PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in and relating to Feeding Means for Sheets or Webs used in Tabulating, Type-Writing and like Writing or Recording Machines

We, LAMSON PARAGON LIMITED, a British company, of Paragon Works, Canning Town, London, E.16, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for feeding continuous stationary assemblies comprising superposed record webs and interleaved carbon transfer webs round the platen of a tabulator, typewriter or like machine.

It has been the practice heretofore to provide continuous stationary in pack form comprising two or more superposed record webs between which are secured carbon webs for transferring details of data typed or imprinted on the top record web to the underlying record web or webs, the transfer sheet and record webs being adapted to travel round the platen as a unit, after which they are separated. This form of pack is very wasteful as the transfer web is only used once and although there may be large areas in its carbonised surface which have not been used, it is thrown away as it is not practicable to salvage it and re-assemble it with other superposed webs.

It has previously been proposed to obviate this wastage by feeding the carbon transfer sheets at a slower rate than the record webs in order that small areas of the transfer sheets could be used with succeeding portions of the record webs. This, however, necessitates feeding the record webs relatively to the transfer sheets but this has presented many difficulties as considerable frictional resistance is set up between the surfaces of the superposed webs and sheets, with the result that they tend to bind together, particularly as they are fed round the platen, and relative feeding of the record webs was either prevented, or resulted in tearing of the transfer sheets. Heretofore no practical means has been found for effecting this relative feed movement.

According to the present invention apparatus for feeding a continuous stationary assembly consisting of superposed record webs having a carbon transfer web interleaved between adjacent record webs, round the platen of a tabulator, typewriter or like machine, includes means for feeding the record webs relatively to the transfer webs comprising two feeding devices each provided with pin feed means engageable with marginal pin feed apertures in the record webs for feeding the latter, one feeding device being mounted at the rearward or infeed side of the platen in a position to push the record webs in a substantially straight line path to the platen, and the other feeding device being mounted above the platen at the outfeed side thereof in a position to exert a pull on the record webs to draw them away from the platen in a substantially straight line path, after they have been fed round the platen, said pin feeding devices being simultaneously operated at the same speed, and being positioned in engagement with the record webs in such a manner that the portion of the record webs extending between said feeding devices is maintained in a relatively slack condition such that as they are fed round the platen they will be sufficiently loosely disposed relative to the platen and the interleaved carbon transfer webs to permit free feeding movement round the platen relatively to said carbon transfer webs, and means being provided for effecting a small feed of the interleaved transfer web or webs independently of the record webs the operation of said last mentioned means being controlled by mechanism which is actuated whenever the record webs are imprinted or fed.

This arrangement ensures that the carbon transfer webs will be progressively fed in small amounts past the imprinted position of the platen so that the whole or substantially the whole area of the transfer webs will be used, thereby effecting a very substantial saving in transfer web material.

In one arrangement the transfer webs are adapted to be fed a small amount at the completion of each line of printing, the feeding of

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the webs being controlled by the line spacing means of the machine which is normally actuated at the completion of each line of printing. Alternatively it may be controlled directly by the action of the printing unit or parts associated therewith or by other parts which are actuated whenever the record webs are imprinted or fed.

To enable the invention to be fully understood it will now be described with reference to the accompanying drawings, in which:—

Fig. 1 illustrates in diagrammatic form one embodiment of the invention wherein the feed of the transfer webs is effected mechanically;

Fig. 2 is an end view of an embodiment wherein the feed of the transfer webs is effected by electrical or electromagnetical means;

Fig. 3 is a plan view of the apparatus shown in Fig. 2;

Fig. 4 is a side view of the apparatus shown in Fig. 2;

Fig. 5 illustrates in more or less diagrammatic form means for feeding the record webs so as to maintain them in loose condition as they are fed round the writing platen; and

Fig. 6 is a fragmentary view of part of Fig. 5 on an enlarged scale showing the gearing for driving the feed devices illustrated in Fig. 5.

In the embodiment shown in Fig. 1, 1 is the platen of a tabulator, typewriter or other writing or recording machine, the record sheets indicated by *a* of a continuous stationary assembly being adapted to be fed to present successive portions in position round the platen to be imprinted by type bars or like means. It will be understood that the stationary assembly will comprise a series of superposed paper record webs, interleaved with webs of carbon transfer material *b*, the leading portions of the latter extending to at least the imprinting position of the platen so that matter printed on the top record web will be transferred to all of the underlying record webs.

