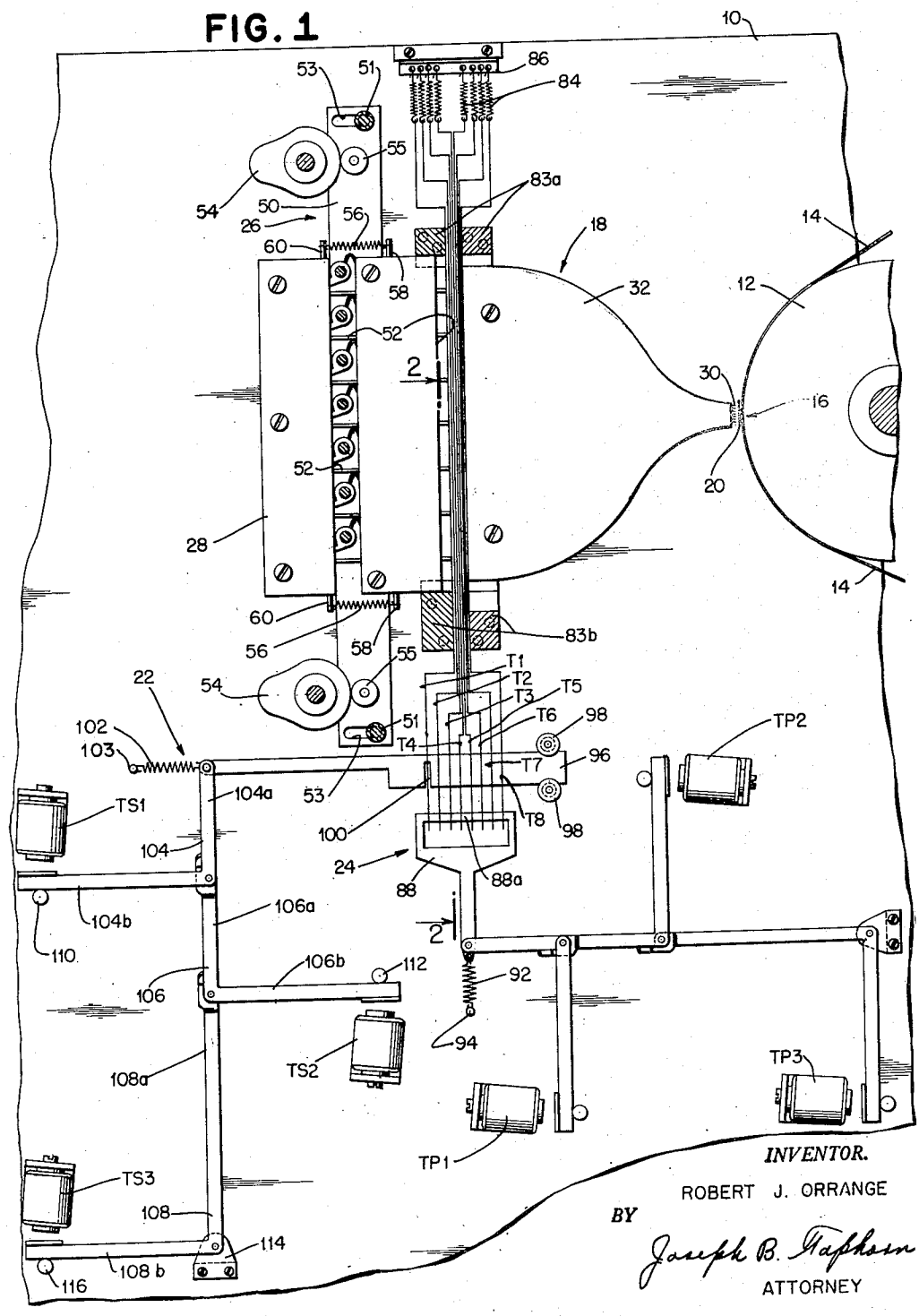
Jan. 7, 1958 R. J. ORRANGE 2,818,800

WIRE PRINTER

Filed Dec. 23, 1953 3 Sheets-Sheet 1

FIG. 1



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BY

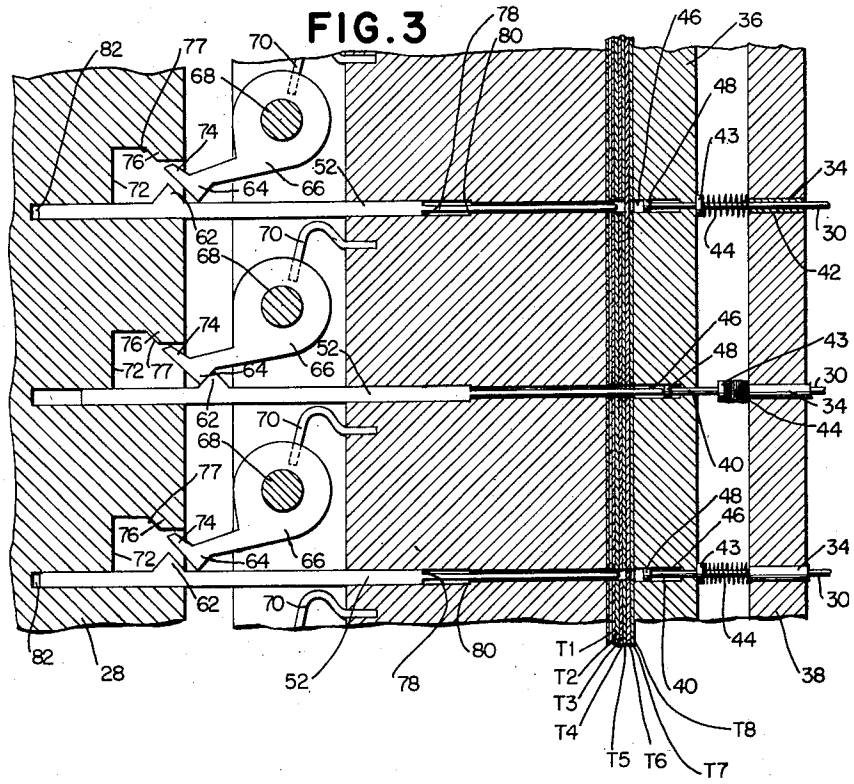
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WIRE PRINTER

