United States Patent [19]

Filsinger et al.

[11] **3,902,409**

[45] **Sept. 2, 1975**

[54] **PRINTING APPARATUS HOLD DOWN MEANS**

[76] Inventors: **John F. Filsinger,** 4821 McDonald Rd., Syracuse, N.Y. 13215; **Roger P. Mueller,** 705 Scott Ave., Syracuse, N.Y. 13224

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[21] Appl. No.: **453,575**

Related U.S. Application Data

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[52] **U.S. Cl.** **101/18;** 101/27

[51] **Int. Cl.** **B44b 5/02**

[58] **Field of Search** 101/27, 21, 19, 20, 26

[56] **References Cited**

UNITED STATES PATENTS

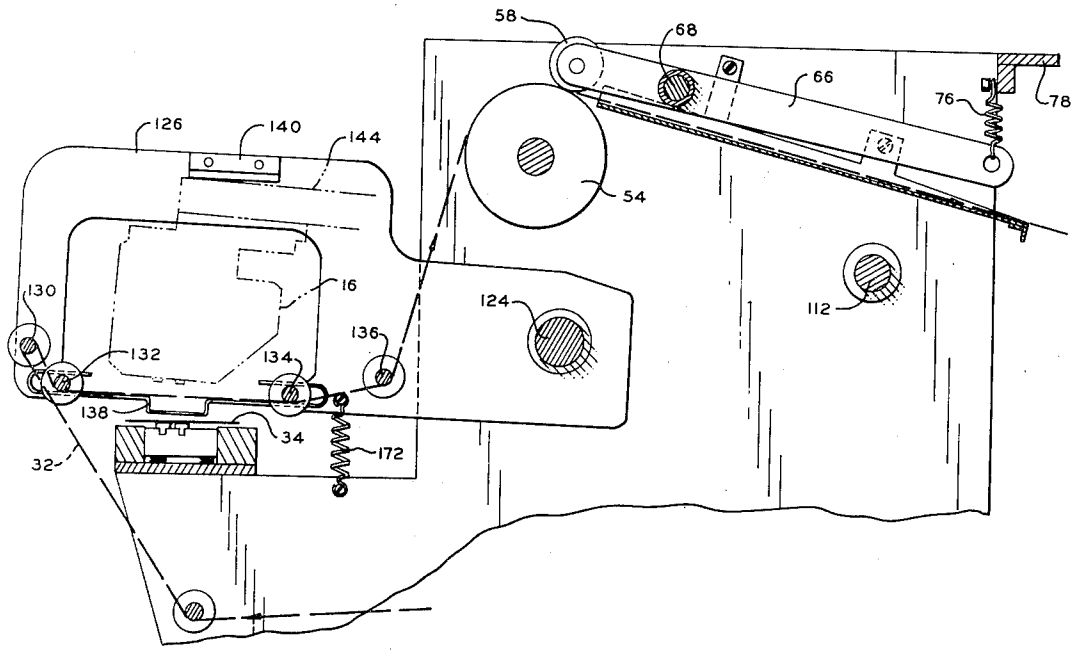
629,076	7/1899	Hess	101/19
1,539,853	6/1925	Littlefield	101/27
1,714,794	5/1929	Luedtke et al	101/21
1,779,091	10/1930	Glass	101/27 X
2,622,527	12/1952	Roderick	101/20 X
3,304,856	2/1967	Birch	101/27
3,774,529	11/1973	Filsinger et al.	101/27

