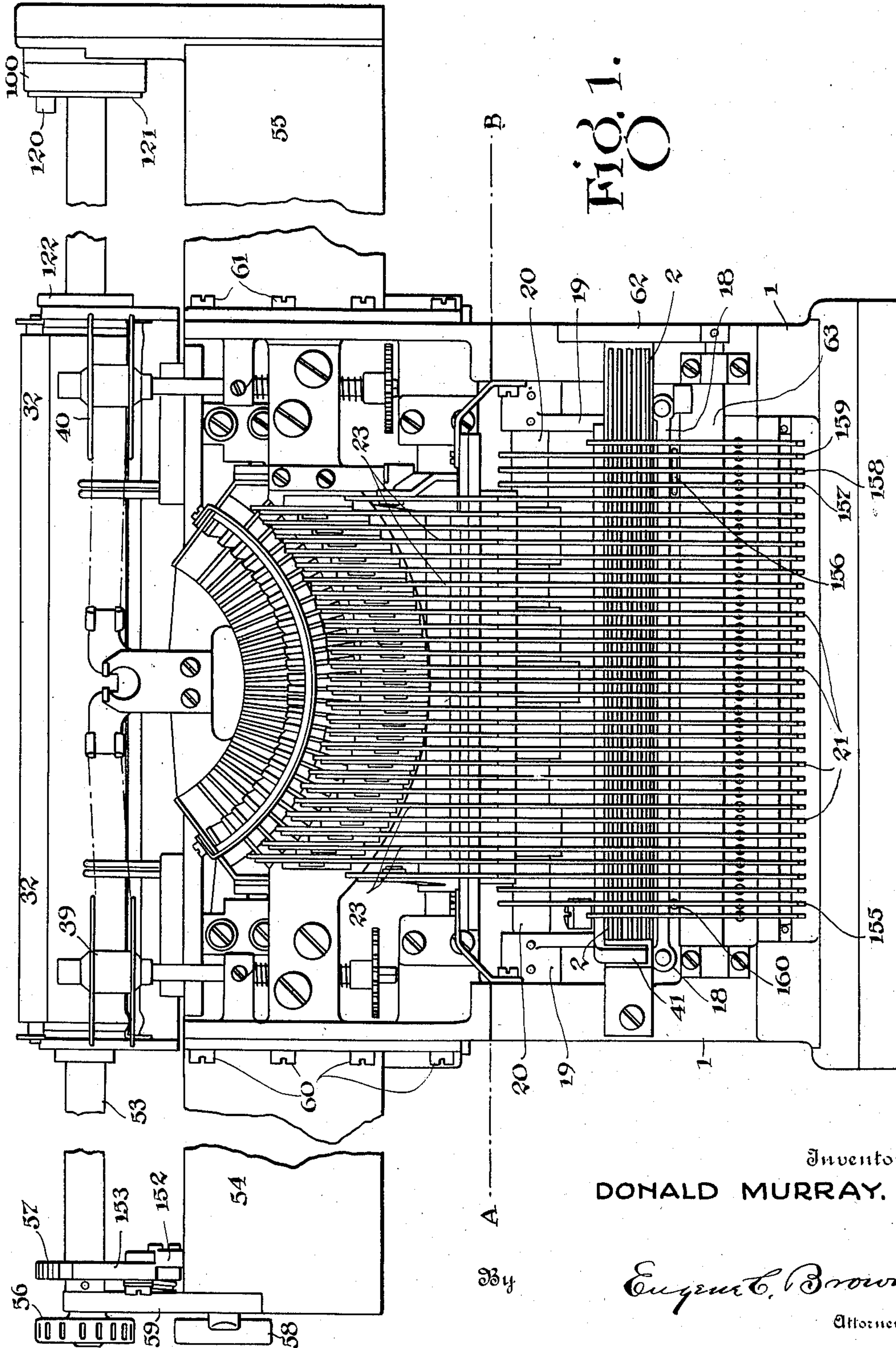
1,540,727

D. MURRAY

PAGE PRINTING TELEGRAPH MACHINE

Filed June 23, 1923

5 Sheets-Sheet 1



Inventor
DONALD MURRAY.

Eugene C. Brown
Attorney

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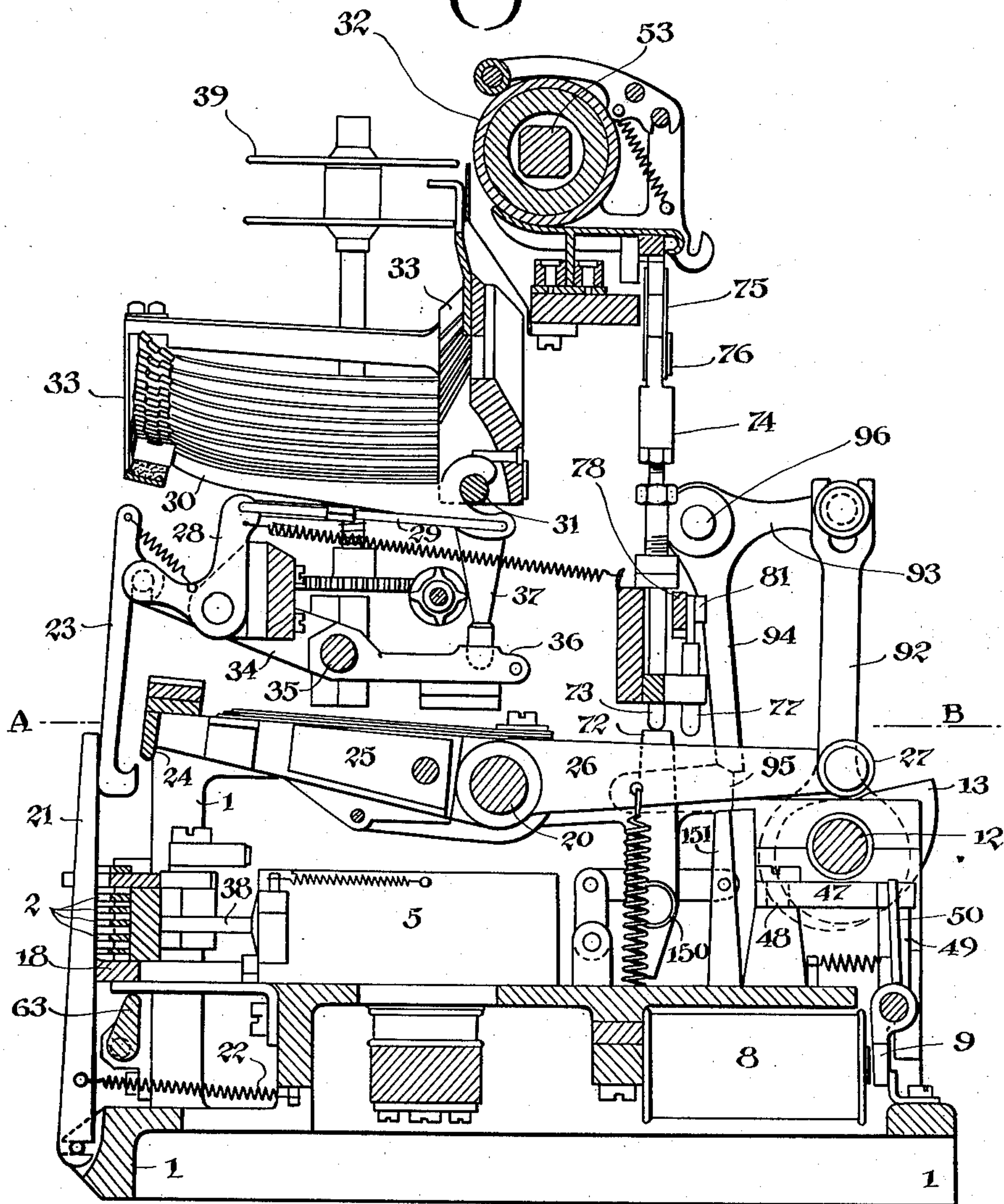
D. MURRAY