Filed Dec. 23, 1953 3 Sheets-Sheet 2

FIG. 3



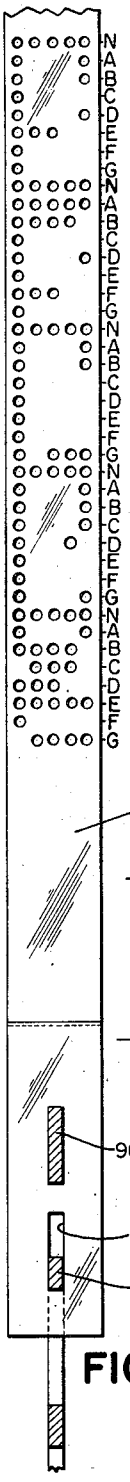


FIG. 2

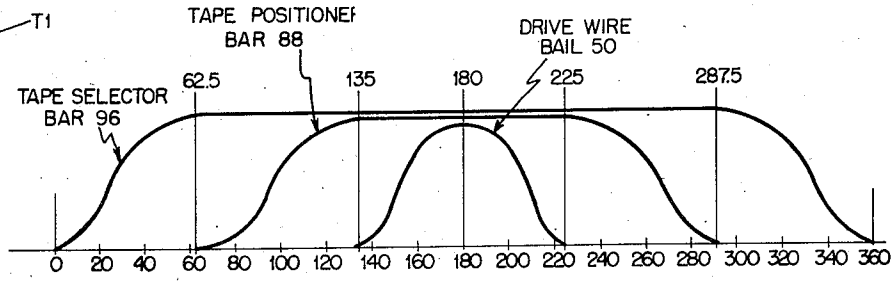


FIG. 7

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Jan. 7, 1958 R. J. ORRANGE 2,818,800

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Filed Dec. 23, 1953 3 Sheets-Sheet 3

FIG.4

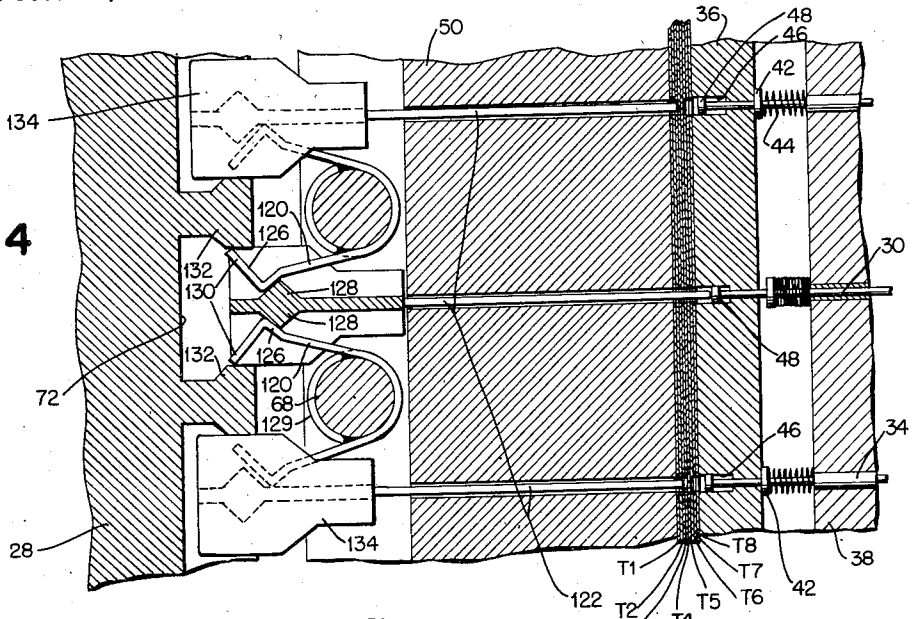
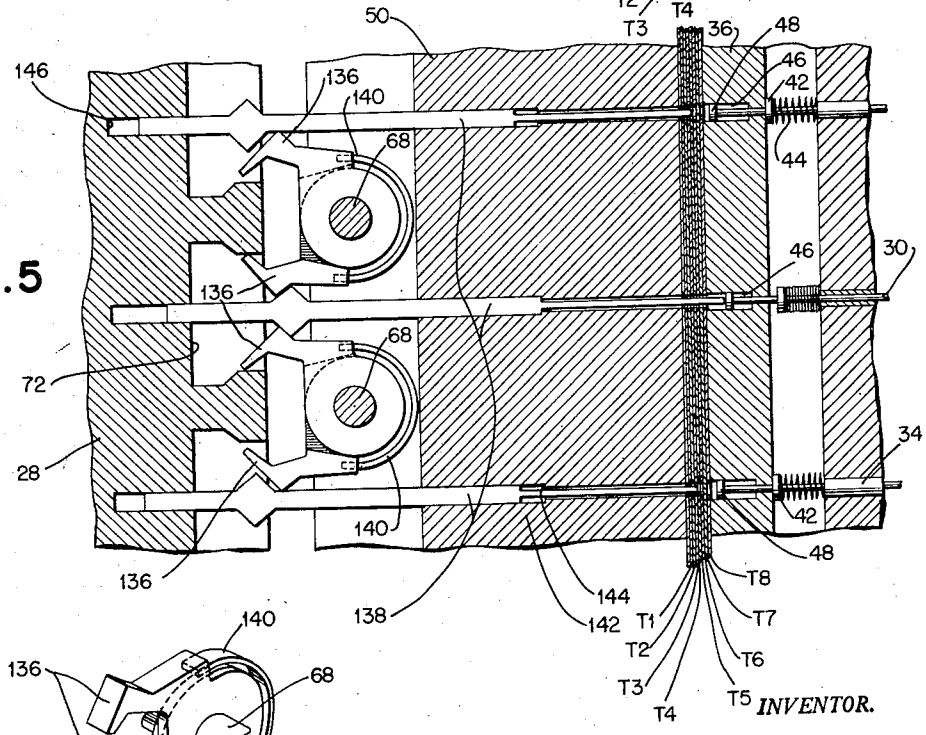