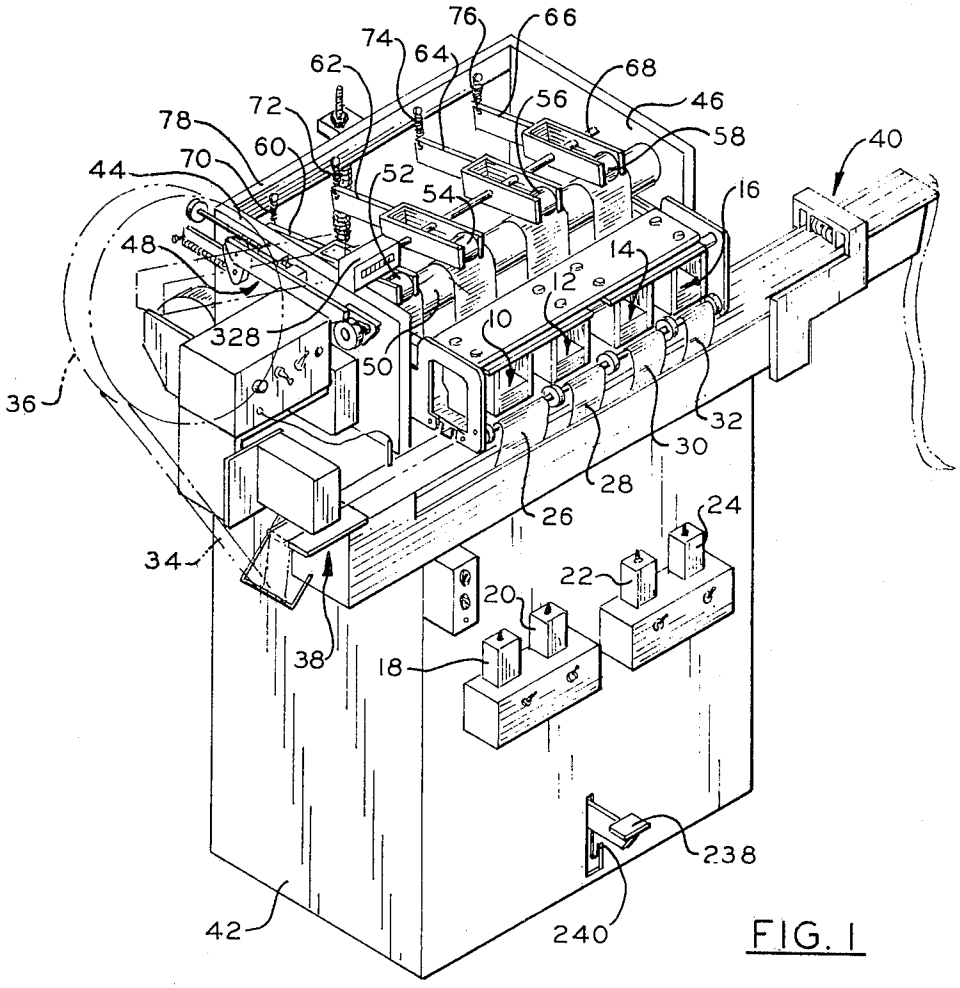
Primary Examiner—Clyde I. Coughenour
Attorney, Agent, or Firm—Charles S. Mc Guire

[57] **ABSTRACT**

In apparatus for transferring a printing medium from a printing ribbon to an underlying material by moving the ribbon into contact with the material and moving raised type face into printing contact with the ribbon, resilient means are provided on the movable portion of the apparatus to hold down the material as the ribbon is pulled away after printing, thus preventing the ribbon and material from sticking together. The material to be printed extends on each side of the ribbon during printing contact and the resilient means, in the form of a pair of flexible spring elements, extend from the portion of the apparatus on which the ribbon and type face are mounted to contact the material prior to contact of the ribbon. As the apparatus is moved to lift the ribbon from the material, the springs remain in contact with the material, holding the latter against movement with the ribbon.

3 Claims, 20 Drawing Figures

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240

FIG. 1

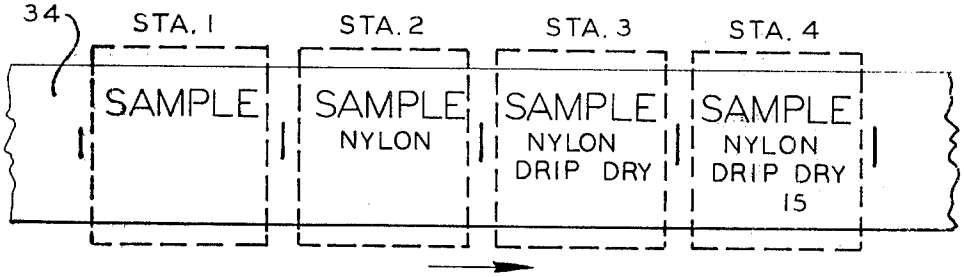
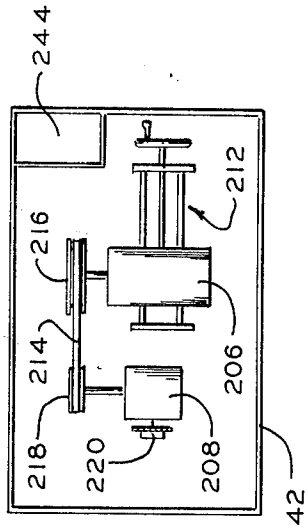