In accordance with known practice the platen 1 is adapted to be rotated through a small arc at the completion of each line of printing by line spacer means which includes a pair of rods 2, 3 mounted in side plates 4, 5 the ends of the rod 2 being pivotally mounted in support members indicated by 6. The side plate 4 is connected by a pin and slot or other suitable means to a pivoted link 7 carrying a pawl 8 which co-operates with a ratchet wheel 9 mounted on the spindle 10 of the platen. An arm 11 is mounted beneath the rods 2, 3 and is adapted to be continuously reciprocated about its shaft 12 while the machine is operating.

In operation when a line of printing has been completed an electrical circuit is closed to energise a solenoid 13 to attract a pivoted arm 14. As the latter moves inwardly it engages the hook member 15 which is freely pivoted on the rod 3 and moves it to position its hook end in the path of the reciprocating arm 11. Accordingly on the next downward stroke of the arm the member 15 will be engaged and forced downwardly to rock the assembly comprising the rods 2, 3 and side plates 4, 5 and thereby actuate the pawl 8 to rotate platen 1 and effect a forward feed movement of the record webs in position to receive the next line of printing.

The transfer web or webs are adapted to be fed independantly of the record webs and as shown a roll of carbon transfer material b^1 is provided and adapted to be unwound and interleaved between adjacent record sheets. In Fig. 1 only one roll of transfer material is shown but it will be understood that any desired number of rolls will be provided according to the number of superposed record sheets in the assembly. The roll b^1 is supported on a shaft 16 having a worm wheel 17 fast on one end and meshing with a worm 18 on a shaft 19. The latter is provided with a ratchet wheel 20 and adjacent thereto is mounted a rocking lever 21, carrying a pawl 22 at one end and formed with a slot 23 at its other end into which projects a pin 24 on a plate 25, the plate being rotatable about a pivot 26. A lateral projection on the plate 25, spaced from the pin 24 is pivoted to a member 27 to which is attached a cable 28 of a Bowden wire device indicated by 29. The opposite end of the Bowden cable is detachably connected to one arm of a bell crank lever 30 pivoted to a spindle 31, the other arm of the lever being pivoted to a lug 32 on the rod 3.

In operation each time the line spacing means is actuated by the member 15 being forced downwardly by the arm 11, the lug 32 will rotate the bell crank 30 and exert a pull on the Bowden cable 28. This will be transmitted to the plate 25 to rotate it, and by reason of the pin 24 engaging in the slot 23, the lever 21 will be rocked in a counter-clockwise direction whereby the pawl 22 will engage the ratchet wheel 20 and rotate the shaft 19 through a small arc equivalent to the distance between the teeth of the ratchet wheel. The rotation of the shaft 19 will effect a corresponding small roation of the roll b^1 to unwind a short length of carbon transfer web. In practice a relatively small rotation of the roll b^1 will result in the formation of a small amount of slack in the transfer web *b* and on the next feed movement of the record webs *a* the record webs on the upper and lower sides of the web or webs *b* will exert sufficient frictional grip on the transfer webs to take up this slack resulting in a small forward feed movement of the latter to present a fresh surface in imprinting position between the record webs. It will be understood that the solenoid 13 will be energised for only a very short space of time so that the member 15 will be actuated by the

reciprocating arm 11 only once for each energisation of the solenoid.

The transfer web or webs will be fed very small amounts irrespective of the feed movement of the record webs so that the whole area of the transfer material will be successively presented in imprinting position. It is not necessary that the feed of the transfer webs should be such as to present an entirely unused area in imprinting position but preferably the amount fed will be very small and the new area presented will correspond to only a fraction of the depth of the type face of the imprinting unit. Accordingly while part of the carbonised area will be printed on in successive printing operations a small unused area will be brought into printing position as the result of each feed movement.

In the embodiment shown in Figs. 2, to 4 the feed of the transfer webs is electrically controlled. As in the prior arrangement rolls of transfer web are supported on spindles 16*a* each of which carries a worm wheel 17*a* meshing with worms 18*a* on a shaft 19*a*, the latter having a ratchet wheel 20*a* mounted at one end. In this embodiment a solenoid 33 is provided adapted to be connected by leads 34 in an electrical circuit to be controlled, for example, by the line spacing means. The armature 35 of the solenoid is pivoted to a lever 36 pivoted at 37 and formed with a slot 38 at one end into which projects a pin 39 of a rotatably mounted plate 40. The plate 40 has a second pin 41 engaging in a slot in a lever 42 pivoted at 43 and provided with a pawl 22*a* at its upper end adapted to cooperate with the ratchet wheel 20*a*. In this arrangement each time the line spacing means is operated an electrical circuit will be closed to energise the solenoid and effect the inward movement of the armature 35. This movement will be transmitted through the plate 40 to the lever 42 which will actuate the pawl 22*a* so as to rotate the ratchet wheel 20*a* to effect a corresponding rotation of the shaft 19*a* to unwind small portions of the transfer webs from the rolls. The circuit to the solenoid will be reopened immediately after the necessary feed movement has been effected to permit the armature 35 and the parts associated with it to return to their "at rest" position as more clearly shown in Fig. 4. If desired the electrical circuit which controls the solenoid 13 may also be adapted to control the solenoid 33 whereby when the solenoid 13 is energised to effect line spacing, the solenoid 33 will also be energised to effect the feed of the transfer web or webs.