FIG.5



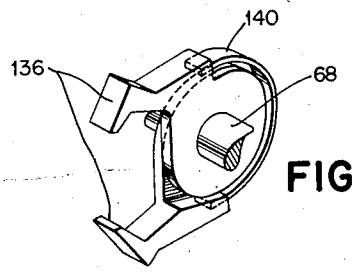


FIG.6

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United States Patent Office

2,818,800

Patented Jan. 7, 1958

2,818,800

WIRE PRINTER

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Application December 23, 1953, Serial No. 400,009

12 Claims. (Cl. 101—93)

This invention relates to wire printers and more particularly to wire printers wherein selected ones of a plurality of print wires are displaced axially to undergo impact with recording material backed up by a platen.

Selective displacement of character forming wires has heretofore been accomplished with mechanisms such as that disclosed in U. S. Patent No. 2,524,127, issued to R. B. Johnson on October 3, 1950. In such a mechanism a code plate mounted opposite the control ends of the print wires is first positioned in each of two dimensions to dispose a pattern of projections opposite the control ends of those wires whose print ends will form the component dots of a particular character. Thereafter the code plate is moved so that the projections strike the control end of the selected print wires to axially displace them against their bias to where the print ends of the wires undergo impact.

Such a plate must be formed of tough materials and, in addition, must be accurately fashioned. Obviously the construction of such plates is a relatively costly process.

Accordingly, it is an object of this invention to provide an inexpensive print wire selecting and operating mechanism. A more specific object is to provide a print wire selecting and operating mechanism which can be easily manufactured.

A further object of this invention is to provide such a print wire selecting and operating mechanism that is also accurate and reliable in operation.

Yet another object of the invention is to provide a print wire selecting and operating mechanism which can be run at high speeds.

According to the invention, selected print wires are axially displaced to effect a printing by corresponding drive wires whose axial movement is controlled by perforated tapes located in the zone between the adjacent ends of the print and drive wires. The tapes, which are easy and inexpensive of construction and of comparatively light mass (now inertia), are so perforated that in their normal or home positions all of the drive wires may pass therethrough to engage the respective print wires. However, the tapes may be individually adjusted to other positions in which perforations are provided only for those drive wires whose corresponding print wires will effect a character pattern particular to the tape and its adjusted position. The drive wires are yieldably moved while piercing the zone occupied by the tapes so that those drive wires for which no perforations exist in the adjusted tape may be readily stopped. It can be seen that the number of different characters that may be printed, within the limits of the number of print wires employed, is determined by the product of the number of tapes and the positions to which each tape may be adjusted from its home position.

A feature of this invention is that the drive wires are yieldably moved only while they are piercing the tape zone and that thereafter only those that completely pierce the tape zone are positively driven to insure that the selected print wires undergo impact. The driving element or bail, which is reciprocable through a fixed range, carries with it yieldable means which drivingly connect it with the respective drive wires, and other means are provided which cooperate with the yieldable means to hold them against yielding in a portion of the range of the driving element which corresponds with the movement of the selected print wires. In one embodiment the driving element carries with it pivotally mounted pawls biased into sliding engagement with the respective drive wires which carry lugs disposed in the pawl paths. The bias of these pawls is such that the teeth thereon will not slide over the lugs while the respective drive wires are piercing the tape zone unless they strike a non-perforated portion of an adjusted tape; hence, the wires are yieldably driven while moving through the tape zone. After the end of a drive wire passes through the tape zone, an extension on the corresponding pawl will be confined by an associated protuberance on a lock bar, and the pawl will be held in positive driving engagement with the lug and thus with the drive wires.

The lock bar serves an additional function—namely, that of providing a reset stop for those drive wires which had been disengaged from the bail, that is, stopped by the non-perforated portion of a tape. The tooth of a pawl when the drive wire is piercing the tape zone is located behind the lug thereon. If the drive wire is stopped by a tape, the tooth passes over the lug and hence is on the other side of the lug when the driving element restores. Under such a condition the pawl, through its driving engagement with lug on the wire, is effective to move the drive wire back. The pawl tooth gets behind the lug again through the action of the reset and lock bar which stops the drive wire in its normal position and forces the pawl tooth to move over the lug because of the continued movement of the driving element toward its normal position. The drive wires are slidably mounted at their rear ends on the bars to prevent lateral reflection thereof due to the unbalanced forces thereon arising from the use of only one pawl per drive wire.

The drive wires which are not stopped by a tape are restored with the bail and simultaneously therewith reach their home positions. Cooperating shoulders on drive wires and in the bail effect this restoration.

In a modification, two biased pawls are provided for each drive wire. Conveniently, these pawls consist of loop springs, the free ends of each being shaped so as to form teeth which are biased against the opposing surfaces of adjacent drive wires from intermediate points. Each drive wire is provided with two oppositely disposed lugs, and the flexible pawls are held in place by side plates fixed to the drive wires. Through the plates the pawls also act to hold the respective drive wires in place.