PAGE PRINTING TELEGRAPH MACHINE

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5 Sheets-Sheet 2

FIG. 2.



Inventor
DONALD MURRAY.

By

Engel C. Brown
Attorney

June 2, 1925.

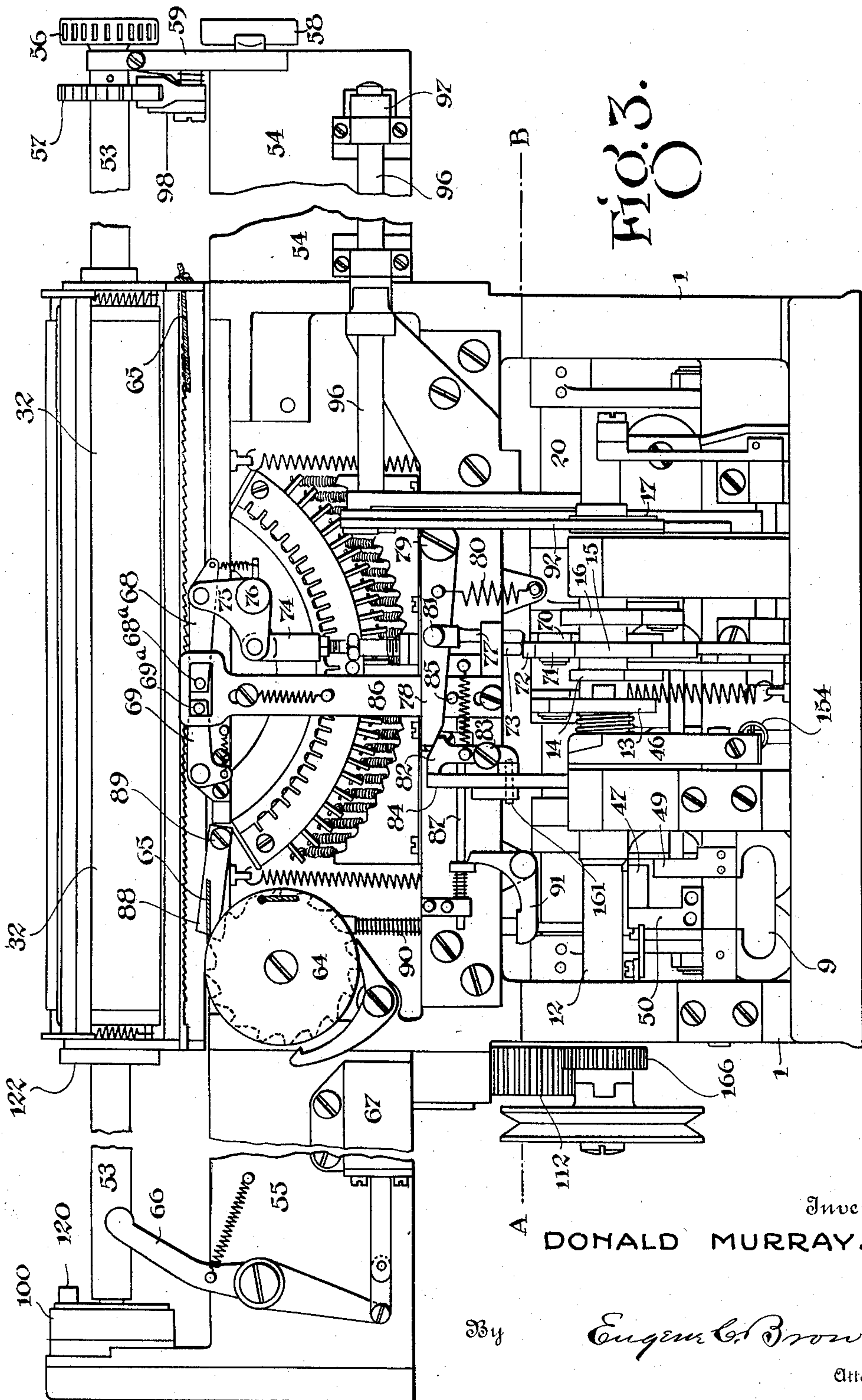
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D. MURRAY

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5 Sheets-Sheet 3



Inventor
DONALD MURRAY.

By

Eugene G. Brown
Attorney

June 2, 1925.