The means for feeding the transfer web or webs according to either embodiment of the invention need not necessarily be controlled by the line spacing means, but may for example, be adapted to be controlled by means which effect the feed of the record webs either a short amount as in line by line printing, or relatively large amounts equavilent to a form length. The feed of the transfer web may also be directly or indirectly controlled by the action of the imprinting unit or type bars, or parts associated therewith, or other parts of the tabulator or the like which are actuated when the record webs are imprinted or fed. For example, any such part may be adapted to control an electrical circuit to actuate the transfer web feeding means. In one arrangement the said part may directly engage ~~contacts~~ contacts to close an electric circuit or may be adapted to effect the transmission of an electrical impulse to a solenoid or electrical relay which controls the actuation of the carbon transfer web feed means. If desired, the arrangement may be such that the means controlling the circuit to the solenoid 13 simultaneously closes a circuit to an electrical device such as the solenoid 33 to actuate the feed of the carbon transfer webs.

The means for feeding the record webs is illustrated in Figs. 5 and 6 and as shown comprises a unit generally indicated by the reference A which is adapted to be detachably mounted on the tabulator, typewriter or like writing or recording machine.

The stationary webs *a* are delivered from a suiable pack or supply and are separated and fed over rods a^1 and webs of transfer material from supply rolls b^1 are fed over rods b^2 into interleaved relation with the stationary webs *a*. The supply rolls b^1 and the rods a^1, b^2 are mounted on a sub-unit B adapted to be attached to the unit A. It is necessary that the stationery webs be moved relatively to the transfer webs and heretofore this has caused difficulty, as in being drawn past the platen roller 1 by the feed means previously used, the various webs have been drawn tightly against the platen and the friction set up between the surfaces of adjacent webs has caused a binding action tending to prevent relative movement between the stationery and transfer webs.

This difficulty is overcome by providing web feeding means which will exert a pull on the record webs *a* on the outfeed side of the platen and a pushing action on the infeed side.

As shown in the embodiment of the invention illustrated in Fig. 5 the unit A includes a pair of side plates each having a vertical portion 44 and a rearwardly extending substantially horizontal portion 45, the plates being held in spaced parallel relation by one or more transverse rods extending between the plates. Only one side plate is shown in the accompanying drawing but it will be understood that a similar plate will be provided on each side of the unit.

A transverse rod 46 extending between opposed vertical portions 44 of the plates supports a pair of endless tractors 47, (one only being indicated in the drawing), which are spaced transversely of the unit to correspond

with the width of the continuous webs *a* to be fed. A second pair of endless tractors 48 is mounted on a transverse rod 48*a* extending between opposed horizontal portions 45 of the side plates, these tractors being also spaced transversely so as to be in alignment with the respective tractors 47.

Each of the tractors 47, 48 includes a body portion on which are rotatably mounted sprocket wheels 49 adapted to drive endless chains 50 which support laterally projecting carriers on which are mounted feed pins 51. One example of a tractor unit suitable for use in the present invention is described in prior British Specifications Nos. 468,327 and 468,284.

The feed pins 51 of the respective tractors are adapted to engage with rows of marginal apertures at the side edges of the superposed stationery webs *a*, such apertured webs being well known in the art. The tractors 47, 48 are adapted to be driven at the same speed and the arrangement is such that the tractors 48 on the infeed side of the platen exert a pushing effect on the webs *a* and the tractors 47 on the outfeed side exert a pulling effect. It will be understood that before the unit is set in operation the portion of the webs extending between the tractors 47, 48 will be formed with sufficient amount of slack so that as they pass round the platen they are loosely disposed relatively to one another and form a relatively loose loop at the platen 1, so that the webs will be drawn smoothly round the platen relatively to the transfer webs *b*.