34
STA. 1
STA. 2
STA. 3
STA. 4
SAMPLE
SAMPLE
NYLON
SAMPLE
NYLON
DRIP DRY
SAMPLE
NYLON
DRIP DRY
15

FIG. 2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212
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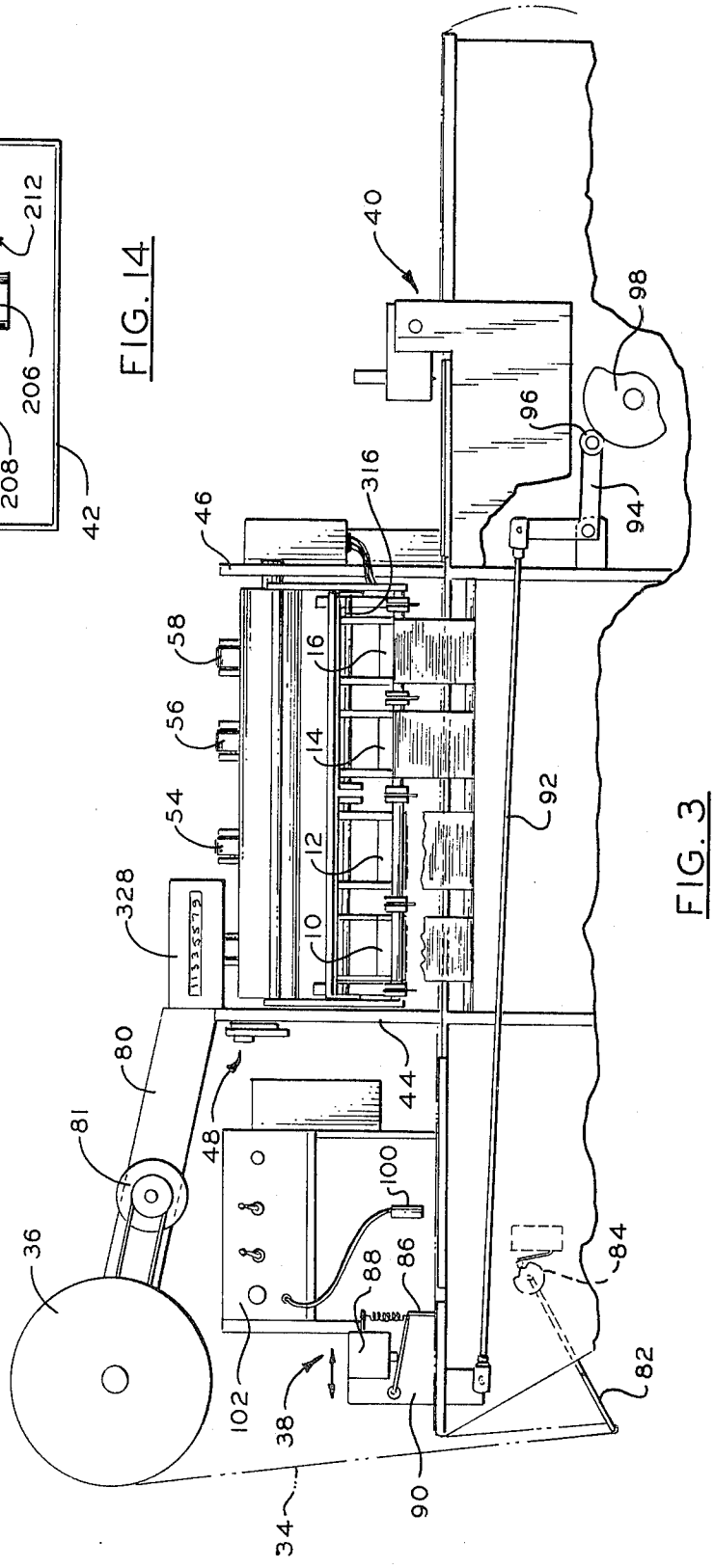
FIG. 14


40
98
96
94
316
46
58
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16
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12
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92
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81
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86
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82
102
38
90
34