1,540,727

D. MURRAY

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5 Sheets-Sheet 4

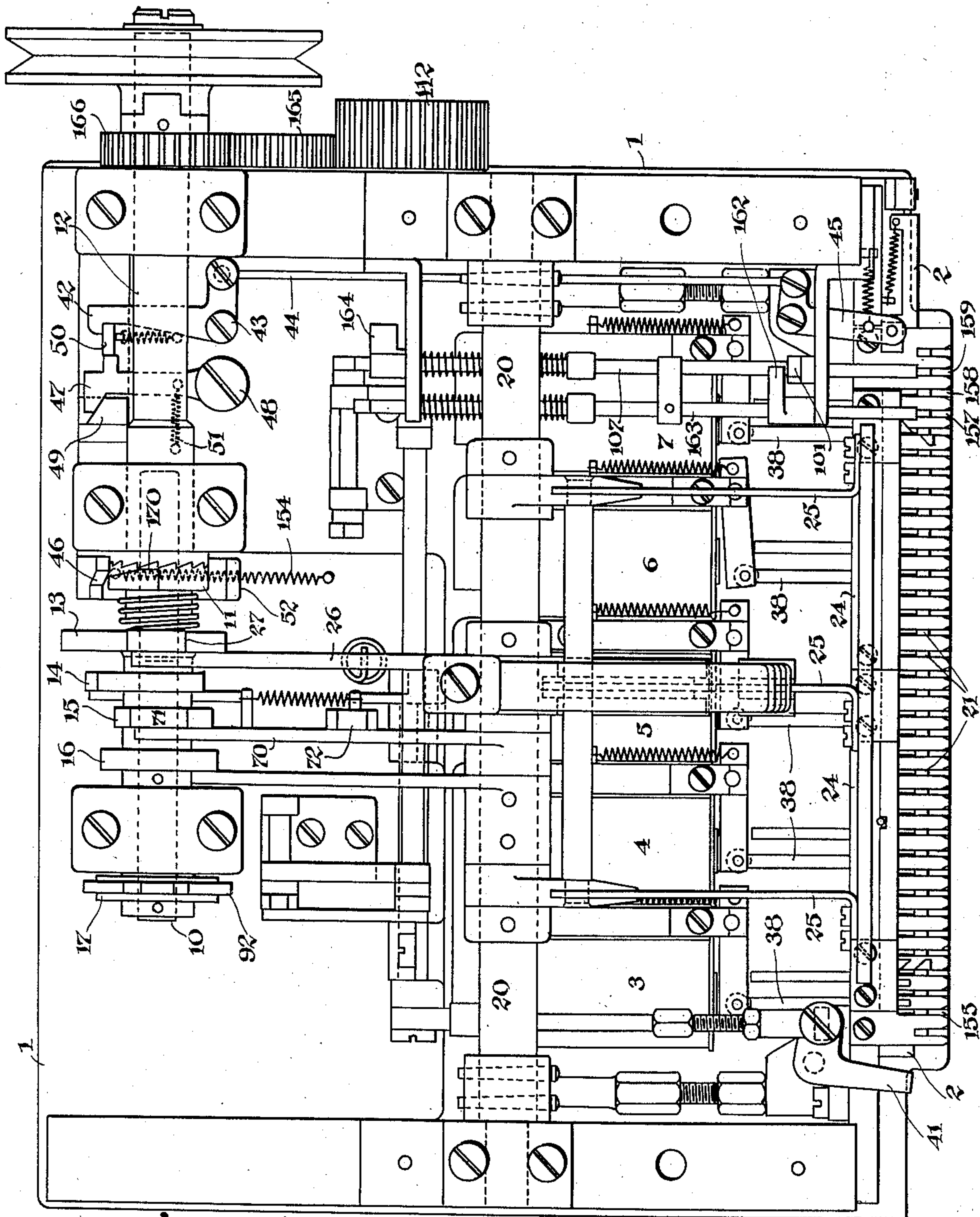


FIG. 4.

Inventor
DONALD MURRAY.

By

Eugene C. Brown

Attorney

June 2, 1925.

D. MURRAY

1,540,727

PAGE PRINTING TELEGRAPH MACHINE

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5 Sheets-Sheet 5

Fig. 5.

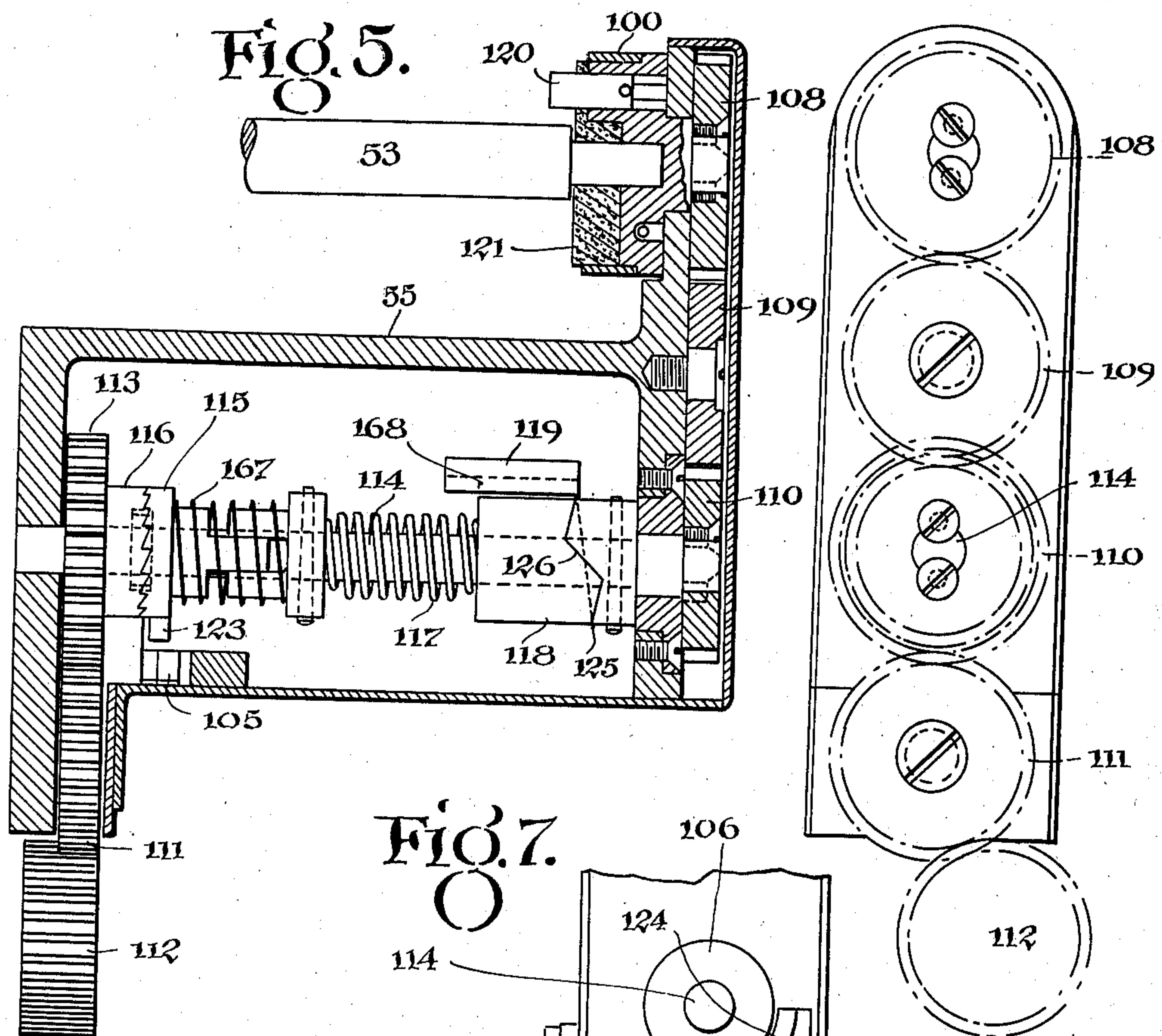


Fig. 7.

