March 6, 1951 R. L. HOUSTON 2,543,910

MACHINE FOR PRINTING ON DUPLEX RECORDS

Filed May 31, 1946 4 Sheets-Sheet 1

Fig. 1.

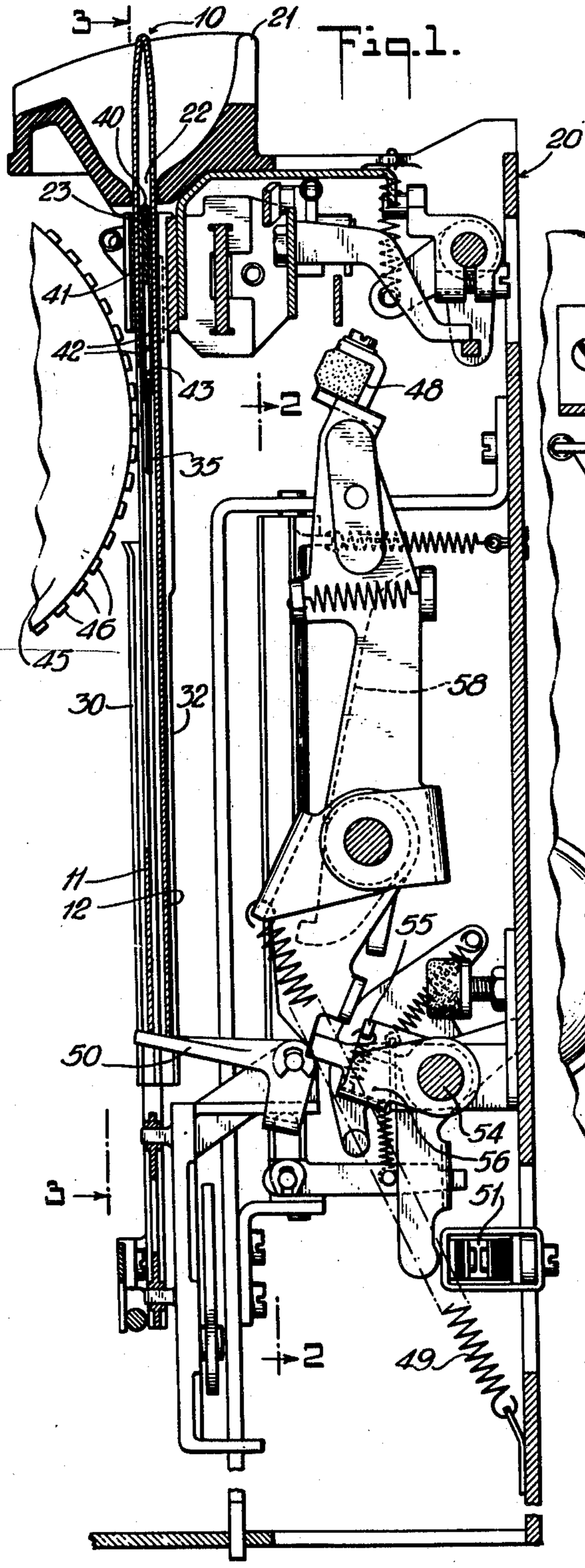
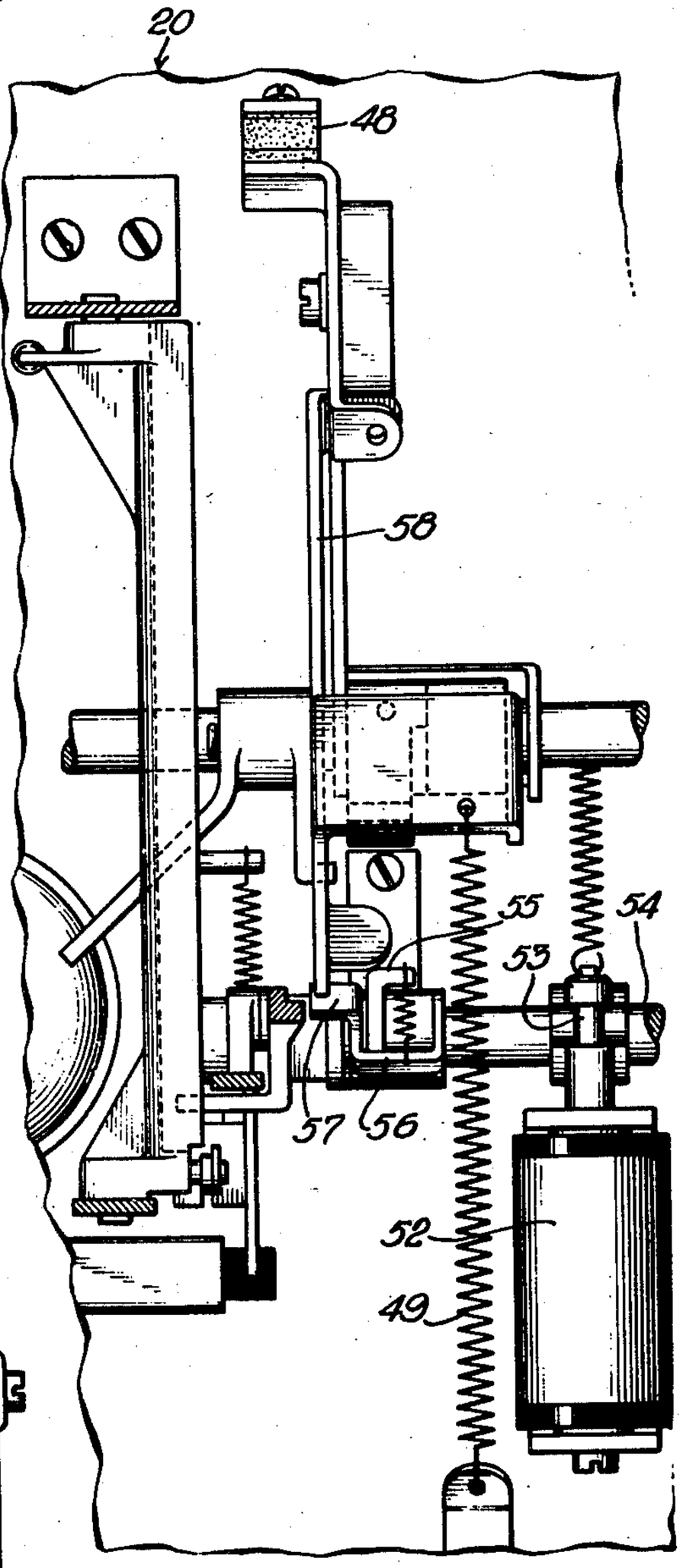