In a second modification, the two pawls per drive wire idea of the first modification is adapted to structures peculiar to the first discussed embodiment. The pawls for the opposing surfaces of the adjacent drive wires are juxtaposed on a shaft and are biased apart by an interconnecting spring. Of course, the lock bar is modified to admit the second pawl for each drive wire.

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 examples, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is an illustration of an apparatus embodying the invention.

Fig. 2 is a view taken along the section line **2—2** of Fig. 1.

Fig. 3 is an enlarged detailed view, partly in section, of a portion of the apparatus shown in Fig. 1.

Fig. 4 is a view showing a modified form of construction which may be employed in place of the mechanism shown in Fig. 3.

Fig. 5 is a view of a second modification which may be employed in place of the mechanism shown in Fig. 3.

Fig. 6 is a view in perspective of a portion of the mechanism shown in Fig. 5.

Fig. 7 is a timing chart for the invention.

Referring more particularly to the drawings, there is disclosed in Fig. 1 a base **10** rotatably supporting a platen **12** upon which a record sheet **14** may be suitably mounted and advanced past a printing point generally indicated by the numeral **16**. A print wire assembly, generally indicated by the numeral **18**, is mounted opposite the platen, and a ribbon bearing transfer medium **20** is located between such assembly and the printing point on the record sheet. In the zone immediately behind the print wire assembly there are juxtaposed eight perforated tapes T1 through T8, each of which is individually adjustable. A tape selector mechanism, generally indicated by the numeral **22**, is effective to select the particular tape, and a tape positioning mechanism, generally indicated by the numeral **24**, is actuated to adjust the selected tape to a desired position. Behind the tape zone is a reciprocable drive-wire assembly, generally indicated by the numeral **26**, and behind that is a cooperating reset and lock bar **28**.

In the print wire assembly **18**, a plurality of print wires **30** are mounted in front of the ribbon **20** and the platen **12** in a tapered housing **32** generally rectangular in cross-section. The housing provides individual tubes or channels **34** (Fig. 3) for the respective wires to prevent lateral deflection thereof under the influence of endwise forces, and the ends of these channels or tubes are arranged in corresponding rectangular patterns on both ends of the tapered housing. At the small end of the housing, the print wires are converged so that the print ends are collected in a group of seven rows and five columns to print characters whose component dots are as shown in Fig. 8 of the above identified patent. At the enlarged end of the housing, the other or control ends of the wires are suitably spread apart to facilitate the operation thereof.

The print wires are respectively biased to normal positions in which the print ends are out of control with the ribbon and the record sheet and do not interfere with the shifting thereof. In order to bias the wires, the housing is formed with two spaced plates **36** and **38** (Fig. 3) at its larger end. Aligned apertures **40** and **42** are formed in these plates for the respective wires, and the wires project through the inner plate **38** and terminate in the outer plate **36**. The tubes **34** terminate in the apertures **42** and are anchored to the inner plate **38**. Between the two plates each wire is formed with a collar **43**, and a compression spring **44** encompassing each wire reacts between such collar and the inner plate **38** to urge the print wires to their normal positions which are determined by the engagement of the collars **43** with the outer or rearward plate **36**.

Each aperture **40** in the outer plate **36** is so formed on the side adjacent the inner plate as to snugly yet slidably receive the control end of the respective print wire. However, on their outer or rearward side the apertures are enlarged, as at **46**, so as to accommodate slidably heads **48** formed on the ends of the respective

print wires. Along the outer surface of the plate **36** the enlarged openings are flared so as to guide respective drive wires, after they pierce the tape zone, into engagement with the heads **48** of the corresponding print wires. It should be observed that the normal positions of heads **48** formed on the rear ends of the print wires are located a small distance forward of the outer surface of the plate **36** and hence also of the tape zone.

The drive-wire assembly **26** includes a reciprocable bail **50** in which drive wires **52** are mounted in aligned relationship with the control ends of the respective print wires. The bail is supported upon the base **10** by studs **51** extending through slots **53** formed in its opposite ends. Its normal position is such that the drive wires which project therefrom terminate just short of the tape zone. The bail is reciprocable from the normal position toward and away from the wire guide housing **18** and releasably moves the drive wires while they are piercing the tape zone; thereafter it positively moves those which pass therethrough so as to impress a firm printing stroke upon the selected print wires.

Movement of the bail is effected by a pair of single lobed cams **54** operating against rollers **55** carried by the bail. The bail is caused to follow the contours of the cams by tension springs **56** anchored at their forward ends to studs **58** fixed to the bail **50** and at their rearward ends to studs **60** fixed to the lock bar **28**. The cams rotate together and so that the high points thereof engage the bail rollers at the same time to move the bail toward the print wire guide housing **18**. When the cam high points recede, the bail is restored to its normal position under the action of the springs.

The drive wires **52** are slidably carried by the bail **50**. They are caused to move with the bail toward the print wires through cooperating lug and pawl arrangements. A generally triangular shaped lug **62** is formed on a rearwardly projecting portion of each drive wire and is adapted to be engaged by the complementarily shaped tooth **64** formed on a corresponding pawl **66** (see Fig. 3).

The pawls **66** are pivotally mounted on rods **68** carried by the bail between the different rows of drive wires. Springs **70** coacting between the respective pawls and the bail bias the pawls into engagement with the respective drive wires. The normal position of the bail is such that the pawl teeth engage the respective drive wires between the lugs **62** formed thereon and the rear ends thereof. It can be seen that, with sufficient bias and the appropriate design of the complementary surfaces on the lugs and pawl teeth, the drive wires may be made to move with the bail toward the print wire assembly **18**. By the same token it may also be observed that, should any of the drive wires be stopped as by engagement with an unperforated portion of a tape, the associated pawls would pivot so that the teeth slide over the lugs on the corresponding drive wires, thus permitting the pawls to continue movement with the bail without thereafter exerting any significant driving force upon the drive wires.