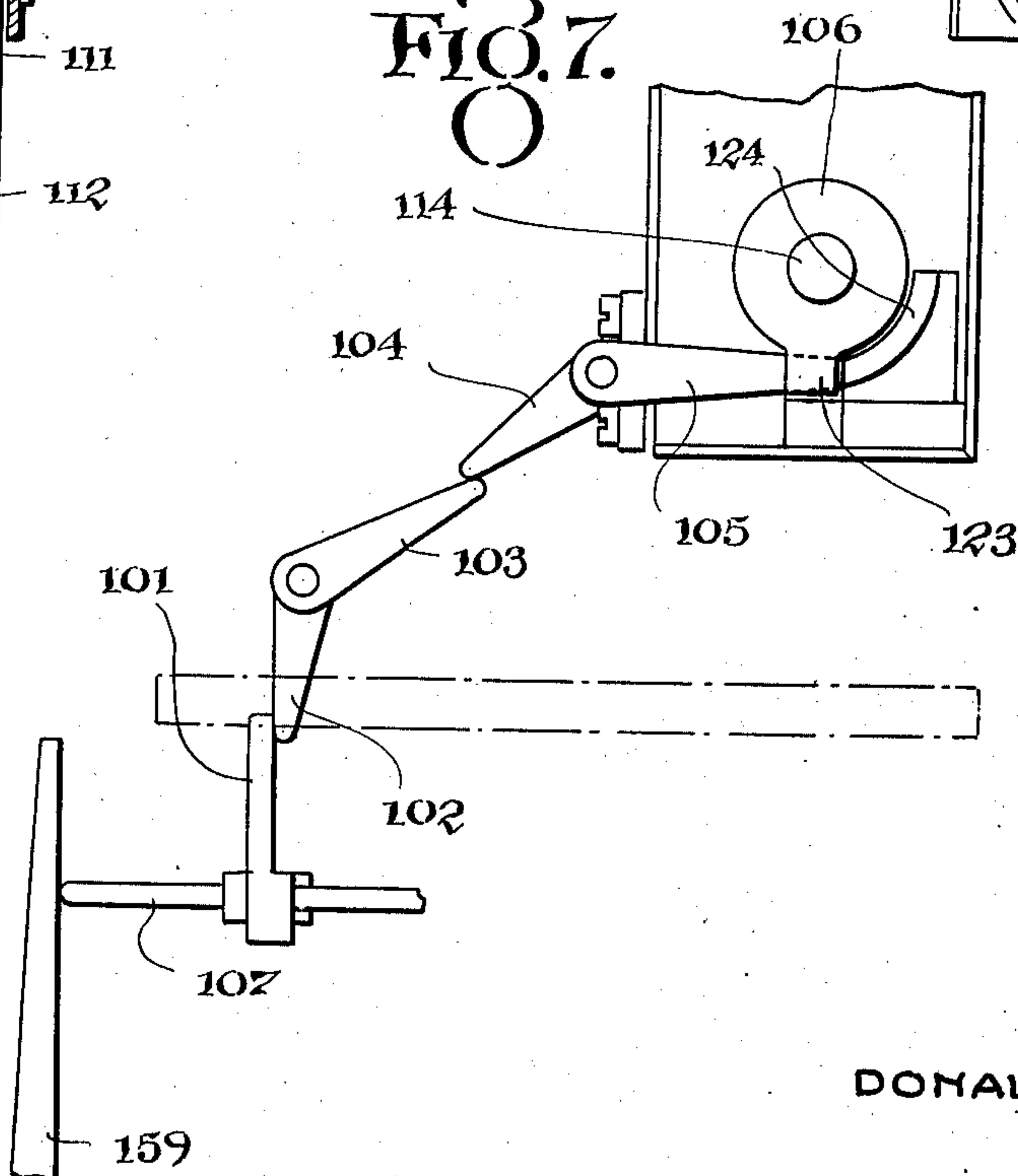


Fig. 6.

Inventor

DONALD MURRAY.

By

Eugene C. Brown

Attorney

UNITED STATES PATENT OFFICE.

DONALD MURRAY, OF LONDON, ENGLAND, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PAGE-PRINTING TELEGRAPH MACHINE.

Application filed June 23, 1923. Serial No. 647,330.

To all whom it may concern:

Be it known that I, DONALD MURRAY, a citizen of the United States, residing at London, in the county of London, England, have invented certain new and useful Improvements in Page-Printing Telegraph Machines, of which the following is a specification.

My invention relates to improvements in telegraph printing apparatus, such as shown in my prior British Patent No. 26918 of 1908, designed to print telegraph messages in page form direct from the telegraph line signals and its main object is to provide improved control of the motions of the paper carriage of a page printing telegraph machine.

In a telegraph printer, there are four motions of the paper required for page printing, as follows:—

Letter-feed—a short horizontal motion of the paper, usually one tenth of an inch.

Line-feed—a long horizontal motion of the paper, usually anything up to seventy-two letters or about seven inches.

Column-feed—a short vertical motion of the paper, equal to the space separating two lines of typewriting.

Page-feed—a long vertical motion for feeding up from one sheet of paper to another.

In the case of telegraph printers, such as the Baudot, which print on a paper tape, only letter-feed mechanism has to be provided to step the paper along about one-tenth of an inch for each letter printed. In the case of the page printers hitherto employed, it has been customary to provide for letter, line and column feed, but not for page feed. The present invention applies to column printers and also to page printers.

The objects to be achieved are to provide all these four motions and to make them all completely automatic, and particularly to increase their speed sufficiently to make page printing as economical in telegraph line time and operator's time as tape printing. In the case of telegraph machines printing messages on tape such as the Baudot, there is no loss of line or operator's time due to the time required for the various movements

of the paper carriage that must be employed in the case of a printer printing directly on sheets of paper. In the case of page-printers hitherto employed, this is a serious loss, amounting to as much as 10% and even 15%. It is the object of this invention, by means of various co-acting devices, to eliminate this loss, and make a page-printer requiring no more signals or line time or operator's time than a tape printer.

Even in the case of tape printing, it is necessary to have a space between the words and to have a special signal and symbol, such as: to divide the preamble of the message from the address, the address from the text and the text from the signature and another special signal and symbol, such as + to indicated the end of the message. In column printing hitherto, it has been necessary to give the time of not less than two letter signals for the "line-feed," to give the paper carriage time to run back to the beginning of a new line. This has usually been achieved by providing the "line" or "carriage-return" signal followed by a "column" or "line-up" signal. This gives the necessary time for the paper carriage to run back because the "column feed" proceeds simultaneously with the "line feed" and consequently the "line feed" has the whole time of two letter signals within which to operate. Even this is sometimes found to be inadequate when the printer speed is raised from 40 words a minute say to 60. In the case of a speed of 40 words a minute on a multiplex printing telegraph circuit with the 5-unit alphabet, the duration of a letter signal is one-fourth of a second. The time of two letter signals is therefore one-half of a second, at 40 words a minute. The "line feed" of the carriage can be secured at this speed readily enough, but at 60 words a minute, there begins to be difficulty as the time of two letter signals is then only one-third of a second, which is very short for a heavy typewriter carriage, weighing from 2 to 3 lbs., to run back six or seven inches.