Fig. 2.



INVENTOR
R. L. HOUSTON
BY W. M. Wilson
ATTORNEY

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MACHINE FOR PRINTING ON DUPLEX RECORDS

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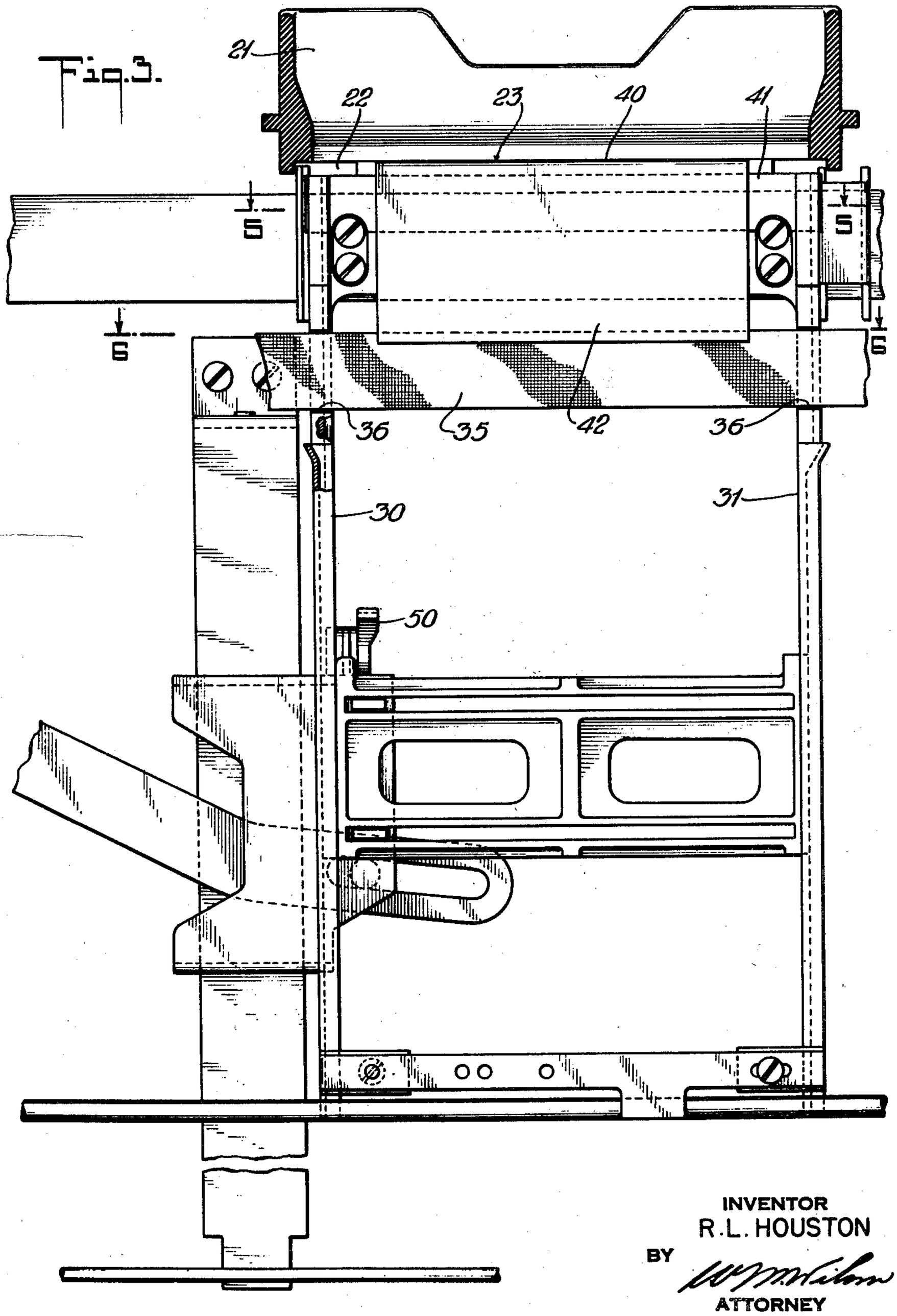
Fig. 3.



INVENTOR
R. L. HOUSTON
BY
ATTORNEY

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MACHINE FOR PRINTING ON DUPLEX RECORDS

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Fig. 4.