Accordingly the webs will not be drawn tightly against the platen as they are fed but will be only lightly in contact therewith, so that there will be little or no tendency for the webs to be in such tight frictional contact as would prevent the record webs *a* being pulled round the platen relatively to the transfer webs *b*.

As shown the endless tractors 47, 48 are adapted to be driven by gearing on the frame indicated by M of the tabulator or like machine on which the unit is mounted, and for this purpose a gear 52 is secured co-axially with the platen 1 so as to be rotated when the platen rotates when the tabulator or the like is in operation. The gear 52 meshes with the main drive gear 53 of the unit, and the latter is connected through a train of pinions 54, 55 to a pinion 56 on a shaft 57, which extends transversely of the unit and carries one of the driving sprocket of the outfeed tractors 47. The shaft 57 also has pinion 57*a* loosely mounted thereon (Fig. 6) which meshes with a pinion 58 on a shaft 59 which also carries a chain wheel 60. The chain wheel 60 drives an endless chain 61 which passes round and drives the chain wheel 62 fast on the shaft 63. The driving sprocket of the infeed tractor 48 is fast on the shaft 63 and accordingly when the tabulator or the like is in operation a gear 52 will be rotated to effect the simultaneous rotation of both the infeed and the outfeed tractors, the interposed gearing referred to above being so arranged that both tractors 47 and 48 will be driven at the same speed.

The tractors 48 are mounted on the transverse rod 48*a* which extends between the horizontal portions 45 of the side plates. The tractors 48 are omitted from Fig. 6 of the drawings for the sake of clarity.

In order to permit the formation of the necessary slack in the webs means are provided to permit adjustment of one or other of the tractors. As shown this means includes an adjustable coupling disc or sleeve 65 keyed to the shaft 57 and connected to the pinion 57*a* by screws extending through slots 64. This permits the pinion 57*a* to be rotated into adjusted position relative to the shaft 57 and locked in adjused position.

It will be understood that the tabulating or like machine will normally be intermittently operated to rotate the platen 1 and drive the tractors to feed the webs *a* the equivalent of a form length, the feed being then halted while the webs are imprinted. The transfer webs *b* are however independently fed a small amount each time the webs *a* are fed as described above.

By the present invention a considerable economy is possible in the amount of transfer material used as it is possible to feed the transfer webs *b* independently of the record webs *a* by very small amounts.

The plane in which the webs are fed towards the platen should be at such an angle to the plane at which they are fed away from it, as to ensure that it is possible to maintain the webs in a slack or loosely looped condition as they pass round it. Mechanism may be provided to permit the pawls 22, 22*a* to rotate the respective ratchet wheels through distances equivalent to one or more teeth. Further, means may be provided for holding the said pawls out of engagement with the ratchet wheels if it is desired to use the tabulator or the like without operating the carbon transfer feed.

If desired, the mechanism for feeding the transfer webs may form a unit adapted to be detachably mounted on the tabulator or the like to enable it to be removed when it is desired to use the tabulator for other purposes, and in this connection the Bowden cable is designed to be readily detachable from the bell crank lever 30.

Although the invention is particularly applicable to tabulating machines it is not limited to this particular form of writing machine but may be used with any other type of writing or recording machine using continuous webs of stationery with interleaved transfer material and particularly wherein the record webs are adapted to be fed varying amounts, e.g. short resistance line by line during printing and

longer distances between successive printing operations.

It will be understood that in all cases the feeding of the transfer webs will be such that irrespective of the varying feed movements of the record webs and the number of lines of printing on each form length of the web, the transfer webs will only be moved to such an extent that successive portions of the sheets will be brought into printing position. Accordingly the whole area of the sheets will be progressively used and there will be no substantial areas of unused carbonised surfaces as would be the case if the transfer sheets were moved every time and to the same extent as the record webs.

It will be understood that the slackness of the record webs as they pass round the platen will be such as to permit their being fed relatively to the transfer webs but will not be such as to prevent efficient imprinting being obtained by the type bars of the tabulator or the like.

Attention is directed to our co-pending Application No. 18472/51 (Serial No. 757,302) which describes and claims apparatus for feeding record webs through a typewriter or like machine by web feeding means including a feeding device mounted at the rearward or infeed side of the platen in a position to push the webs towards the platen and a second web feeding device mounted above the platen at the outfeed side thereof to exert a pull on the webs to draw them away from the platen after they have been fed round the same, the portion of the record webs between the feeding devices being maintained in a relatively slack condition.