FIG. 3

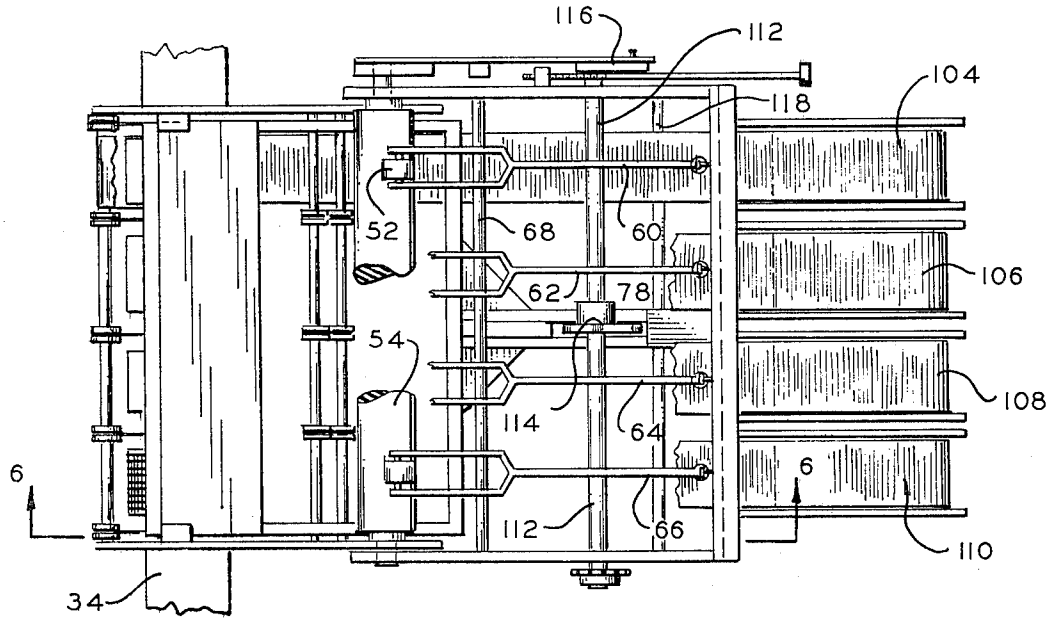
116
112
104
118
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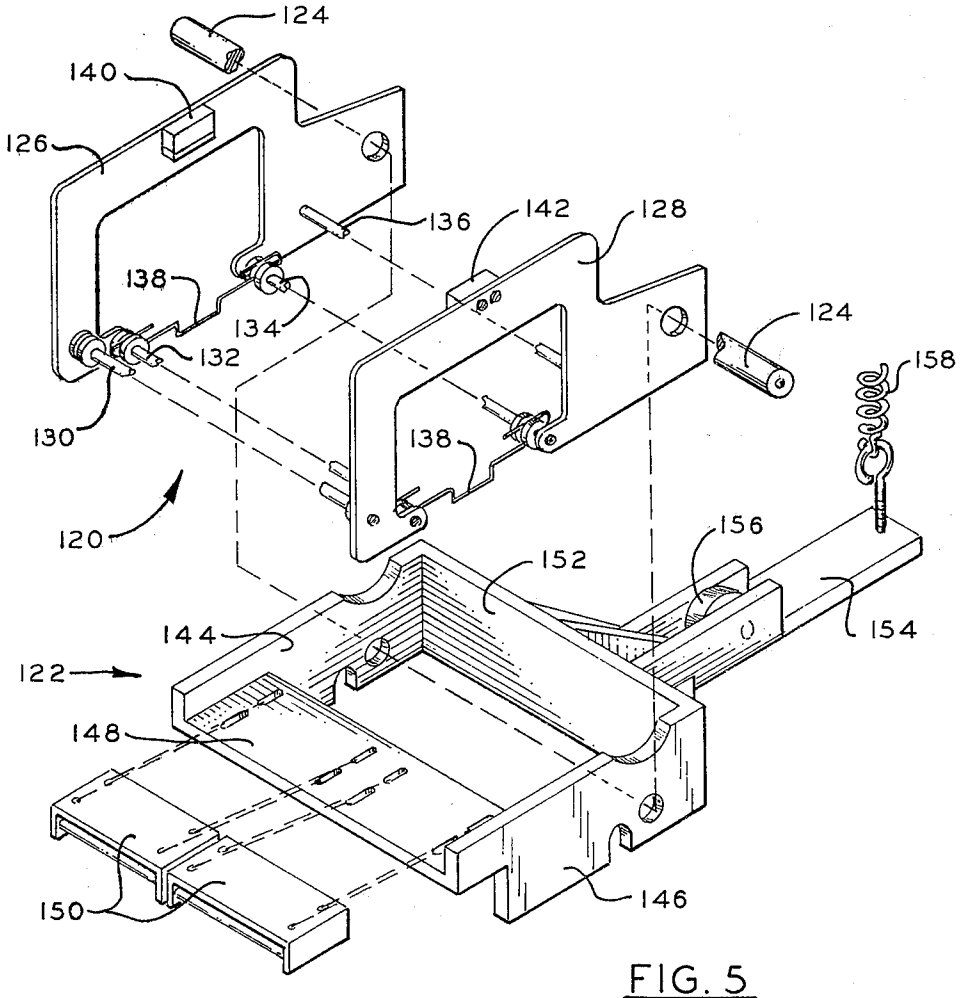
FIG. 4