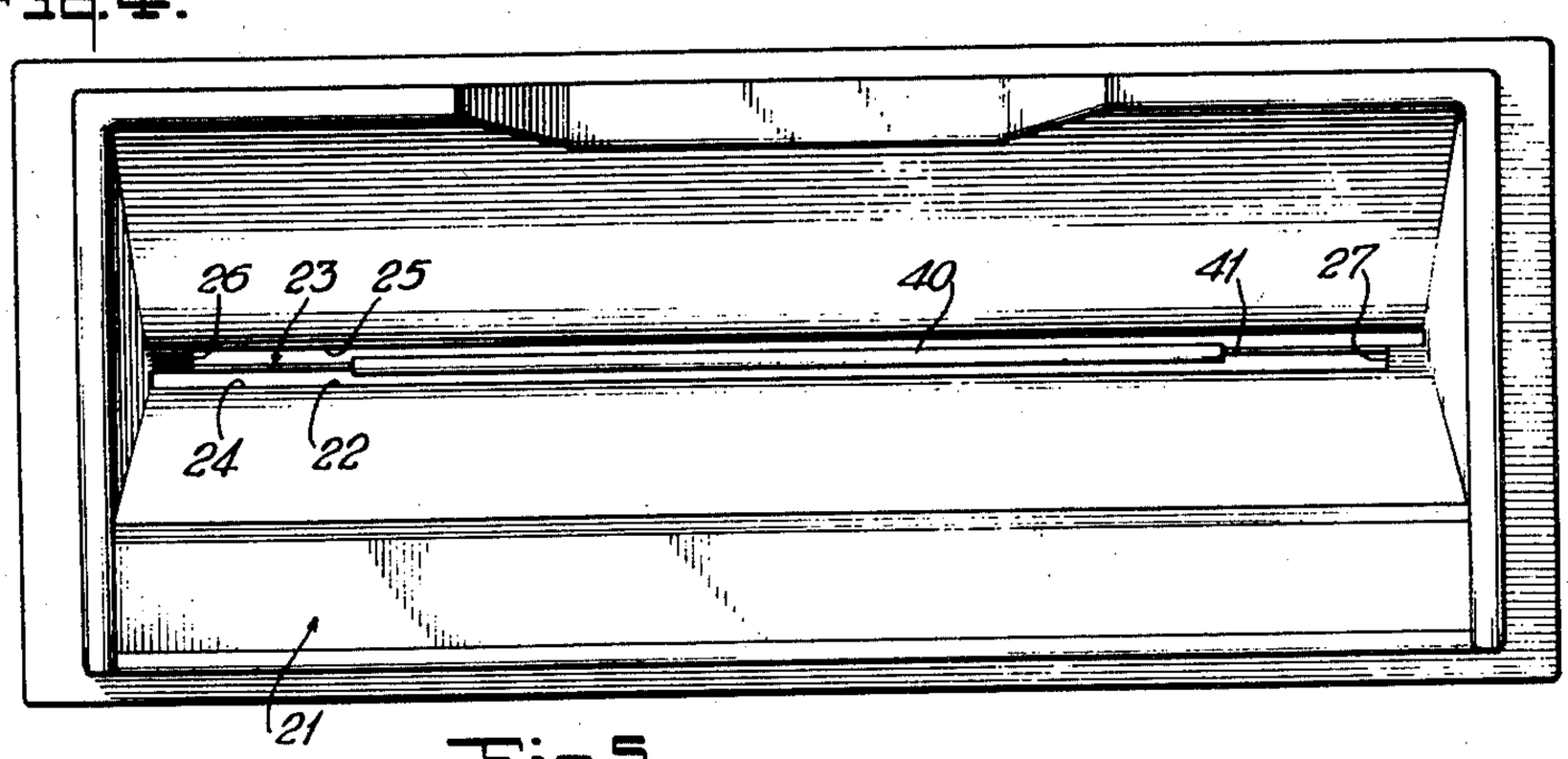


Fig. 5.