As pointed out earlier, the drive wires are yieldably moved while piercing the tape zone, and that thereafter they are positively moved to insure displacement of the selected print wires **30**. The positive moving of the drive wires which pierce the tape zone is effected through the reset and lock bar **28**. This bar, which is suitably fixed to the base **10**, is formed with a hole **72** at the rear end of each drive wire so as to receive both the drive wire and the tooth portion of the associated pawl. The bar **28** is so located and the hole is of such depth that reciprocation of the pawls due to reciprocation of the bail takes place in these holes. The interior ends of the holes are of such size so as to permit the pawls to pivot and ride over the lugs on the associated drive wires. This permits yieldable moving of the drive wires while the same are piercing the tape zone. Hence, if a drive wire is stopped by

the non-perforated portion of a tape, its drive will be discontinued. The drive wire may not remain in the position in which it is stopped by the adjusted tape, however, for in moving over the lug, the pawl tooth may exert sufficient pressure on the forward slope of the lug to cause the corresponding drive wire to be moved rearwardly a slight distance.

Shortly after the drive wires for the selected print wires have pierced the tape zone, the pawls are restrained against pivoting, and thus a positive driving relationship is maintained between the bail and the selected drive wires. This is accomplished through an inclined extension **74** on each pawl which engages a protuberance **76** formed by the reduced size of each hole entrance to prevent the tooth from riding over the associated lug. The extension **74** and the protuberance **76** are so formed and located that the pawl **66** is held against pivotal movement while the drive wires are displacing the print wires.

On the other hand, the extensions **74** and the protuberances **76** are also so formed and located as to admit of some bail movement between the point where the drive wires completely pierce the tape zone and the point where the pawls become held against pivotal movement. This is necessary to permit the pawls to ride over the lugs in those cases where the drive wires are stopped by the last tapes, such as T7 and T8. It should be observed that when a drive wire is stopped, for example by tape T8, it is still necessary that the pawl be able to ride over the lug before the forward drive relationship therebetween is discontinued. Thus, there must be sufficient clearance in the corresponding hole **72** to permit this pivotal movement of the pawl to take place. The extra distance that is needed is only that which permits the pawl tooth to ride over the crest of the lug. For thereafter the pawl tooth may act on the forward inclined slope of the lug to force the drive wire backward to where the lug is no longer beneath the pawl tooth. This action is made positive by the engagement of the inclined extension with the cam surface **77** on the protuberance **76**, which engagement forces the pawl downward as the bail movement continues. The point of bail movement is so reached where extensions for all of the pawls are beneath the protuberances **76**, and positive driving of all of the selected drive wires will be effected. The distance that the bail moves after the drive wires pierce the tape zone and before the pawls are locked against pivotal movement is less than that between the last tape and the heads **48** formed on the rearward ends of the print wires **30**, so that when the drive wires engage the print wires, they are being positively driven and cannot be stopped by the added load of the print wires.

The drive wires are restored with the restoration of the bail to its normal position. In the case of those drive wires which were moved all the way by the bail, it can be seen that the pawl tooth **64** remains behind the lug and, thus, is of no avail so far as restoration of the respective drive wire is concerned. The restoration of such drive wires is accomplished by providing cooperating shoulders on the drive wires and the bail. As shown in Fig. 3, the drive wires are formed of two distinct portions—a front portion that is circular in cross-section and a rear portion that is rectangular in cross-section. The rear portion is rectangular to keep the wires from rotating and thus insures that the lugs **62** will remain aligned with the respective pawls **66**. A shoulder **78** exists on each wire at the junction of the front portion with the rear portion. The bail holes are formed of complementary shapes and have shoulders **80** formed at the junctions of the differently shaped portions. When the bail recedes, the shoulders **80** of the bail holes engage the shoulders **78** of the selected drive wires to restore them with the bail to their normal positions.

The drive wires which were stopped by a non-perforated portion of a selected tape have their lugs **62** disposed behind the teeth **64** of the associated pawls when the bail begins to restore. Thus, these drive wires are restored by the action of the pawls instead of by the cooperating shoulders **78** and **80** which are separated at this time. Their rearward movement is terminated when they have arrived in their home positions by the engagement of their rear ends with the rear end of reset bar openings **82** in which they are slidably disposed. After the drive wires arrive in their home positions, the respective pawl teeth ride over the lugs thereon. When the bail comes to rest in its normal position, the pawls will have been reset in proper driving relationship to the drive wires.

It may be observed that the side of the drive wires opposite that on which the lugs are formed rest upon the reset bar material surrounding the holes **72**. This is to minimize the deflection of the drive wire by the biased pawls.

Returning to the tapes T1 through T8, each is formed as a thin steel band of some width and considerable length (Figs. 1 and 2). The intermediate portions of the tapes are juxtaposed frontwise to form a tape zone, and they are held against the backside of the rear plate **36** of the print wire guide housing **32** by upper and lower sets of guides **83***a* and **83***b*, respectively, which also slidably receive the forward end of the bail **50**. The intermediate portions are perforated in a nondescript pattern because all of the perforations for one print wire appear in a column before those for the next and because the positions to which tapes are adjusted are those which present successive rows of perforations to the rows of print wires.

The tapes are supported at their upper ends by individual tension springs **84** anchored at their upper ends to a member **86** fixed to the base **10**. To facilitate the attachment of the tension springs to the respective tapes, the upper ends of the tapes are offset from their intermediate portions as may be best seen in Fig. 1. It may be noted that the springs bias each of the tapes upwardly from their normal or home positions.