124
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122
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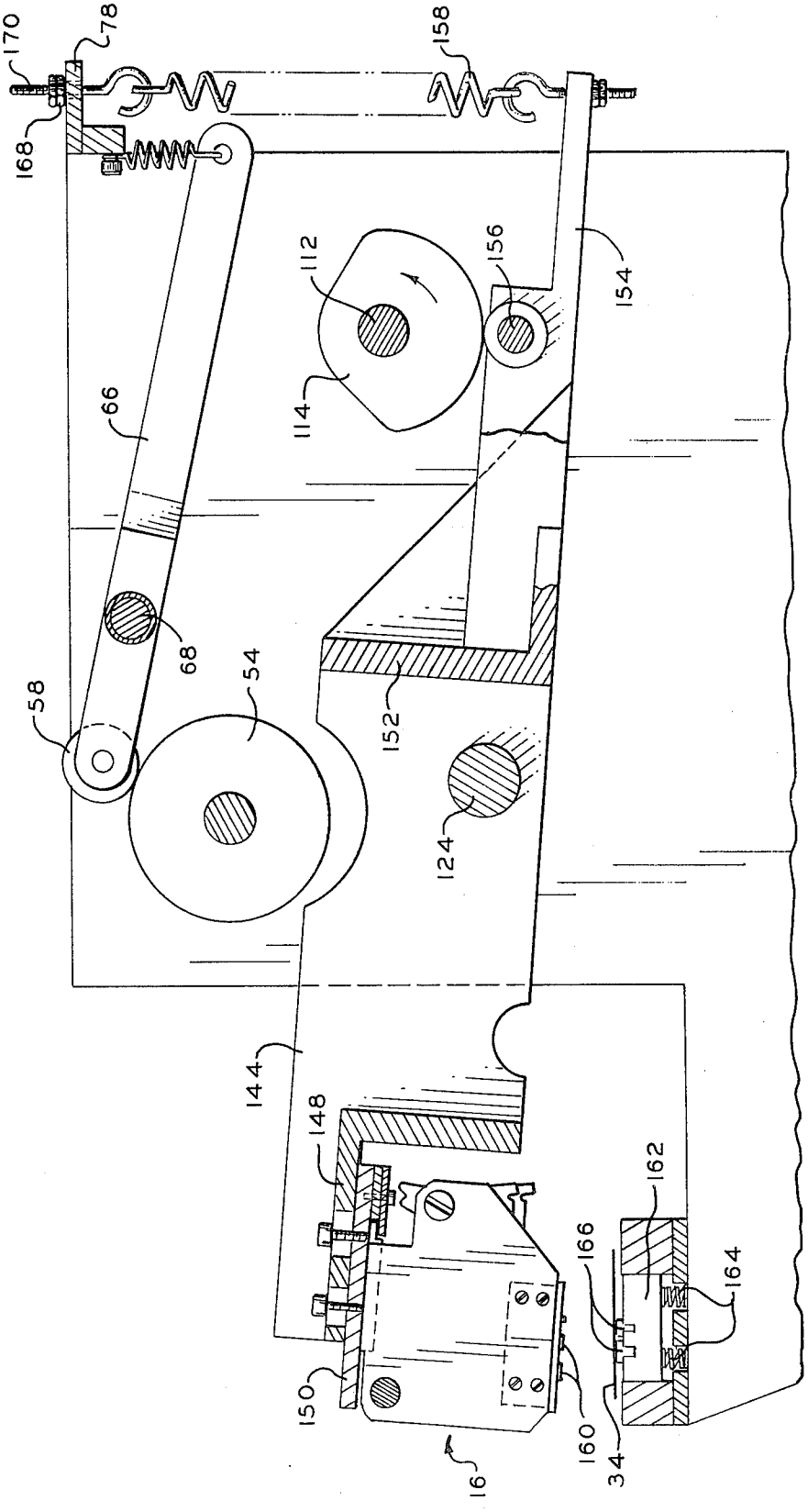
150

FIG. 5


170
78
158
168
112
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160
34
16

FIG. 6

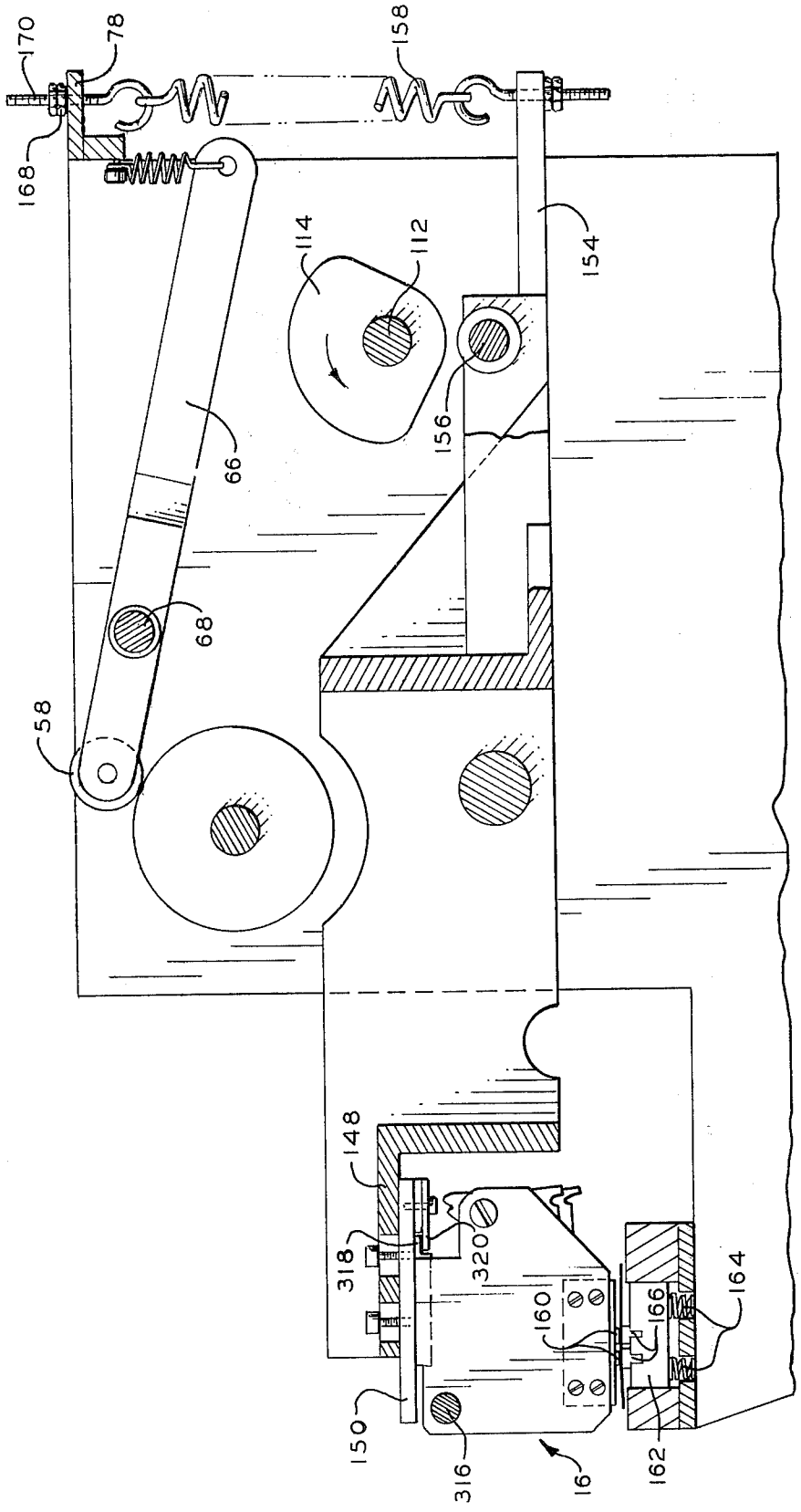
170
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FIG. 7