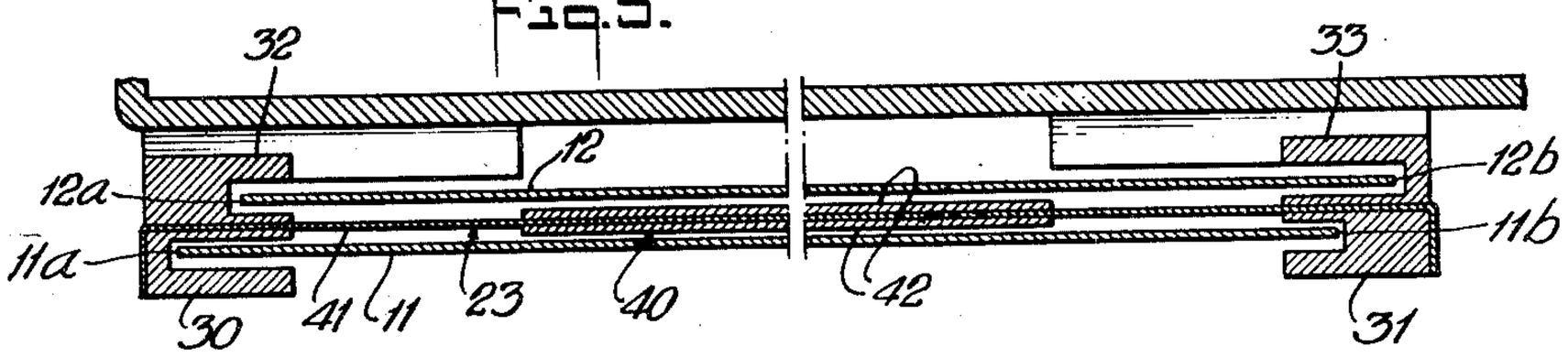
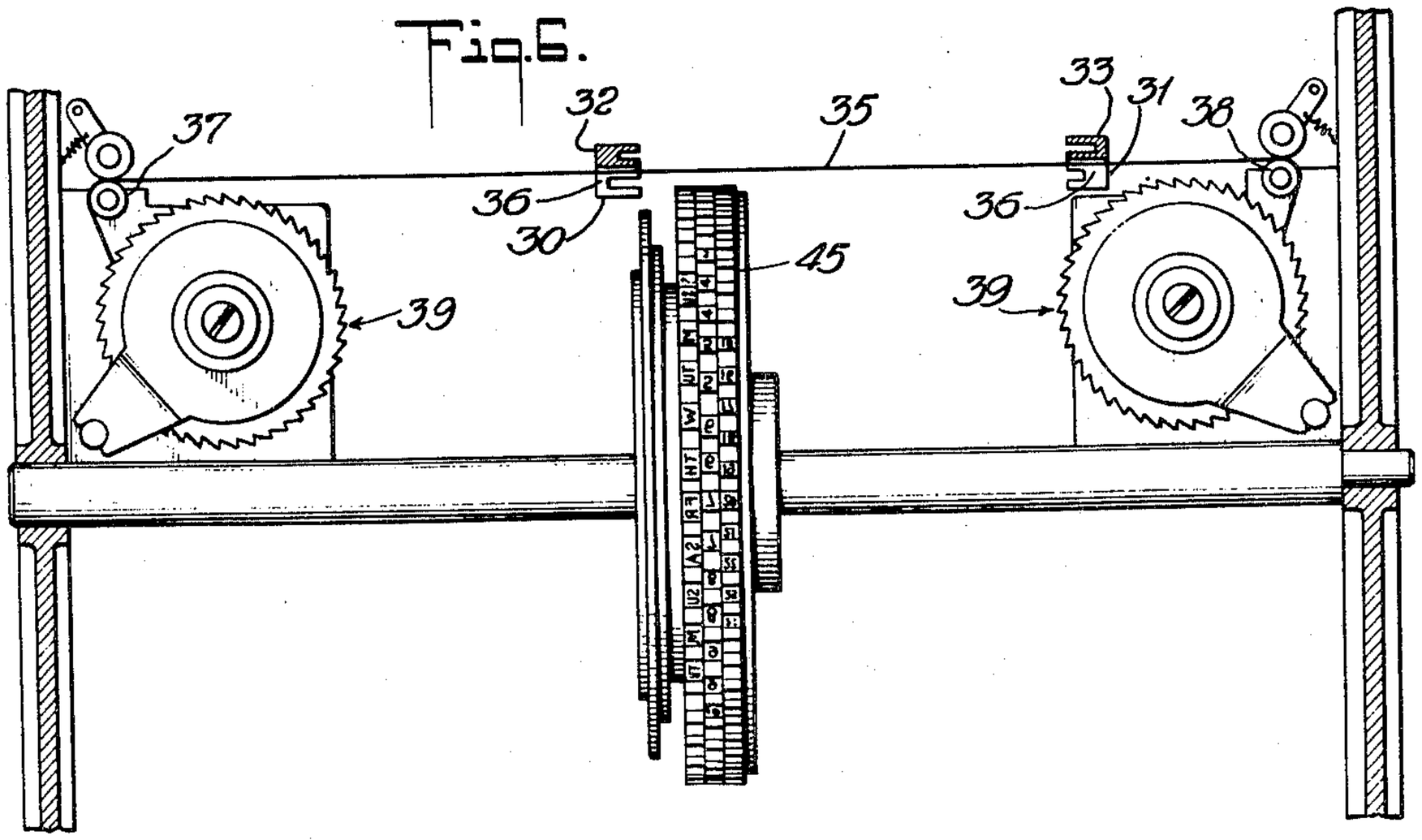


Fig. 6.