The tapes are usually held in their normal positions by a bar **88** of the tape positioning mechanism **24**. The lower end of each tape is formed with an elongated opening **90** (Fig. 2), and a transverse portion **88***a* of a loop formed on the upper end of the bar is seated in these openings. A tension spring **92**, heavy enough to overcome the combined bias of the tension springs **84** at the upper end of the tapes, is connected between the lower end of the tape positioner bar **88** and a fixed stud **94** fixed to the base **10**. Spring **92** acts to urge the tape positioner bar together with the tapes to their normal positions.

These normal positions of the tape are determined by a bar **96** of the tape selector mechanism **22**. The bar is slidably supported at its right hand end (Fig. 1) by a set of vertically spaced guides **98**, and at its left hand end it is held against vertical displacement by the rest of the selector mechanism **22**. It extends through a second set of openings **98** formed in the respective tapes above the openings **90**. The openings are of such size that the bar is snugly yet slidably received therein. Thus, the tape selector bar will hold the tapes in their normal position even when the tape positioner bar is moved upward by the tape positioner mechanism. This is true for all except the tape disposed in line with a slot **100** formed in the bottom side of the tape selector bar. The selected or aligned tape moves upwardly in the slot to a position which is determined by how far the tape positioner bar **88** is moved upwardly against the bias of the heavy spring **92**. Thus it can be seen that, by suitable control of the tape selector bar **96** and of the tape positioner bar **88**, any one of the tapes may be moved to any of a number of different positions. Magnet actuated adding linkages in the tape selector mechanism **22** and in the tape positioner mechanism **24** provide this control.

The adding linkage for the tape selector mechanism fixes the home position to which the tape selector bar **96**

is biased by a tension spring **102** anchored at one end to a stud **103** fixed to the base **10** and at its other end to the left hand end of bar. In this home position the slot **100** is aligned with the first or left hand tape T1 (Fig. 1). The adding linkage consists of three bell cranks **104**, **106**, and **108** which are respectively controlled by tape selector magnets TS1, TS2, and TS3. Bell crank **104** is pivoted upon the upper end of the upstanding arm **106***a* of bell crank **106**. The energization of magnet TS1 attracts the horizontal arm **104***b* from its stop **110** to swing it clockwise an amount which will move the tape selector bar the width of one tape to the right. Thus, if magnet TS1 is the only tape selector magnet energized, the slot **100** will be in line with the second tape T2. It may be observed that stop **110** determines the position to which the bell crank **104** may be rotated upon the bell crank **106** by the spring **102** and, thus, partially determines the home position to the tape selector bar.

Bell crank **106** is pivotally mounted on the free end of the upstanding arm **108***a* of bell crank **108**. Energization of magnet TS2 attracts the horizontally extending arm **106***b* of bell crank **106** from its stop **112** to swing the bell crank clockwise. The upstanding arm **106***a* of bell crank **106** is of substantially the same length as the upstanding arm **104***a* of bell crank **104**, and it may be observed that since the former carries the latter with it, its effective moment arm is twice that of bell crank **104**. Thus, energization of magnet TS2 will effect a movement of the tape selective bar which is equal to the thicknesses of two tapes. When energized by itself, slot **100** will be aligned with tape T3.

Bell crank **108** is pivotally mounted at its bend at a fixed support bracket **114**. Its upstanding arm **108***a* is equal in length to the combined lengths of the upstanding arms **104***a* and **106***a* of bell cranks **104** and **106** and carries with it these bell cranks. Hence, its effective moment arm is four times that of bell crank **104** and twice that of bell crank **106**. When magnet TS3 is energized, the horizontal arm **108***b* of bell crank **108** is swung from its stop **116**, and the tape selector bar is moved to the right the thickness of four tapes. Thus, if magnet TS3 alone is energized, the slot will be disposed in alignment with tape T5.

It will be appreciated that the tape selector magnets TS1, TS2, and TS3 may be energized singly or in combination to shift the bar **96** against the action of spring **106** the thickness of from one to seven tapes. A shift equal to three thicknesses will be accomplished by an energization of magnets TS1 and TS2, one equal to five thicknesses by an energization of magnets TS1 and TS3, and one equal to six or seven thicknesses by an energization of magnets TS2 and TS3 or all of them.

The tape positioner mechanism adding linkage is like that for the tape selector mechanism save that it is disposed horizontally because the tape positioner bar **88** is displaced vertically. The tape positioner bar magnets TP1, TP2, and TP3, when energized, respectively shift the bar **88** upward against the bias of the spring **92** to where the tape aligned with the slot **100** in the selector bar **96** and caused to follow the bar **88** by its spring **84** is disposed in the first, second, or fourth remote from home positions. The third, fifth, sixth, and seventh positions of a tape are respectively obtained by a combinational energization of the magnets TP1 and TP2, TP1 and TP3, TP2 and TP3, and all of them.

From the foregoing it will be evident that, by a suitable energization of the tape selector and the tape positioner magnets, any one of eight tapes may be selected and moved from its home position to any of seven other positions. Thus, any one of fifty-six characters may readily be selected for printing. In the following table are listed separately, for each character that may be printed, the tape and the combination of tape selector magnets energized, together with the position to which the selected tape is moved and the combination of tape position magnets energized.