What we claim is:—

1. Apparatus for feeding a continuous stationery assembly consisting of superposed record webs having a carbon transfer web interleaved between adjacent record webs round the platen of a tabulator, typewriter or like machine, said apparatus including means for feeding the record webs relatively to the transfer webs comprising two feeding devices each provided with pin feed means engageable with marginal pin feed apertures in the record webs for feeding the latter, one feeding device being mounted at the rearward or infeed side of the platen in a position to push the record webs in a substantially straight line path to the platen, and the other feeding device being mounted above the platen at the outfeed side thereof in a position to exert a pull on the record webs to draw them away from the platen in a substantially straight line path, after they have been fed round the platen, said pin feeding devices being simultaneously operated at the same speed, and being positioned in engagement with the record webs in such a manner that the portion of the record webs extending between said feeding devices is maintained in a relatively slack condition such that as they are fed round the platen they will be sufficiently loosely disposed relative to the platen and the interleaved carbon transfer webs to permit free feeding movement round the platen relatively to said carbon transfer webs, and means being provided for effecting a small feed of the interleaved transfer web or webs independently of the record webs the operation of said last mentioned means being controlled by mechanism which is actuated ~~wherever~~ the record webs are imprinted or fed.

2. Apparatus according to Claim 1 wherein the operation of said means for feeding the interleaved transfer webs is controlled by mechanism which is actuated each time a line of printing is completed.

3. Apparatus according to Claim 1 or 2 wherein the operation of said means for feeding interleaved transfer webs is controlled by the record web imprinting unit or a part connected thereto, on its being moved in effecting an imprinting operation.

4. Apparatus according to Claim 1 wherein the operation of said means for feeding the interleaved transfer webs is controlled by mechanism which effects the line by line spacing of the record webs.

5. Apparatus according to Claims 1 to 4 wherein said means for feeding the interleaved transfer webs is mechanically connected with the line spacing mechanism or a member or members adapted to be actuated each time a line of printing is completed.

6. Apparatus according to any one of Claims 1 to 4 wherein said means for feeding the interleaved transfer webs is operated by an electrically or electro-mechanically actuated device, the energising circuit of which is controlled in such a manner that the device is energised to effect a small feed of the transfer web or webs each time a line of printing is completed or the record webs are fed.

7. Apparatus according to Claim 6 wherein the device includes a solenoid adapted when energised to actuate lever means connected with mechanism for effecting a small feed of the transfer web or webs.

8. Apparatus according to Claim 7 wherein the lever means is adapted to actuate a pawl of a pawl and ratchet wheel device to rotate a roll or rolls of transfer web to unwind a small portion of the web or webs.

9. Apparatus according to Claim 5 wherein the said means for feeding the interleaved transfer webs includes a ratchet wheel and pawl adapted to rotate a roll or rolls of transfer web to unwind a small amount of the web or webs, the pawl being adapted to be actuated by a Bowden cable device connected with the line spacing mechanism or said other member or members.

10. Apparatus according to Claim 8 or 9 wherein the ratchet wheels are arranged to rotate a shaft geared to the spindle or spindles of the roll or rolls of transfer web.

longer distances between successive printing operations.

It will be understood that in all cases the feeding of the transfer webs will be such that irrespective of the varying feed movements of the record webs and the number of lines of printing on each form length of the web, the transfer webs will only be moved to such an extent that successive portions of the sheets will be brought into printing position. Accordingly the whole area of the sheets will be progressively used and there will be no substantial areas of unused carbonised surfaces as would be the case if the transfer sheets were moved every time and to the same extent as the record webs.

It will be understood that the slackness of the record webs as they pass round the platen will be such as to permit their being fed relatively to the transfer webs but will not be such as to prevent efficient imprinting being obtained by the type bars of the tabulator or the like.

Attention is directed to our co-pending Application No. 18472/51 (Serial No. 757,302) which describes and claims apparatus for feeding record webs through a typewriter or like machine by web feeding means including a feeding device mounted at the rearward or infeed side of the platen in a position to push the webs towards the platen and a second web feeding device mounted above the platen at the outfeed side thereof to exert a pull on the webs to draw them away from the platen after they have been fed round the same, the portion of the record webs between the feeding devices being maintained in a relatively slack condition.