INVENTOR
R. L. HOUSTON
BY
W. M. Wilson
ATTORNEY

March 6, 1951 R. L. HOUSTON 2,543,910

MACHINE FOR PRINTING ON DUPLEX RECORDS

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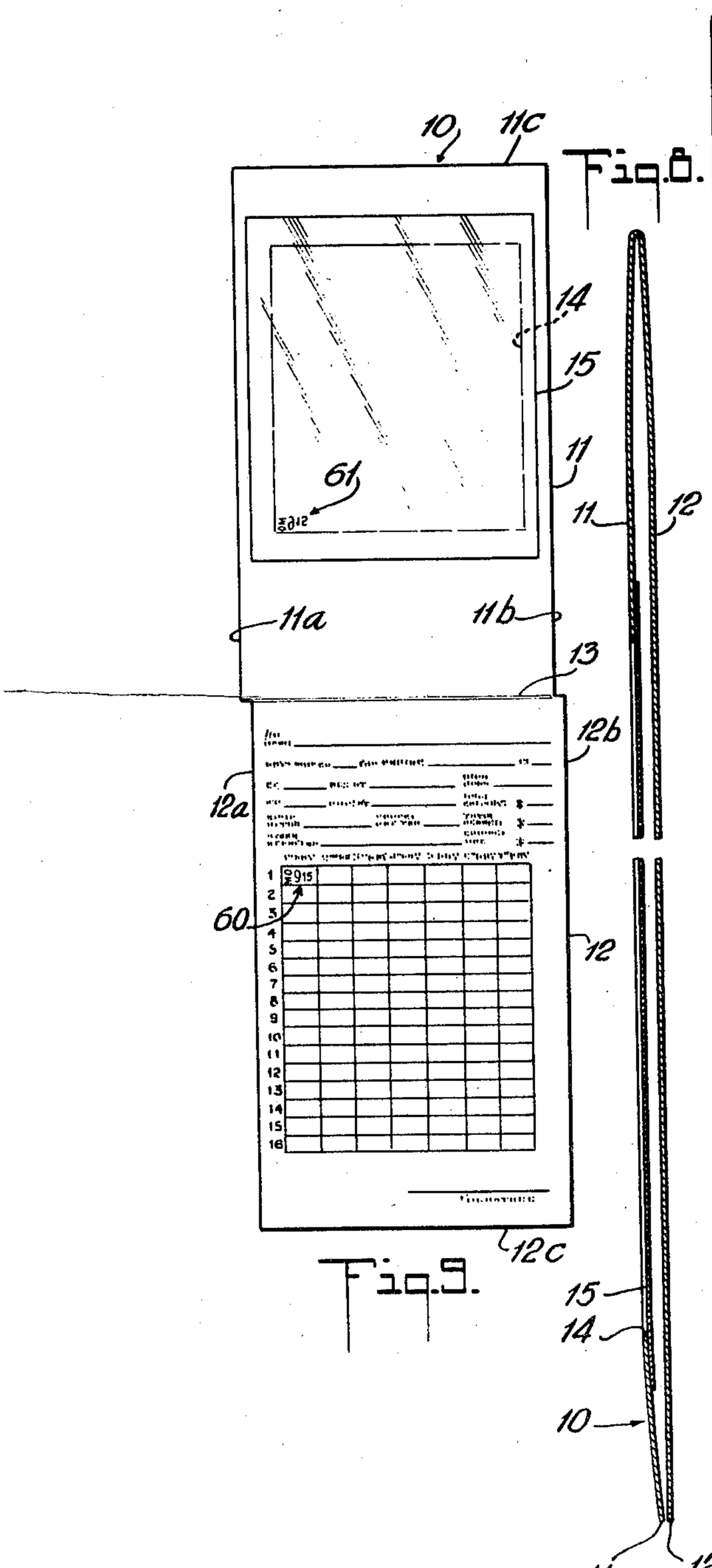

Fig. 8.

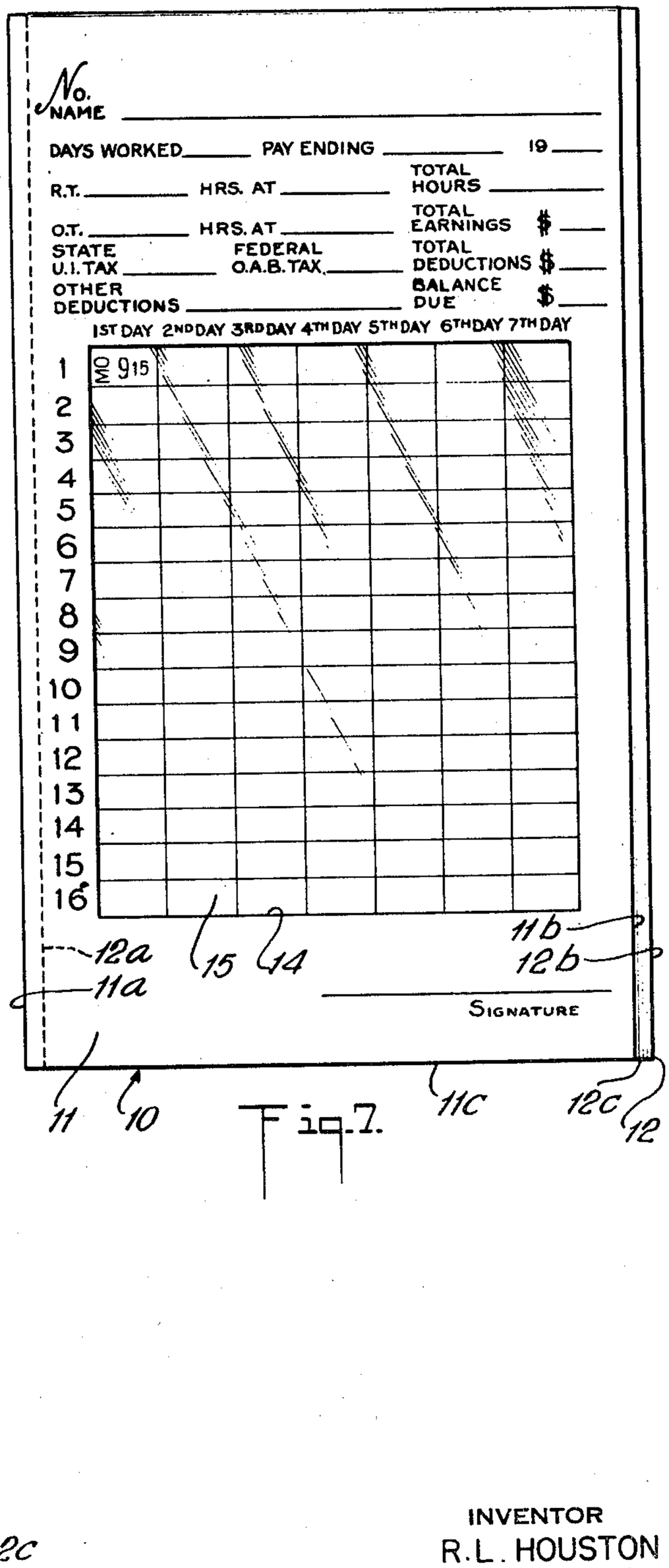

Fig. 7.

Fig. 9.