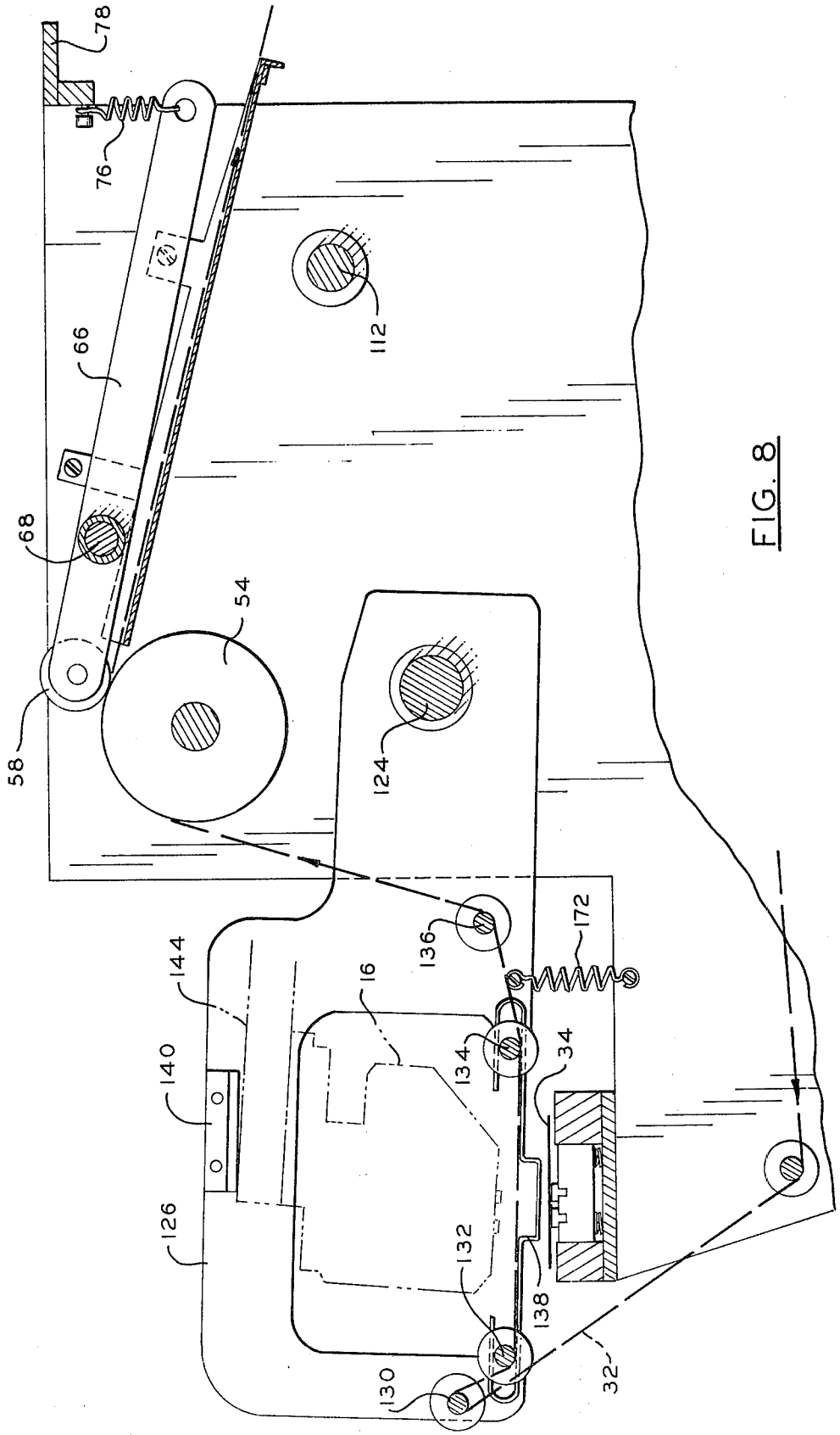
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FIG. 8