What we claim is:—

1. Apparatus for feeding a continuous stationery assembly consisting of superposed record webs having a carbon transfer web interleaved between adjacent record webs round the platen of a tabulator, typewriter or like machine, said apparatus including means for feeding the record webs relatively to the transfer webs comprising two feeding devices each provided with pin feed means engageable with marginal pin feed apertures in the record webs for feeding the latter, one feeding device being mounted at the rearward or infeed side of the platen in a position to push the record webs in a substantially straight line path to the platen, and the other feeding device being mounted above the platen at the outfeed side thereof in a position to exert a pull on the record webs to draw them away from the platen in a substantially straight line path, after they have been fed round the platen, said pin feeding devices being simultaneously operated at the same speed, and being positioned in engagement with the record webs in such a manner that the portion of the record webs extending between said feeding devices is maintained in a relatively slack condition such that as they are fed round the platen they will be sufficiently loosely disposed relative to the platen and the interleaved carbon transfer webs to permit free feeding movement round the platen relatively to said carbon transfer webs, and means being provided for effecting a small feed of the interleaved transfer web or webs independently of the record webs the operation of said last mentioned means being controlled by mechanism which is actuated ~~wherever~~ the record webs are imprinted or fed.

2. Apparatus according to Claim 1 wherein the operation of said means for feeding the interleaved transfer webs is controlled by mechanism which is actuated each time a line of printing is completed.

3. Apparatus according to Claim 1 or 2 wherein the operation of said means for feeding interleaved transfer webs is controlled by the record web imprinting unit or a part connected thereto, on its being moved in effecting an imprinting operation.

4. Apparatus according to Claim 1 wherein the operation of said means for feeding the interleaved transfer webs is controlled by mechanism which effects the line by line spacing of the record webs.

5. Apparatus according to Claims 1 to 4 wherein said means for feeding the interleaved transfer webs is mechanically connected with the line spacing mechanism or a member or members adapted to be actuated each time a line of printing is completed.

6. Apparatus according to any one of Claims 1 to 4 wherein said means for feeding the interleaved transfer webs is operated by an electrically or electro-mechanically actuated device, the energising circuit of which is controlled in such a manner that the device is energised to effect a small feed of the transfer web or webs each time a line of printing is completed or the record webs are fed.

7. Apparatus according to Claim 6 wherein the device includes a solenoid adapted when energised to actuate lever means connected with mechanism for effecting a small feed of the transfer web or webs.

8. Apparatus according to Claim 7 wherein the lever means is adapted to actuate a pawl of a pawl and ratchet wheel device to rotate a roll or rolls of transfer web to unwind a small portion of the web or webs.

9. Apparatus according to Claim 5 wherein the said means for feeding the interleaved transfer webs includes a ratchet wheel and pawl adapted to rotate a roll or rolls of transfer web to unwind a small amount of the web or webs, the pawl being adapted to be actuated by a Bowden cable device connected with the line spacing mechanism or said other member or members.

10. Apparatus according to Claim 8 or 9 wherein the ratchet wheels are arranged to rotate a shaft geared to the spindle or spindles of the roll or rolls of transfer web.

11. Apparatus according to Claim 10 wherein the shaft has one or more worms mounted thereon, the, or each worm meshing with a worm wheel on the spindle of a roll of transfer web.

12. Apparatus according to any one of the preceding claims wherein a pair of aligned pin feed devices is provided for feeding the record webs to the platen, and a second pair of aligned pin feed devices is provided for feeding the webs away from the platen, the devices of each being transversely spaced and positioned for engaging feed apertures in the oppositely disposed marginal edges of the record webs.

13. Apparatus for feeding a continuous stationery assembly comprising superposed record webs and interleaved carbon transfer webs round the platen of a tabulator, typewriter or like machine having means for feeding the transfer webs substantially as described with reference to Figs. 1 to 4 of the accompanying drawings.

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PROVISIONAL SPECIFICATION
No. 27957, A.D. 1951

Improvements in and relating to Feeding Means for Sheets or Webs used in Tabulating, Type-Writing and like Writing or Recording Machines

We, LAMSON PARAGON LIMITED, a British company, of Paragon Works, Canning Town, London, E.16, do hereby declare this invention to be described in the following statement:—

This invention relates to tabulating, typewriting and like writing or recording machines wherein continuous webs of stationery interleaved with carbon transfer sheets, are fed round a platen roller or the like.

It has been the practice heretofore to provide continuous stationery in pack form comprising two or more superposed record sheets between which are secured carbon sheets for transferring details of data typed or imprinted on the top sheet to the underlying record sheets, being secured together, travel round the platen as a unit, and are subsequently separated. This form of pack is very wasteful as the transfer sheet is only used once and although there may be large areas in its carbonised surface which have not been used, it is thrown away as it is not practicable to salvage it and re-assemble it with other superposed record sheets.