INVENTOR
R. L. HOUSTON
BY
W. M. Wilson
ATTORNEY

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MACHINE FOR PRINTING ON DUPLEX RECORDS

Robert L. Houston, New York, N. Y., assignor to International Business Machines Corporation, New York, N. Y., a corporation of New York

Application May 31, 1946, Serial No. 673,534

2 Claims. (Cl. 101—287)

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This invention relates generally to the art of printing data on record sheets such, for example, as the printing of the entering and leaving time on a time record card. More particularly, the invention relates to providing a duplicate printed record of character data and it relates to the form of the record card, or sheet, and also to the apparatus and the method for effecting the printing of the data on the record card.

In the U. S. patent to Rast, No. 2,281,998, granted May 5, 1942, and in subsequent patents granted on divisional subject matter disclosed therein, there is disclosed a commercially used time recorder, by means of which a single record is made on a conventional time card whenever it is desired. According to one of its aspects, the present invention may be considered as being in the nature of an improvement over the means and method of recording data disclosed in the Rast patent. A duplex record card or sheet of improved form is provided and provision is made for simultaneously recording data in a new and improved manner on both parts of the duplex record card and so that the two parts of the record card may be subsequently separated and be available for whatever use is desired.

It is, therefore, an object of the present invention to provide both a new and improved method and a new and improved structure, by means of which a duplicate record of character data is obtained in a simple and effective way and by one printing operation.

A further object is to provide a new and improved form of duplex record card, or sheet.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a fragmentary transverse vertical section of a time recorder of the type shown in the above cited Rast patent, and as modified in accordance with the present invention, and showing the position of the new and improved duplex record at the beginning of a printing operation.

Fig. 2 is a fragmentary vertical section taken on the line 2—2 of Fig. 1 and showing the mechanism for releasing the printing hammer or platen.

Fig. 3 is a fragmentary vertical section taken on the line 3—3 of Fig. 1 and showing the card receiving and guiding means, the card being omitted from the view so as to show the structure more clearly.

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Fig. 4 is a horizontal or top plan view of the card receiving throat.

Fig. 5 is a fragmentary horizontal section on the line 5—5 of Fig. 3 and showing the card receiving and guiding means with the two parts of the duplex record card held in printing position by their respective pairs of opposed guide members.

Fig. 6 is a fragmentary plan section on the line 6—6 of Fig. 3, the view being reduced in scale and including portions of the ribbon feeding and guiding means.

Fig. 7 is an outside face view showing one preferred embodiment of a duplex record card constructed in accordance with the present invention.

Fig. 8 is a longitudinal sectional view, on an enlarged scale, through the card of Fig. 7.

Fig. 9 is a face view on a reduced scale showing the inside surfaces of the two sections composing the card of Fig. 7.

Referring first to Figs. 7 to 9 inclusive, the reference numeral 10 indicates a new and improved form of duplex record card comprising a rectangular front section 11 and a similar rectangular back section 12, the two sections being joined together along a scored line 13 to provide a common top margin for the two sections. The two sections are folded one upon the other along the scored line 13 and are thereby arranged in face-to-face relation, as shown in Fig. 8.

The front section 11 is formed with parallel straight lateral edges 11*a* and 11*b*, respectively, and a straight bottom edge 11*c* parallel to the scored line 13, and the rear section 12 is also formed with corresponding straight lateral edges 12*a* and 12*b*, respectively, and a straight lower edge 12*c*. As shown, when the two sections are folded one upon the other, the lateral edge 11*b* of front section 11 is spaced inwardly a slight amount from the corresponding lateral edge 12*b* of rear section 12, and likewise, the lateral edge 12*a* of section 12 is spaced a slight distance inwardly from the corresponding lateral edge 11*a* of section 11. As will appear later, the purpose of the laterally spaced corresponding lateral edges of the two sections is to assure the separation of the sections when the record card is inserted within the card-receiving throat of the recorder. Corresponding lower edges 11*c* and 12*c* of the two sections are continguous.

The front section 11 is formed with a rectangular cut-out or window portion 14 and the latter is covered by a sheet 15 of light-transmitting material which is secured to the marginal por-

tions of the section defining the cut-out by any suitable adhesive. The material of which the sheet 15 is made may be any which will retain printing ink from the conventional inked ribbon and which will transmit sufficient light to permit data printed on one surface to be read from the opposite side. An example of such a material is a commercially known vellum or tracing paper.

In securing the sheet 15 to the marginal portions of the cut-out 14, the sheet 15 is preferably placed under tension so as to provide, when the adhesive is dry, a slight inward bow to the front section 11 and thereby facilitate further the separating of the two sections when inserting the latter in the recorder. While the sheet 15 may be secured in a variety of ways to the marginal portions of the cut-out so as to place the sheet under tension and provide the permanent slight inward bow to the front section, an effective and acceptable way is first to bend or bow the front section 11 a slight amount and then to secure the sheet 15 thereto with adhesive while in the bowed shape and to hold the section in the bowed shape while the adhesive dries. When the adhesive dries, the sheet 15 will be under tension and will thereby hold the section 11 in the desired shape. It will be appreciated that the amount of bow required to facilitate the separation of the sections is very slight.

As shown in Fig. 9, the sheet 15 of light-transmitting material provides a record field for the front section 11 and the inside surface of the rear section 12 provides the record field of the latter section, the two record fields being arranged in superposed relation. The vertical and longitudinal columns of the record field of the front section are indicated by appropriate indicia printed on the outer face of the front section and along the margins of the sheet 15 (see Fig. 7). The vertical and horizontal dividing lines appearing in Fig. 7 are those printed on the inner face of the back section 12 and viewed through the light-transmitting sheet.