The letter and column feeds being short movements, there is no difficulty in performing these operations in the time of one letter

signal even at 60 or more words a minute, but in the case of the two long motions, "line-feed" and "page-feed" more time is usually required. In the case of the "page-feed" which has hitherto been performed manually, American telegraph practice actually provides ten letter signals between each telegraph message, to allow sufficient time for the manual throwing out of a finished message and the feeding up of a new message form or blank.

Another desirable feature is that the "line-feed" should automatically bring in the "column-feed", because when the conditions are not good and there is trouble on the telegraph line, it happens occasionally that a false signal may cause the line-feed to operate; the result is that the carriage runs back and printing takes place on top of the words already printed.

Experience has shown that in order to secure low maintenance cost and reliable action, it is necessary that a telegraph printer shall be, as far as possible, mechanical in its action and that it shall use no power magnets as distinguished from trigger magnets, and that it shall be free from electric contacts. The ideal to be aimed at is to make a telegraph printer that will run mechanically, like a sewing machine driven by a small electric motor. Obviously a sewing machine driven by magnets and electric contacts could not possibly give such satisfactory service as a sewing machine operated by mechanical means. Experience has shown beyond question that telegraph printers operated by power magnets and electric contacts are noisy and troublesome and "temperamental" and cannot give such smooth satisfactory service as printers operated by cams and levers. The second object of the present invention is therefore to provide a printer as nearly mechanical in its operation as possible.

The mechanism of the improved printer for controlling the paper, therefore, consists essentially of a number of levers, rods and springs cooperating to provide the four motions for the paper carriage and actuated by cams on a single revolution cam spindle driven by a small electric motor. As the printer is designed mainly for use on multiplex telegraph circuits, there are necessarily five selecting magnets and one printer trip magnet (all trigger magnets) operated from the distributor in the usual way. With the exception of these six trigger magnets, the improved printer which is the subject of the present patent application is entirely mechanical in its construction and operation and contains no electric contacts.

The invention is shown in the accompanying illustrations.

Fig. 1 is a front elevation,

Fig. 2 is a sectional side elevation,

Fig. 3 is a back elevation,

Fig. 4 is a plan view on an enlarged scale of the selecting mechanism with the upper typewriter portion lifted off,

Fig. 5 is a sectional elevation of the page-up mechanism forming the right hand bracket of Fig. 1,

Fig. 6 is an end elevation of Fig. 5,

Fig. 7 shows the chain of levers for tripping the page-up mechanism into action.

A telegraph printer is composed essentially of two parts, namely (a) the selecting mechanism below the line A—B in Figs. 1, 2 and 3, and shown in plan in Fig. 4, and (b) the printing mechanism or typewriter above the line A—B. Owing to the special requirements in the case of the Murray page printer, a special typewriter shown in Figs. 1, 2, 3, above the line A—B has been designed for the purpose.

Referring first to the selecting mechanism, it consists of a cast metal frame 1 carrying in front a group of five code-bars or selector plates 2, Figs. 1, 2 and 4. These code-bars are held in zero position to the right in Fig. 1 by pawls 38 attached to the armatures of five selector magnets 3, 4, 5, 6, 7, Figs. 4 and 2. If one or more of these five selector magnets is energized by an impulse from the distributor, the corresponding selector plate is liberated from its pawl 38 and moves about one tenth of an inch to the left. The selector plates are differentially slotted and form lever lock combinations, any one of 31 groups being aligned by any particular five-unit signal operating on the five selector magnets.

Immediately after the selector plates have been aligned in a particular combination, the printing trip magnet 8, Fig. 2, gets an impulse from the distributor and attracts its armature 9, which trips a clutch 11, Fig. 4, which couples the constantly revolving spindle 12 with the cam spindle 10, which then makes a single revolution and stops, the clutch 11 being thrown out by suitable mechanism, leaving the cam spindle ready to operate again upon the arrival of the next signal. The cam spindle carries five cams shown in Fig. 4 as follows:—

1. The printing cam 13, Fig. 4, which causes the selected typebar to strike the platen and print;

2. Zeroizing cam 14, which restores the selector plates to zero position ready for a new selection;

3. Spacing cam 15, which moves the paper carriage along letter by letter and at the same time stores up power in a clock spring drum for the return of the carriage to the beginning of a new line upon the transmission of a "line" signal. It also raises the line trip lever and stores up power to trip the "line" mechanism for returning the carriage.

4. Selecting lever drop cam 16, which permits the selecting levers or latches to rest against the selector plates at the right moment.

5. Column feed cam 17, which stores up power in the column feed lever and spring for the operation of the column feed at any required moment.

When the cam spindle starts to revolve, the drop cam 16, Figs. 3 and 4, allows the drop bar 18, Figs. 1 and 2, to move back, thus permitting the latches 21 (one for each of the 31 signals) to rest against the selector plates 2. One of these latches falls into an aligned group of slots in the selector plates and under the tension of its spring 22, Fig. 2, the selected latch moves inward and pushes in the corresponding hook 23, Fig. 2, under the universal striker-bar 24, carried on three levers 25 pivoted on spindle 20, Figs. 2 and 4. As the cam spindle continues to revolve, the printing cam 13 raises the printing lever 26 with its cam roller 27, thereby depressing levers 25 and the attached striker-bar 24. In this way the selected hook 23, Fig. 2, out of 26 hooks, Fig. 1, linked to the 26 typebars of the printer, is depressed. Inspection of Fig. 2 will show that the depression of the hook 23 pulls down the corresponding bellcrank lever 28, which in its turn, by means of the wire link 29, causes the typebar 30, pivoted on the curved rod 31, Fig. 2, to rise and strike the platen 32, thus printing the transmitted character on the paper.

Immediately after a hook 23 has been engaged by the striker-bar 24, a zeroizing lever 41, Figs. 1 and 4, operated by a chain of levers from the zeroizing cam 14, throws the selector plates back to zero position, where they are held by the selector magnet pawls 38 until the next signal is transmitted over the telegraph line.

This covers the main features of the printer selecting mechanism; but it is convenient to describe here the printing trip mechanism that starts the printing cycle of motion, because it is a special feature of the invention used also in the typewriter portion of the printer. The high speed of operation of the various paper carriage motions as well as of the printing mechanism depends on this device. It is essential that the printer actions shall start at the earliest possible moment after the arrival of the line signals.

In the case of magnetically operated printers, this is comparatively easily arranged as magnets operate with extreme rapidity and power, but the advantages of mechanical operation far outweighs this advantage of electrical operation. Hence it is necessary to provide some mechanism by which action, as quick as that of a magnet, can be obtained. In my improved

printer this result is achieved by storing up power from the cam spindle revolution during the printing of the previous letter. The power can be most conveniently stored up in a spring. Hence, during the revolution of the cam spindle, a cam raises a lever that stretches a spring and a trigger then engages the lever and holds the power stored up in the spring available for instant action immediately after the arrival of the next letter signal.