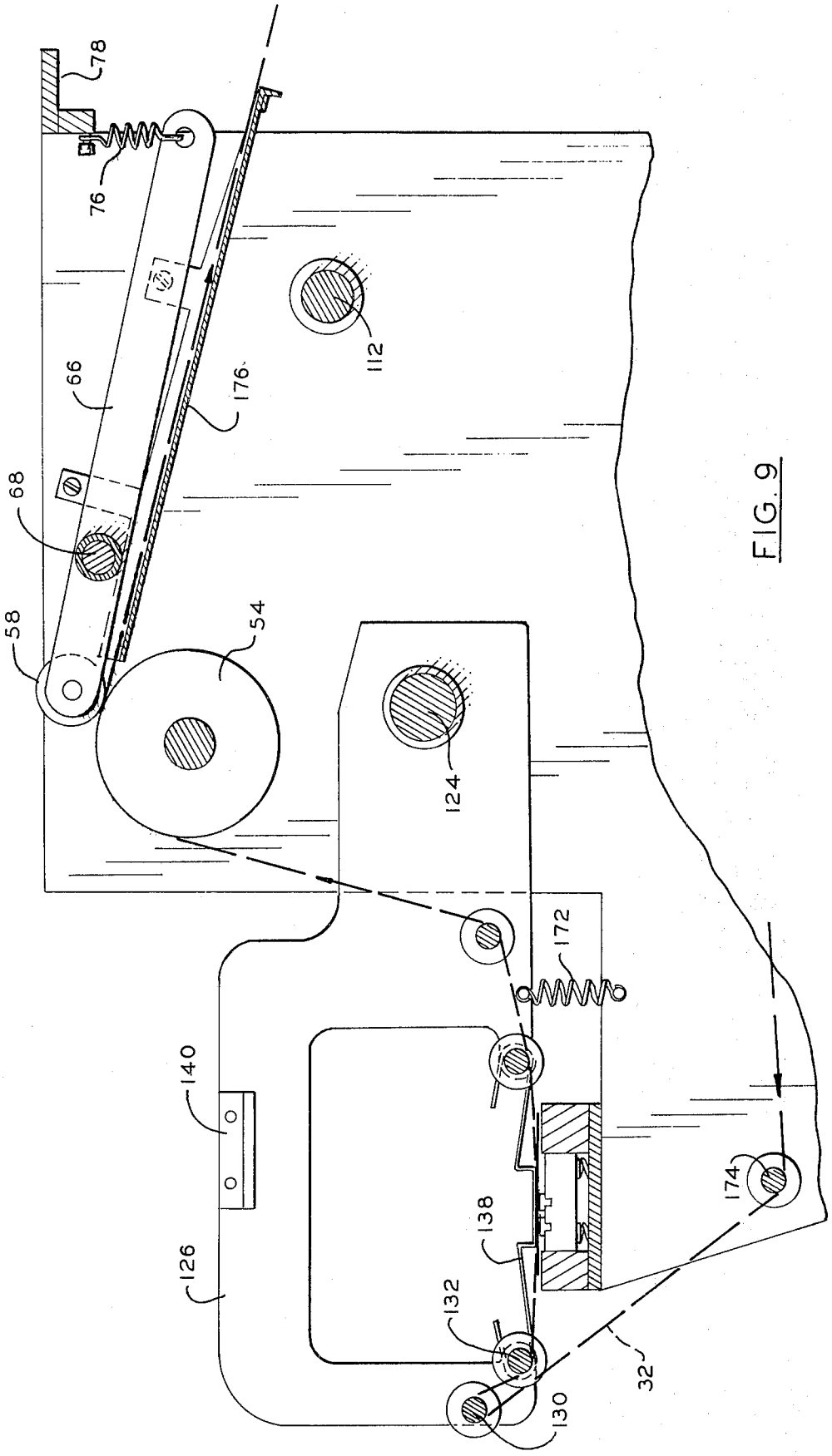

FIG. 9

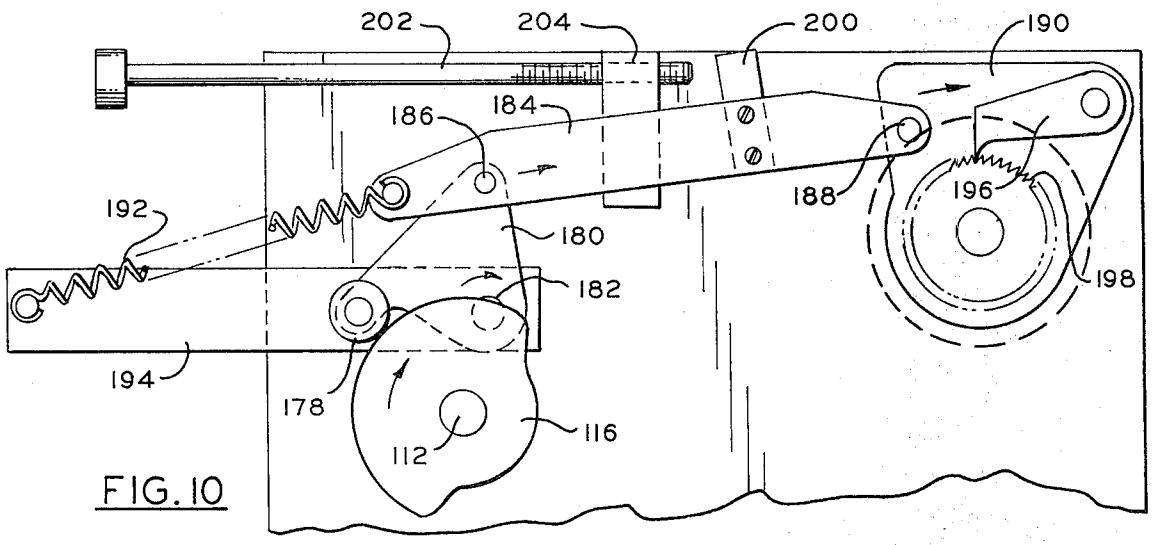

FIG. 10