If however loose transfer sheets are provided interleaved between the record sheets and anchored so as to be usable with succeeding portions of the record sheets, a considerable saving in the transfer sheets is obtained but the said sheets have only a limited life as with the anchored carbon sheets, the typing on successive form lengths of the web takes place on the same area of the transfer sheets, and accordingly it would be necessary to throw away the sheets while some part of its area was still unused. This drawback can be remedied by feeding the transfer sheets towards printing position as the record sheets are fed through the machine. This however presents difficulties in that the record sheets are not fed in uniform lengths through the machine. For example, the record webs are usually divided into form lengths and if a single or only two or three lines have to be typed on successive forms it will mean that after the small amount of typing a considerable length of the record webs will be fed through the machine corresponding to the portion of the web extending from the last entry of one form to the first entry on the next form. If the transfer sheets are fed to a corresponding extent it would naturally entail that large areas of these sheets would be fed past the typing position without being used.

It is an object of the present invention to provide means for obviating this drawback and ensuring that the whole or substantially the whole area of the transfer sheets will be used thereby effecting a very important saving in the use of the transfer sheets.

According to the present invention a tabulating, typewriting or writing or recording machine is provided with means for controlling the feed of the transfer sheets in such a manner that irrespective of the amount the record sheets are fed through the machine the transfer sheets are only fed such small amounts as to present successive portions of the sheets to printing position whereby the whole or substantially the whole of the area of the said sheets will be used to transfer the printing to the underlying record sheets. In one arrangement the transfer sheets are adapted to be fed a small amount at the completion of each line of printing. The feeding of the carbon sheets may be controlled by the line spacing means of the machine which is normally actuated at the completion of each line of printing, or alternatively it may be controlled directly by the action of the type bars or parts associated therewith so that when the line of printing is completed the transfer feed means is automatically set in operation.

The invention is particularly applicable to tabulating machines of the kind which are provided with means for automatically feeding the webs line by line while lines of type are being imprinted on the webs and then to feed the web relatively large amounts to present a fresh form length in printing position.

In one particular form of such a machine it is known to provide a pivoted member connected with ratchet and pawl mechanism for feeding the record webs line by line, the said member carrying a depending hook adapted to be actuated by a rocking lever. In this arrangement the lever is continuously rocking and the hook is normally out of engagement therewith but is drawn into its path by an armature which is attracted by a solenoid the circuit of which is closed when a line of printing is completed.

According to one embodiment of the invention the movement of the pivoted line spacing member is used for imparting a small feed movement to the interleaved transfer sheets. These sheets may be in roll form and the arrangement such that each time the line spacer is operated the roll is unwound a small amount to permit a small portion of the transfer sheet to be drawn forwardly by the webs to present a fresh part at the printing position.

As in this type of machine the means for feeding considerable lengths of the webs is effected without operating the line spacer, it will be obvious that the transfer sheets will only be fed after a printing operation and accordingly successive small areas of the transfer sheet will be moved forwardly and used.

The means for feeding the transfer sheets may comprise a shaft carrying one or more worms meshing with worm wheels mounted on the spindles of the rolls of transfer material, a worm and worm wheel being provided for each roll in the machine. It will be understood that in accordance with normal practice if only two record webs are used to give a top copy and one carbon copy only one roll of transfer material will be required and that for each additional carbon copy required a further roll of transfer material will be needed. One end of the shaft carrying the worms has a ratchet wheel fitted thereon, and a pawl adapted to operate the ratchet wheel is pivotally mounted on a pivoted arm whereby when the arm is reciprocated about its pivot the ratchet wheel will be rotated an amount equivalent to one tooth and the transfer sheet rolls correspondingly rotated. The arm carrying the pawl is adapted to be pivoted by a bell crank lever which is connected by "Bowden" wire mechanism with the line spacer means on the tabulating machine.

In one arrangement the pivoted member of the line spacer mechanism has a lug which is connected to one end of a bell crank lever pivoted to a suitable part of the carriage of the tabulating machine, the opposite end of this bell crank being detachably connected with one end of the "Bowden" wire mechanism.

In operation each time the line spacer is actuated the bell crank on the carriage of the tabulating machine is pivoted to exert a pull on the "Bowden" wire. As the opposite end of the wire is connected with the bell crank of the transfer sheet feed means the latter bell crank will be rocked against the action of a return spring, to reciprocate the arm and thereby effect the rotation of the ratchet wheel to rotate the rolls and feed the transfer sheets.

The transfer sheet feed means may be adapted to form a unit which is readily supported on brackets mounted on the carriage of the tabulating or like machine and the "Bowden" wire may be adapted to be readily attached or detached from means on the said machine so that transfer feed means may be put out of action when desired to enable the tabulating machine to be used for other purposes.