In the recording apparatus 20 disclosed in Figs. 1 to 6 inclusive, means are provided for receiving the record card 10 and for positioning the latter in printing position with the sections 11 and 12 thereof separated a predetermined relatively small amount. The card receiving and positioning means is so constructed that the record card can only be inserted in the recording apparatus when the two sections 11 and 12 thereof are separated.

The card receiving and positioning means comprises a molded card throat 21 (see Figs. 1 and 4) having an oblong opening 22 formed lengthwise through the bottom thereof. A vertical partition wall 23 extends lengthwise of the opening 22 and divides the latter into a first card receiving slot 24 and a second card receiving slot 25 which are adapted to receive, respectively, the front card section 11 and the rear card section 12. Each of the slots 24 and 25 is just long enough to slidably receive its respective card section without "binding." As shown in Fig. 4, the left-hand end of slot 25 is defined by an inwardly extending projection 26 of the throat, and the right-hand end of slot 24 is defined by a second inwardly extending projection 27. The slots 24 and 25 are formed in this manner so that only one of the card sections can be inserted in one of the slots, the length of the projection 26 corresponding to the amount of inward spacing of the lateral edge 12*a* of the section 12, and the projection 27 corresponding to the amount of

inward spacing of the edge 11*b* of the section 11. Thus, the record card can be inserted within the recorder only when the sections thereof are separated and when they are inserted within their respective slots. The vertical partition wall 23 and the slight inward bow of the front section 11, previously described, further facilitate the separation of the card sections and the proper positioning of the sections within their respective slots.

The record card receiving and positioning means also comprises a first pair of opposed vertical guide members 30 and 31 forming downward continuations, respectively, of the two end portions of the first slot 24, and a second pair of opposed vertical guide members 32 and 33 forming downward continuations, respectively, of the two end portions of the second slot 25 (see Figs. 1, 3, 5 and 6). The vertical partition wall 23 also extends below the throat 21 and between the two pairs of opposed guide members so as to assure the separation of the card sections and to keep them within their respective pairs of grooves as they are slid downwardly therein to printing position.

A flat strip 35 of material, bearing ink on both faces thereof, is interposed between the two pairs of guide members and in the vertical plane of the partition wall 23. If desired, the strip 35 may be in the form of a conventional typewriter ribbon. As shown in Figs. 1, 3 and 6, each of the pair of guide members 30 and 31 is interrupted intermediate its height to provide aligned slots 36 therein for receiving and guiding the strip or ribbon 35. The ribbon 35 is kept taut in its vertical plane and against the vertical faces of the slots 36 by two idler rollers 37 and 38 arranged, respectively, at opposite sides of the recorder (see Fig. 6) and over which the ribbon is fed by the conventional ribbon feeding and reversing mechanism indicated generally by the numeral 39.

In addition to the foregoing, the ribbon 35 is also guided and positioned in its vertical plane by the spaced parallel lower edge portions of a metal plate 40 forming a part of the partition wall 23. As shown in Figs. 1, 3 and 5, the partition wall 23 comprises a sheet metal plate 41 and the plate 40. The plate 41 is arranged between and secured at its ends to the two pairs of opposed guide members. The sheet metal plate 40 is formed of relatively thin stock and is folded along a transverse center line and over the plate 41 to provide spaced parallel depending plate portions 42, 42 which extend below the plate 41 and define therebetween at their lower edges a slot or groove 43 opening away from the card receiving ends of the guide members and slidably receiving the upper edge of the inked ribbon 35. In addition to guiding the ribbon 35, the plate portions 42, 42 prevent the lower edges of the card sections from accidentally engaging the ribbon 35 when such sections are inserted within their respective pairs of guide members.

As shown in Fig. 1, the ribbon 35 is arranged at the printing line and opposite a type-carrying wheel 45 and the latter is adapted to be rotated by the conventional time-responsive apparatus (not shown) of the recorder to position successively the type elements 46 at the printing line. A printing or recording operation is effected by the tripping or releasing of a platen element, here shown as being in the form of a printing hammer 48. When so released, the hammer 48 moves under the force of a spring 49 into engagement with the rear outer face of the rear card section

12 and so as to compress between the hammer and the type element at the printing line the portions of the card sections 11 and 12 at the printing line, and the inked ribbon 35 interposed between such sections.

The mechanisms for driving the type wheel or wheels 45, and for releasing and resetting the printing hammer 48, are the same as those fully disclosed in the Rast Patent No. 2,281,998, referred to herein at the outset, and are well known to those skilled in this art. Consequently, a detailed disclosure and description of such mechanism are not necessary herein, it being sufficient to state that as the record card is inserted within the card receiving and holding means, as previously described, the lower edges 11c and 12c of the card sections engage and actuate a trip lever 50 when the portion of the record fields of the card sections to be printed upon reach the printing line. The actuation of the trip lever 50 effects the closing of a pair of contacts 51 which energize a circuit including a trip solenoid 52 and the armature of the latter through an arm 53 rocks a shaft 54. A second arm 55 on the shaft 54 engages and moves with it a U-shaped arm 56 carrying a latch plate 57. Movement of the latter releases the hammer operating arm 58 and under the force of the strong spring 49 connected to the arm 58, the latter is rotated clockwise as viewed in Fig. 1 and carries with it the printing hammer 48 which effects printing engagement with the record card, as stated above.