	Tape	T. S. Magnet	Selected Tape's Position	T. P. Magnet
Character:				
A	1		1	1
B	1		2	2
C	1		3	1, 2
D	1		4	3
E	1		5	1, 3
F	1		6	2, 3
G	1		7	1, 2, 3
H	2	1	1	1
I	2	1	2	2
J	2	1	3	1, 2
K	2	1	4	3
L	2	1	5	1, 3
M	2	1	6	2, 3
N	2	1	7	1, 2, 3
O	3	2	1	1
P	3	2	2	2
Q	3	2	3	1, 2
R	3	2	4	3
S	3	2	5	1, 3
T	3	2	6	2, 3
U	3	2	7	1, 2, 3
V	4	1, 2	1	1
W	4	1, 2	2	2
X	4	1, 2	3	1, 2
Y	4	1, 2	4	3
Z	4	1, 2	5	1, 3
1	4	1, 2	6	2, 3
2	4	1, 2	7	1, 2, 3
3	5	3	1	1
4	5	3	2	2
5	5	3	3	1, 2
6	5	3	4	3
7	5	3	5	1, 3
8	5	3	6	2, 3
9	5	3	7	1, 2, 3
0	6	1, 3	1	1
20 Special Characters:				
( )	6	1, 3	2	2
( )	6	1, 3	3	1, 2
( )	6	1, 3	4	3
( )	6	1, 3	5	1, 3
( )	6	1, 3	6	2, 3
( )	6	1, 3	7	1, 2, 3
( )	7	2, 3	1	1
( )	7	2, 3	2	2
( )	7	2, 3	3	1, 2
( )	7	2, 3	4	3
( )	7	2, 3	5	1, 3
( )	7	2, 3	6	2, 3
( )	7	2, 3	7	1, 2, 3
( )	8	1, 2, 3	1	1
( )	8	1, 2, 3	2	2
( )	8	1, 2, 3	3	1, 2
( )	8	1, 2, 3	4	3
( )	8	1, 2, 3	5	1, 3
( )	8	1, 2, 3	6	2, 3
( )	8	1, 2, 3	7	1, 2, 3

A wire printer of the type described is adapted to be employed in an accounting machine or the like wherein data is periodically made available. Such machines are cyclically operated, and the wire printer is operated in step therewith. The components of the printer are operated at fixed times in each cycle, and the operation of the printer may be best understood with reference to an illustrative timing chart such as is disclosed in Fig. 7.

The beginning of a cycle in the chart disclosed has been arbitrarily chosen in the absence of embodiment in a specific machine as the time at which one or more of the tape selector magnets TS1, TS2, and TS3 are pulsed if the character to be printed is on a tape other than the first tape T1. Their energization results in a shift of the tape selector bar **96** which may be completed by 62.5 degrees of cycle time. With the slot **100** aligned with the tape bearing the desired character, the tape positioner bar may be positioned. Thus, one or more of the tape positioner magnets TP1, TP2, and TP3 are energized at 62.5 degrees of cycle time, and the selected tape will be adjusted to the character determining position under the influence of its spring **84** by 135 degrees of cycle time. At this point the lobes of the cams **54** advance upon the bail **50** and move it so that the drive wires **52** attempt to pierce the tape zone and strike the respective print wires **30**. Certain of the drive wires will be stopped by unperforated portions in the displaced tape and will remain in these stopped positions as the

bail restores. At 180° of cycle time the selected print wires will have been displaced to where impact occurred with the recording material backed up by the platen **12**, and the bail will begin a restoration under the influence of springs **56** as the lobes of the cams **54** recede. This restoration is completed at 225° of cycle time. Thereafter the tape positioner magnets are deenergized, and the spring **92** lowers the tape positioner bar **88** to withdraw the adjusted tape from the slot **100** in the tape selector bar **96**. When the selected tape has been fully restored to its normal position, for example, at 287.5° of cycle time, those tape selector magnets which were energized, if any, are dropped. Thus the tape selector bar may be fully restored to its normal position by the end of the cycle, and the above described cycle of operation may be repeated in the next cycle.

In Fig. 4 there is shown a modification of the drive wire bail assembly **26** and reset and lock bar **28** shown in Fig. 3. In this modification two pawls **120** are provided for each drive wire **122**. Conveniently, the pawls are formed of loop spring material in which the loop **129** is mounted on the rods **68** between adjacent rows of drive wires, and the free ends of the springs are angularly shaped to form teeth **126** which bear against lugs **128** formed at opposite sides of the drive wires. Integral extensions **130** formed on the pawls **120** engage projections **132** formed on the reset and lock bar at the entrance to the holes **72** which have been enlarged to accommodate the two pawls for the respective drive wires. Plates **134** are affixed to opposite sides of the drive wires to hold the flexible spring pawls **120** in engagement with the drive wires. It may be observed that the plates slidably abut the projections **132** of the reset bar to guide the rear ends of the drive wires. The operation of the drive wires by bail **50** and the reset bar **28** is the same as in the earlier modification save that those drive wires which were stopped by a tape are restored by the engagement of the bail **50** with the plates **134** rather than by cooperating shoulders on the wires and in the bail holes.

Still another modification of the drive wire bail assembly **26** and the reset and lock bar **28** is shown in Figs. 5 and 6. Therein two pawls **136** for each spring, instead of being formed of flexible spring material as shown in Fig. 4, are formed of rigid material as were the pawls of Fig. 3. The vertically aligned pawls for opposing sides of adjacent drive wires **138** are juxtaposed on the rods **68** between the rows of drive wires and biased apart by a piece of spring material **140**. Thus, no side plates are required in this modification, and, therefore, the unset drive wires are again restored through cooperating shoulders **142** and **144** formed on the drive wires and the bail. At their rear ends the drive wires are guided in reduced openings **146** in the holes **72** of the reset and lock bar **28**.

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 device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of axially movable drive wires respectively aligned with said print wires, a number of perforated elements each having a normal position in which perforations are aligned with all of the drive wires and adjustable to positions in which perforations are only aligned with different ones of said drive wires, and means for moving each of the perforated elements to its different positions for individual character selection.

2. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of axially and yieldably movable drive wires respectively aligned with said print wires, a plurality of perforated tapes disposed between the adjacent ends of the drive wires and the print wires and each having a normal position in which perforations are aligned with all of the drive wires and other positions in which perforations are only aligned with different ones of said drive wires and the movements of other of said wires will be arrested by the non-perforated positions thereof, and means for moving any of said tapes to any of its other positions for individual character selection.

3. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of axially movable drive wires respectively aligned with said print wires, a plurality of perforated tapes disposed between the opposing ends of the drive wires and the print wires and having normal positions in which perforations are aligned with all drive wires and other positions corresponding to different characters and in which perforations are only aligned with those drive wires which move print wires forming component dots of the character pattern, means for selecting the tape bearing the perforations of the desired character, and means for moving the selected tape to character determining position.

4. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of axially movable drive wires respectively aligned with the said print wires, a plurality of perforated and upwardly biased tapes disposed between the opposing ends of the drive wires and the print wires, said tapes each having in one position perforations aligned with each of said drive wires and in other positions perforations aligned only with different ones of said drive wires, a selector bar lying in the path of said tapes and movable so as to dispose a notch in alignment with the different ones of said tapes, said notch permitting upward movement of the aligned tape, a solenoid controlled linkage for moving the selector bar, a positioner bar biased to hold the tapes in their one positions and movable so as to permit the aligned tape to move upwardly in the notch, and a solenoid controlled linkage for moving the positioner bar upwardly.

5. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of axially movable drive wires aligned with said print wires, perforated means disposed in the zone between the drive wires and the print wires and adjustable to various positions in which perforations are aligned with different ones of said drive wires, means for yieldably moving said drive wires while piercing the perforated means zone, and means for thereafter positively moving those drive wires which pierced the perforated means zone until the respective print wires undergo printing impact.

6. In a wire printer, a plurality of print wires movable axially to undergo printing impact, an element movable towards and away from said print wires in the axial direction thereof, drive wires slidably carried by the movable element and aligned with respective ones of said print wires, perforated means disposed in a zone between the print wires and the drive wires and adjustable to various positions in which perforations are aligned with different ones of said drive wires to permit their engagement with aligned print wires, cooperating means on said drive wires and the movable element for yieldably connecting said drive wires with said movable element, and means for preventing yielding of the connections between said drive wires and said movable element after the movable element has carried those drive wires aligned with perforations through the perforations.

7. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding num-

ber of drive wires aligned with said print wires, perforated means disposed in a zone between the print wires and the drive wires and adjustable to various positions in which perforations are aligned with different ones of said drive wires to permit their engagement with respective ones of said print wires, a receiprocable member in which the drive wires are slidably mounted, lugs formed on the respective drive wires, pawls carried by the reciprocable member and biased into engagement with the respective drive wires, said pawls each having a tooth adapted to engage the lug on the corresponding drive wire, an extension formed on each pawl, and a fixed part overlying a part of the path of each pawl extension so as to prevent movement of the associated pawl tooth over the lug on the corresponding wire after the drive wire has passed through an aligned perforation.

8. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of drive wires aligned with said print wires, perforated means disposed in a zone between the drive wires and the print wires and adjustable to various positions in which perforations are aligned with different ones of said drive wires to permit their engagement with respective ones of said print wires, a reciprocable member in which the drive wires are slidably carried, lugs formed on opposite sides of each drive wire, springs formed with tooth shaped angular portions carried by said reciprocable member and biased so as to engage respectively opposite sides of the different drive wires, plates mounted on opposite sides of each drive wire to hold the springs onto the drive wire, extensions formed on the toothed portions of said springs, and parts overlying the paths of the spring extensions so as to prevent movement of the associated teeth over the lugs on the respective drive wires after the drive wires have passed through aligned perforations.

9. In a wire printer, a plurality of print wires movable axially to undergo printing impact, a corresponding number of drive wires aligned with said print wires, perforated means disposed in a zone between the drive wires and the print wires and adjustable to various positions in which perforations are aligned with different ones of said drive wires to permit their engagement with respective ones of said print wires, a reciprocable member in which the drive wires are slidably carried, lugs formed on opposite sides of each drive wire, pawls for the respective lugs pivotally mounted on said reciprocable member and engaging the opposite sides of the drive wires, the pawls for the opposed surfaces of adjacent drive wires being pivotally and juxtaposedly mounted on common elements and biased apart by an interconnecting spring, extensions formed on the respective pawls, and parts overlying the paths of the extensions so as to prevent movement of the pawl teeth over the lugs on the respective drive wires after the drive wires have passed through aligned perforations.

10. In a drive mechanism, a driving element reciprocable through a fixed range, a driven element, a toothed pawl pivotally carried by said driving element, a lug formed on the driven element, a spring biasing the toothed pawl into engagement with the driven element with such force that upon engagement with the lug thereon it will move the driven element, an extension formed on the pawl, and a fixed part overlying the path of the extension during a portion of the range of movement of the driving element to prevent yielding of the pawl.

11. In a drive mechanism, a driving element reciprocable through a fixed range, a driven element, lugs formed on opposite sides of the driven element, springs formed with tooth-shaped angular portions and carried by said driving element and biased so as to rest in engagement with the respective sides of the driven element, plates mounted on opposite sides of the driven element to hold the tooth-shaped portion of the springs in engagement with the driven element, extensions formed on the respective springs, and fixed parts overlying paths of movement of the extensions to prevent yielding of the springs during a portion of the range of movement of the driven element.

12. In a drive mechanism, a driving element reciprocable through a fixed range, a plurality of driven elements, lugs formed on opposite sides of each driven element, pawls carried by the driving element and respectively engaging the sides of the driven elements bearing the lugs, the pawls for the lugs on opposing surfaces of adjacent driven elements being juxtaposed on the same rod and biased by interacting springs, extensions formed on each pawl, and fixed parts overlying the path of movement of said extensions during a portion of the range of movement of the driving element so as to prevent yielding movement of the associated pawls.

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