It will be understood that other means than those described may be provided for imparting a limited feed movement to the transfer sheets, for example, the rotation of the rolls may be effected by electrically controlled means as by the energisation of a solenoid the circuit of which is closed at the completion of each line of printing or each time the line spacer means is actuated. For example, in a machine of the type already described the electrical circuit which controls the solenoid which effects the movement of the hook into the path of the continuously rocking lever may also be adapted to control means to close a circuit to effect the feed of the transfer sheet rolls, so that at the completion of each line of printing the line spacer will be actuated simultaneously with the feeding of the carbon sheets.

Although the invention is particularly applicable to tabulating machines it is not limited to this particular form of writing machine but may be used with any other type of writing or recording machine using continuous webs of stationery with interleaved transfer sheets and wherein the record webs are adapted to be fed varying amounts, e.g. short distances line by line during printing and longer distances between successive printing operations.

In an alternative arrangement instead of the transfer sheets being fed each time a line of printing is completed they may be adapted to be fed a small amount each time a relatively large feed movement of the web takes place as when it is fed to present a fresh form length at printing position. In this case means substantially as described above could be used for feeding the transfer sheets but instead of being controlled by the line spacer means or the type bars or associate parts, it would be controlled by the gearing or other means adapted to be set in motion at the time that such

a relatively large feed movement of the web is to be effected.

It will be understood that in all cases the feeding of the transfer sheets will be such that irrespective of the varying feed movements of the record webs and the number of lines of printing of each form length of the web, the transfer sheets will only be moved to such an extent that successive portions of the sheets will be brought into printing position. Accordingly the whole area of the sheets will be progressively used and there will be no substantial areas of unused carbonised surfaces as would be the case if the transfer sheets were moved every time and to the same extent as the record webs.

Preferably the transfer sheets are fed only a fraction of the depth of the type face so that while part of the carbonised area printed on during the preceding printing operation will be used, a small area of the unused carbonised surface will be brought into printing position each time.

It has been found in practice that difficulty is often experienced in feeding superposed record webs round a platen roller retatively to interleaved transfer sheets owing to the tendency of the superposed sheets binding when they are pulled tightly against the platen roller due to the friction set up between the record webs and the carbonised surfaces of the transfer sheets. Our co-pending Application No. 18472/51 (Serial No. 757,302) describes means for overcoming this difficulty and the present invention may be used in combination with that described in the said co-pending application.

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PROVISIONAL SPECIFICATION
No. 13596, A.D. 1952

Improvements in and relating to Feeding Means for Sheets or Webs used in Tabulating, Type-Writing and like Writing or Recording Machines

We, LAMSON PARAGON LIMITED, a British company, of Paragon Works, Canning Town, London, E.16, do hereby declare this invention to be described in the following statement:—

This invention relates to tabulating, typewriting and like writing or recording machines wherein continuous webs of stationery interleaved with carbon transfer sheets are fed round a platen, roller or the like, and more particularly relates to the invention described and claimed in our co-pending Application No. 27957/51.

It is an object of the present invention to provide improved means for controlling the intermittent feed movement of the transfer sheet or sheets.

According to the present invention the feed movement of the transfer sheet or sheets is controlled electrically as by the closing or opening of an electrical circuit by means associated with the tabulator or like machine or the means for feeding the record sheets through the machine. As is the case in the co-pending application, the feeding of the transfer sheet or sheets will be effected irrespective of the amount the record sheets are fed so that the transfer sheet or sheets will be fed only such small amounts as to present successive portions in printing position. The electrical means for effecting the feed of the transfer sheet or sheets may include a solenoid which is energised periodically to operate mechanism, for example, a pawl and ratchet to produce the desired feed movement.

It will be understood that the electrical circuit to the solenoid may be controlled by means associated with the print unit or its control, or by the line spacing mechanism or its electric control or by other parts of the tabulator or the like, whereby the circuit is closed whenever the print unit comes into operation. Alternatively it may be controlled directly by the action of the type bars or parts associated therewith so that when the line of ~~printing~~ printing is completed the transfer feed means are automatically set in operation.

Means may be provided whereby the amount of the carbon web fed each feed movement may be varied.

According to one embodiment of the invention pawl and ratchet means adapted to operate feed worms is provided as described in co-pending Application No. 27957/51, the pawl being adapted to be actuated by a solenoid which is energised by electrical impulses when a feed of the transfer web is required. The means for varying the amount of web to be fed may include mechanism which permits the pawl to rotate the ratchet wheel one or more teeth as desired.

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