In the manner disclosed fully in the Rast patent above identified, the card throat 21 and the pairs of opposed guide members may be connected together as a unit and may be spaced laterally a unit distance each day. Also, the trip lever 50 may be spaced vertically a unit distance for a predetermined number of times each day and such lateral and vertical spacing is effected under the control of a time-responsive programming mechanism (not shown). As is well known by those skilled in the recording art, the lateral spacing of the card throat and guides each day is effected so that the different vertical columns of the record fields on the card sections will be arranged in printing position upon inserting the card in the recorder during the different days of the week. The vertical spacing of the trip lever at regularly spaced intervals is for the purpose of sequentially positioning the different horizontal columns of the record fields in printing position at different times of the day.

The type elements 46 are formed in the conventional manner, i. e., each character type element when viewed from the front is laterally inverted with respect to the normal appearance of the character when printed. Consequently, when the type and platen elements are relatively moved into printing engagement with opposed outer faces of the card sections and when the portions of the record fields in printing position and the ribbon are compressed therebetween, the character corresponding to the type element at the printing line is printed in normal fashion on the record field of the rear card section 12 and in reverse on the inner face of the strip 15 of light-transmitting material providing the record field of the front section 11. By printing in "reverse" is meant that the printed character appears as laterally inverted from the normal position of the character. The normal printing of a character on the record field of the rear section is indicated at 60 in Fig. 9 and the reverse printing of such character on the inner surface

of the light-transmitting strip 15 of the front section is indicated at 61. The printing of the character in reverse on the inner surface of the light-transmitting strip 15 provides for the printed character appearing in its normal fashion when viewed through the strip and from the front of the front section (see Fig. 7). Thus, by using a strip of light-transmitting material for the record field of the front section and by interposing the inked ribbon between the two card sections, a duplicate record is provided simultaneously on both sections of a duplex card with the use of only one ribbon and with a minimum of alteration to the standard form of recording apparatus. At the end of the week, the sections of the record card may be separated along the scored line 13, and the employee may be given one of the sections as a duplicate record of his working time for the week.

It will be readily appreciated that while the improved method of preparing duplicate records of character data, comprising one aspect of the present invention, has been disclosed as being performed in part by recording apparatus of the type shown in the above identified Rast patent, such apparatus is not essential to the carrying out of the improved method, for various other forms of apparatus may be used equally as well in carrying out the method or the steps of the method may even be carried out by hand.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the invention disclosed may be made by those skilled in the art without departing from the spirit thereof. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. The combination with a duplex record comprising first and second sections joined together along a margin and arranged in face-to-face relation, said sections being of substantially the same width, one section being offset a relatively slight distance with respect to the other section whereby the right and left margins of the sections are slightly out of alignment said first section having a record field provided on the inner face thereof and said second section comprising a sheet of light-transmitting material and having a record field provided thereon and disposed in superposed relation with respect to the record field of said first section, of means for receiving and holding said record in printing position comprising means defining a first slot and a second slot arranged in closely spaced parallel relation and receiving, respectively, said first and second sections, said slots being offset with respect to each other a distance commensurate with the discrepancy in alignment between said first and second sections of the duplex record and guide means coacting with each of said slots for holding the inserted sections in approximately parallel closely spaced relation; an inked strip of material interposed between the slightly separated sections and opposite the portions thereof providing the record fields; and printing means comprising a character type element disposed at one side of said record, a platen element disposed on the opposite side of said record, and means providing relative printing movement of said elements toward one another and into printing engagement with opposite

outer faces of said first and second sections and so as to compress therebetween said sections and said inked strip whereby the character is printed simultaneously on the record field of said first section and on the inner surface of said light-transmitting material, and the printing element being so formed that the character is printed in normal fashion on the first section and in reverse on the inner side of said second section so that it appears in normal fashion from the outer side of said second section.

2. An apparatus for performing multiple printing upon a duplex record comprised of a front sheet formed of light-transmitting material and a back sheet formed of opaque material, said sheets being joined together along a common line extending along their upper edges, said sheets also being arranged in overlapping relationship with the front sheet offset slightly from the rear sheet, means for receiving and holding said duplex record in printing position comprising two pairs of opposed guideways defining respective sheet-receiving slots arranged in closely spaced parallel relationship, said pairs of guideways being offset from each other transversely a distance commensurate with the offsetting of said front and rear sheets whereby said front sheet is receivable in one of said slots and the rear sheet receivable in the other of said slots each to the exclusion of the other when the duplex record is in printing position, a printing media interposed between the slightly separated sheets and capable of performing printing operations in reverse on one sheet and directly on the other sheet, a character type element disposed on one side of said duplex record, a platen element disposed on the opposite side of said record, and means providing relative movement between said elements one toward the other and into printing engagement with opposite outer faces of the duplex record sheet so as to compress therebetween said sheets and said printing material.

ROBERT L. HOUSTON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 8,199	Waring	Apr. 23, 1878
463,701	Leonard	Nov. 24, 1891
680,350	Parmalee	Aug. 13, 1901
809,378	Kay	Jan. 9, 1906
911,406	Hoen	Feb. 2, 1909
1,024,157	Steele	Apr. 23, 1912
1,194,742	Johnson	Aug. 15, 1916
1,592,470	Smith	July 13, 1926
1,881,090	Moulton	Oct. 4, 1932
1,889,657	Henry	Nov. 29, 1932
2,039,600	Locke	May 5, 1936
2,045,996	Rast	June 30, 1936
2,163,958	Neidich	June 27, 1939
2,165,301	Petz	July 11, 1939
2,281,260	Bjorksten	Apr. 28, 1942
2,331,331	Lambert	Oct. 12, 1943
2,363,989	Pittman	Nov. 28, 1944
2,386,872	Lewis	Oct. 16, 1945