Referring to Figs. 3 and 4, the clutch 11 is tripped and re-locked by a pawl 46. It is necessary that this pawl shall be very sensitive and shall trip clutch 11 with a very slight and brief impulse in the printing magnet 8, Fig. 2. On the other hand, if it is sensitive, then the vibration of the printer will cause it to operate when not desired. The special device already referred to, not only secures very quick action, but also sensitive action combined with secure locking. Referring to Fig. 4, a sliding pawl 47 is provided, pivoted at 48 and held in lightly by the spring 51. On the spindle carrying the clutch pawl 46, there is fixed an upward projecting lever 49 with the surface bevelled at the point where it engages with the bevelled surface of the slipping pawl 47. A heel at the back of the pawl 47 rests against an upward-projecting blade 50 fixed to the armature 9 of the printing trip magnet 8, Fig. 2. By selecting a suitable angle for the bevel, the pressure of the heel of the pawl 47 on the blade 50 can be made very light, so that a very slight and momentary impulse is required in the printing trip magnet to move the blade 50 out from the pawl 47, which then slips under the pressure of the lever 49, which is pulled outward by a strong spring 154, Figs. 3 and 4 acting below the pivot of the pawl 46. This also pulls out the pawl 46 and liberates the cam spindle clutch which then engages with the driving spindle. As the clutch revolves a tooth 170, Fig. 4, on its periphery throws it out of engagement at the right moment, and the same projecting tooth thrusts in the lever extension 52 of the pawl 46. This resets the slipping pawl train ready for the next signal. The advantage of this arrangement is that while it is exceedingly sensitive and operates with feeble power, it is positive and insensitive to shock or vibration. It enables considerable mechanical power to be stored up in a spring and released by a very slight mechanical force. This is the arrangement which is also an essential feature of the paper carriage moving devices to be described presently.

By varying the slope of the hook portion of the pawl 47, this device can be made more or less sensitive without affecting its security. It will be seen that once it has

tripped, it can only be reset by power storing up energy in a spring for this purpose. Two other instances of the use of this device will be described presently in connection with the carriage motions of the printer.

Coming now to the printing mechanism above the line A—B, this printing mechanism is essentially a typewriter and has a typewriter paper carriage and platen 32. The typewriter is of the type-bar class, experience having shown that type-wheel typewriters are not satisfactory for rapid operation. The printing mechanism therefore is a front-stroke, type-bar, visible typewriter with basket shift for figures, similar to the L. C. Smith typewriter. The paper carriage 32 slides on a one-half inch square steel spindle 53 conveniently about 19 inches long. This provides a very positive and durable guide for the carriage and lightens the carriage not only by the amount of the weight of the core of the platen displaced by the steel bar, but also transfers from the carriage to fixed positions the mechanisms required for the various feed motions of the carriage. The column-feed or line-up can take place at any point by a slight rotation of the steel spindle and page-feed by a greater rotation of the steel spindle.

Coming now to the most characteristic feature of the improved Murray page printer, namely, the paper carriage movements, the carriage with its platen 32, Figs. 1, 2, 3, is carried by and slides on a square steel spindle 53 supported at each end on a bracket 54 and 55, Figs. 1 and 3. The advantage of this arrangement is that the paper carriage, while retaining its strength, can be made about half the weight of an ordinary typewriter carriage, that is to say about one and one-half pounds instead of about three pounds. The spindle 53 removes from the carriage a considerable weight of material which has to move with the carriage on ordinary typewriters. It also dispenses with the various guides which add to the weight of an ordinary carriage and the knob 56 and the line-up mechanism 57 are also removed from the carriage.

In the box bracket 54 is contained the line-up mechanism operating the ratchet wheel 57, and in the box bracket 55 is contained the page-up gearing to be presently described.

The carriage 32 and the rod 53 are readily detachable by taking out the thumbscrew 58, Fig. 1, which liberates the plate 59 and the carriage spindle 53 and the carriage. When these are removed, the brackets 54 and 55 can be removed by one or two turns to the clamping screws 60 and 61. The brackets then simply lift off. The typewriter is also easily detachable from the selecting mechanism along the line A—B.

The machine is readily decomposed into still smaller sections if required, and it can be assembled again in a few minutes. The selector plates 2 for instance can be taken out instantly by pulling forward the lever 62, Fig. 1, which throws out the latches 21 by means of the cam-bar 63, Fig. 2.

A little reflection will show that a mechanically operated printer is at a serious disadvantage compared with a power-magnet operated printer in one respect, namely, instant application of considerable power for various operations. The moment a contact is closed the corresponding magnet acts with extreme rapidity and power. Consequently in a very small fraction of a second after the recording of a signal in the printer, the carriage can be tripped and will start moving back to the beginning of a new line, and similarly with other carriage movements. At 60 words a minute the total time for receiving a signal and printing it is one-sixth second. That may be described as one letter time. Obviously if the signal has first to be recorded in the printer and then the carriage has to move back to the beginning of a new line in one-sixth of a second, very special provisions must be made, even in a power-magnet operated printer. Even if the signals are recorded and the printing action started, as is done in the Murray printer, in one-fifteenth of a second, this leaves only one-tenth of a second at the most for the return of the carriage to the beginning of a new line, a motion of as much as seven inches. For this reason the carriage 32 is made as light as possible, one and one-half pounds. Also a strong carriage tension spring 64, Fig. 3 is provided with the usual typewriter carriage cord 65. There is also provided a pneumatic buffer consisting of a lever 66 and a piston and cylinder 67 to absorb the shock and energy of the returning carriage. Experience shows that it is practicable to get such a carriage to return the full length of a line in one-tenth of a second.

Against such heavy carriage tension a fair degree of power is required to release the carriage from its retaining letter-feed pawls 68 and 69, Fig. 3. As this power must be applied instantly the moment the selection by the signal has been made and not less rapidly than by a magnet, it is obvious that in a mechanically operated printer the only possible plan is to store up power in a strong spring during the printing of the previous letter. The power is then available for instant action, even more rapid than that of a magnet, a spring approaching a condenser in speed of operation. It is also necessary as already explained to use the bevel pawl trip device to obtain safe but sensitive release action. These are arrangements used in the improved Murray page printer.

Referring to Figs. 3 and 4, the spacing cam 15 raises the spacing lever 70 by means of the cam roller 71 every time the cam spindle makes a revolution. Pivoted on the side of the lever 70 is a lever 72 pivoted at 150, and situated immediately under a rod 73, Figs. 2, 3 and 4. Hence when the spacing cam 15 raises the lever 70, the rod 73 and its extension 74 are thrust up and the bellcrank lever 75 oscillates on its pin 76 and pulls the carriage letter-feed pawl 68 to the right to the extent of slightly more than one tooth of the rack under the carriage. The retaining pawl 69 holds the carriage in the new position. It will have been noticed that there are no key levers in the typewriter and that the spacing action comes direct from the cam spindle. This is the same arrangement as in the Murray automatic printer, which also dispenses with typewriter key levers. In the case of certain operating signals, however, such as the Erase signal, it is necessary to cut out the spacing action. For this purpose the latch 158, Figs. 1 and 4 operated by the Erase signal thrusts in a rod 156 with the extended head immediately behind the latches 157, 158 and 159. Rod 156 operates an intermediate lever mechanism (not shown) which tilts vertical lever 72, Fig. 2 on its pivot 150, so that the top of lever 72 is no longer under the rod 73, and consequently no longer operates the spacing mechanism. Latches 157 and 159 operate in the same way by means of the head of the rod 156. Latch 155 also operates on a rod 160 which also operates the same mechanism so as to cut out spacing.

At the same time as the spacing action takes place, the spacing lever 70 in rising strikes the end of the rod 77, Figs. 2 and 3 pivoted at 81 on the lever 78 pivoted at 79. Hence the spacing cam and lever raises lever 78 and extends the strong spring 80, thus storing up power in the spring 80. The free end of the lever 78 is bevelled and catches on the bevelled edge of the slipping pawl 82 pivoted at 83. The pawl is locked by the lever blade 84 pivoted at 161, Fig. 3. By giving a suitable slope to the bevel, the pressure of the pawl 82 on the blade 84 can be made slight in spite of the tension of the spring 80, and very slight pressure on the lower part of lever blade 84 below its pivot 161, by a selected latch in front of the printer will move lever blade 84 inward, thus releasing pawl 82 and lever 78, although it is otherwise quite secure. This tripping action is performed by the latch 159, Fig. 1, operated by the carriage return signal. The pawl 82, Fig. 3 being freed, slips back under the downward pressure of the lever 78, which is then powerfully depressed by the spring 80. The lever 78 in its descent strikes the pin 85 in the plate 86, the upper

end of which links over two pins 68^a, 69^a, in the sides of the two feed pawls 68 and 69. Hence these pawls are pulled down, liberating the carriage, which under the tension of its strong drum spring 64, flies back to the beginning of a new line (line feed).

The plate 86 must be held down till the carriage has completed its return. For this purpose a small rod 87, Fig. 3, engages over a pin in the back of the plate 86 and holds it depressed till the carriage returns to the beginning of a new line. The carriage then depresses the lever 88 pivoted at 89. This lever depresses the rod 90, which in turn oscillates the bellcrank lever 91, the upper end of which thrusts back the rod 87 and liberates the plate 86, which rises and allows the two feed pawls to engage again with the carriage.

The action for turning the platen up to a new line (column feed) is arranged in a similar way. Turning to Fig. 2, a lever 92 operated by the column feed cam 17 raises the lever 93 pivoted at 96. The lower end of this lever 94 moves out and is caught by the slipping pawl 95, which is retained by a light detent blade 151 easily operated by the latch 157, Fig. 1, selected by the "column" signal. A spindle 96, to which lever 93, 94, is fastened extends as shown in Fig. 3 along the bracket 54 and at the end carries a lever 97, which extends into the interior of the bracket, which is in the form of a hollow box. This lever is pulled up by a powerful spring in the box 54, (not shown), and this spring is extended and power stored up in it by the action of the "column" feed cam 17 by the train of mechanism just described. When the column signal arrives the blade 151, Fig. 2 is thrust to the right by lever mechanism operated by the column signal latch 157, Fig. 1. This liberates lever 95, Fig. 2, which drops, leaving lever 94 free to move in under the torsion of the spindle 96 operated by the strong spring inside the bracket 54. The lever 97, Fig. 3, is free to rise sharply under the tension of the spring inside of the box 54, and the lever thrusts up a rod 152, Fig. 1, which operates the pawl 153, which feeds the ratchet-wheel 57 around one tooth, thereby rotating spindle 53 and the platen of the carriage 32 and the message paper to a corresponding extent, namely the distance between two lines of typewriting. The rotation of the cam spindle causes cam 17 to reset this column feed mechanism stretching the spring in bracket 54 ready for the next column or line-up signal.

It will be seen that this action is independent of the "line-feed," (carriage return), and can proceed simultaneously with it. Hence one signal, the "line" signal, trips both of these actions, which consequently take place in the time of one letter signal.

The mechanism by which this result is arrived at is as follows:—Latch 159, when selected by a "line" signal, presses rod 107, Figs. 4 and 7, inward, causing lever 101 fixed to the rod 107 to press against the lever 162 fixed to rod 163. It will be seen that both rods 107 and 163 are operated by the line-signal latch 159. Hence the line signal operates the column as well as the carriage return mechanism. This arrangement has another important advantage. It is a desirable feature in a telegraph printer that the "line-feed" (carriage return), should automatically bring in the column-feed, because when the conditions are not good and there is trouble on the telegraph line, it happens occasionally that a false signal may cause the "line-feed" to operate. The result is that the carriage runs back and printing takes place on top of the words already printed. This is guarded against in the Murray printer owing to the line-feed being combined with the column-feed in one signal.

Provision is also made for operating the "column-feed" separately from the "line-feed" when it is desired to print an address thus:—

John Smith

35 Strand

London

For this purpose it will be seen that latch 157 can operate rod 163 which controls column-feed independently of the carriage return (line-feed).

This exhausts the 31 available signals and no signal is left for the page-up operation of feeding in a new message form to the right printing point for starting to print a new message. To get over this difficulty, the carriage when it returns to the beginning of a new line, that is to say, up against the disc 100, Fig. 3, depresses the rod 90, which not only depresses the lever 91, but also rotates the rod 107, Figs. 4 and 7, slightly, by pressing down the short lever 164 fixed to rod 107. This slight rotation of rod 107 tilts the lever 101, Figs. 4 and 7, attached to the "line" trip rod 107 so that it comes opposite the end of the lever 102, Fig. 7, thus becoming a "page" trip lever. Consequently when the "line" signal is sent twice in succession, its latch 159 first runs the carriage back to the beginning of a new line, and then, when repeated, it trips the page-up mechanism now to be described.

The clutch of the page-up mechanism (page feed) is shown end on at 106, Fig. 7, and it is tripped into action by the depressing of the lever stop 105, which is operated by the train of levers 104, 103, 102 and 101. Consequently when the "line-feed" latch 159 is operated for the second time it pushes in the rod 107 as usual, but on the second occasion, the rod being slightly ro-

tated by the return of the carriage, the lever 101 strikes against 102, Fig. 7, thus tripping the clutch 106 into action.

The internal mechanism in the bracket box 55 is shown in sectional elevation in Fig. 5 and in end elevation in Fig. 6. On the end, covered by a metal case, there are three small gears, which are known as the "feed-gears," 108, 109 and 110, as they determine the extent of rotation of the platen. Gear 110 is fixed to the single-revolution spindle 114. Consequently as 110 makes only a single revolution the ratio between 110 and 108 (the platen rotating gear) determines the amount of rotation of the platen. One and one-half revolutions of the platen are convenient for feeding up telegraph forms about 8 inches long. The platen being 4 inches in circumference, this is a total motion of 6 inches for the message form, and the overlap of the message forms accounts for the remaining two inches. The ratio can be changed for other lengths of forms.

The gears 111, 112, 113, 165 and 166 (see Figs. 4 and 5) are the "speed-gears," as they determine the speed at which the page-feed takes place. The gear 166 is fixed to the main driving shaft 12, which revolves continuously by belt or gearing from a small motor. The chain of gears 166, 165, 112, 111 and 113 revolve continuously as long as the printer is in operation. One half 116 of the clutch shown in Fig. 5 is fixed to the wheel 113. The other half of the clutch 115 is held back clear of 116 by the pawl 105, Fig. 7. When the pawl 105 is tripped, the clutch 115 is pushed by the spring 167 into engagement with 116 and the spindle 114 starts revolving and the train of gears 108, 109 and 110 do the same. When the carriage returns by sliding along the spindle 53 to the disc 100, the end disc 122 Fig. 1 of the carriage presses in the stud 120 until the disc 122 strikes the leather buffer 121 and the pneumatic buffer 66 and 67 has absorbed the energy of the moving carriage. The disc 122 on the carriage has a hole in it corresponding to the stud 120, but it will depend on the number of lines on the printed message whether the stud will engage at once with the hole in the disc or not. The disc 100 with the stud 120 revolves until the stud comes opposite the hole in the disc 122. The stud then jumps into the hole and the disc 100 and the platen are locked and revolve together for the remainder of the revolution of the spindle 114, Figs. 5 and 6. In this way the page-feed revolves the platen and the new message form to the correct printing point for starting the new message regardless of the length of the previous message.

As the clutch 115 Fig. 5 revolves, the projection 123 on the edge of the clutch strikes

an inclined plane 124, Fig. 7, which disconnects the clutch, and 123 strikes against the pawl 105 Fig. 7, which by this time has risen, and the rotation of the spindle 114 with its attached gearing is arrested after making one revolution, and the platen one and one-half revolutions (if so desired). The stud 123 coming against its stop pawl 105 prevents excess rotation of the platen. Another device shown at 118 and 119 assists. The piece 118 is prevented from revolving by the fixed keyway piece 119, which permits only axial motion to the piece 118 which is fitted with a key 168, Fig. 5. The screw cam surface shown at 125 Fig. 5, as the spindle 114 revolves, forces the piece 118 to the left against the powerful spring 117 until the sloping surface 126 is reached. This forces the spindle 114 to snap forward rapidly so as to free the teeth of the clutch without injury. At the same time the pressure of the spring 117 on the piece 118 tends to prevent excess motion of the platen.

Shifting to figures and back to letters is effected as follows. One of the hooks 23, Fig. 2 when selected, depressed the lever 34, Fig. 2, pivoted at 35, raising the other end of two levers 36, which raise two feet 37, which in turn raise the typebar basket 33, which is balanced to rise or fall a quarter of an inch, in the same way as the typebasket of the well-known L. C. Smith typewriter. A catch holds the type basket in the raised position in which the machine prints figures. Another of the hooks 23 when selected drops the typebar basket back to letters.

The usual typewriter provision for carrying and moving an ink ribbon is made together with automatic reverse for the ribbon when it has been wound from one spool 39 to the other 40.

As the printing trip magnet 8, Fig. 2, gets regular impulses from the distributor, the printer would continue to operate "running empty," entailing useless wear and noise. Provision is therefore made to prevent the armature 9 of the magnet 8, Fig. 2, from being operated except when signals arrive over the telegraph line. For this purpose, a hook pawl 42, Fig. 4, pivoted at 43 engages with the inward projecting blade 50 from the armature 9 of the magnet 8, Fig. 2. This prevents the armature from moving, but when a signal has been recorded on any of the selector magnets and a selector plate 2 has moved to the left, the selector plate moves a pin connected to the bellcrank lever 45. The lever 45 is thus moved to the left and pulls a wire link 44 which in turn moves the hook pawl 42 out of engagement with the blade 50 of the printing trip magnet armature, which is then free to operate when its impulse arrives.

I claim:—

1. A page-printing telegraph machine of the type described, comprising a selecting mechanism actuated by the line impulses, a typewriter printing mechanism including a fixed type bed and a platen carriage reciprocable thereover, the printing operation being controlled by said selecting mechanism, a power driven shaft, an operating spindle having a series of cams, and means actuated by said cams for effecting the required movements of the paper carriage of the printer, a spring-actuated clutch for connecting said shaft and said spindle and a trigger device for said clutch controlled by said selecting mechanism.

2. A page-printing telegraph machine as set forth in claim 1, said carriage moving means comprising page-feed mechanism arranged to be tripped into operation by a second line-feed signal and operating to rotate the platen of the typewriter carriage to the proper printing position to start the printing of a new message regardless of the length of the previous message.

3. A page-printing telegraph machine as set forth in claim 1, said carriage moving means comprising page-feed mechanism arranged to be tripped into operation by a second line-feed signal, said mechanism being provided with arresting devices to prevent excess rotation of the platen, to ensure the right printing position for the start of a new message and enabling the page-feed to take place in the time required for two letter signals.

4. A page-printing telegraph machine, comprising a spring-actuated line feed mechanism, a trip device therefor under control of a line feed signal, a page feed mechanism, a trip device for setting the latter in operation, means operated by the paper carriage for juxtaposing said trip devices, whereby the page trip device is operated upon a repetition of a line signal.

5. A page-printing telegraph machine, comprising a selecting mechanism actuated by the line impulses, a typewriter printing mechanism having pivoted type bars and a carriage having a rotatable platen reciprocable transversely of said type bars, an operating spindle provided with a plurality of cams, means actuated by said cam spindle for advancing said carriage step by step, a spring-actuated releasing device for said carriage placed under tension by said cam spindle, and means actuated by a line impulse for tripping said releasing device.

6. A page-printing telegraph machine, comprising a selecting mechanism actuated by the line impulses, a typewriter printing mechanism having pivoted type bars and a carriage having a rotatable platen reciprocable transversely of said type bars, an operat-

ing spindle provided with a plurality of cams, a drive shaft, a spring-actuated clutch for connecting said shaft and said spindle, a line-feed device, a spring-actuated operating device therefor, a page-feed mechanism operable by said drive shaft, a spring-actuated clutch for connecting said mechanism and said shaft, a spring-actuated carriage-releasing device, said spring-actuated devices being placed under tension by said drive shaft, and tripping latches for each of said spring-actuated devices, actuated by the line impulses.

In testimony whereof I affix my signature

DONALD MURRAY.