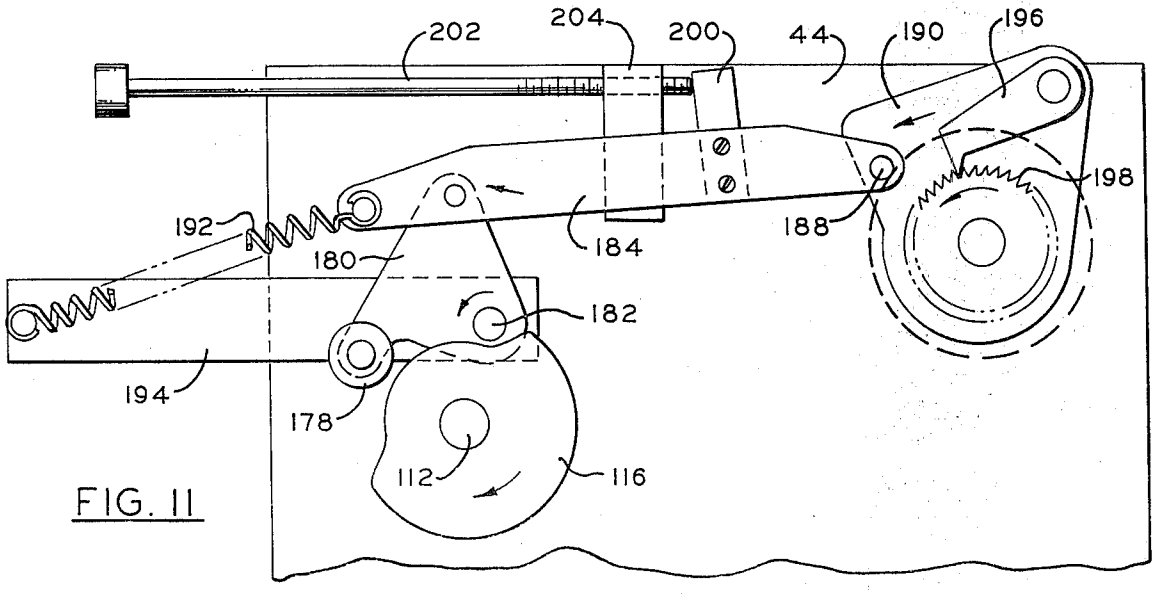

FIG. 11

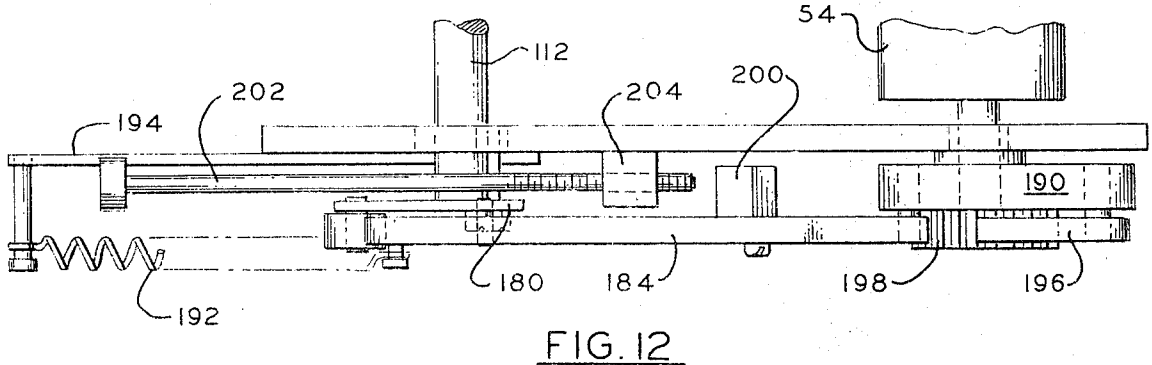

FIG. 12

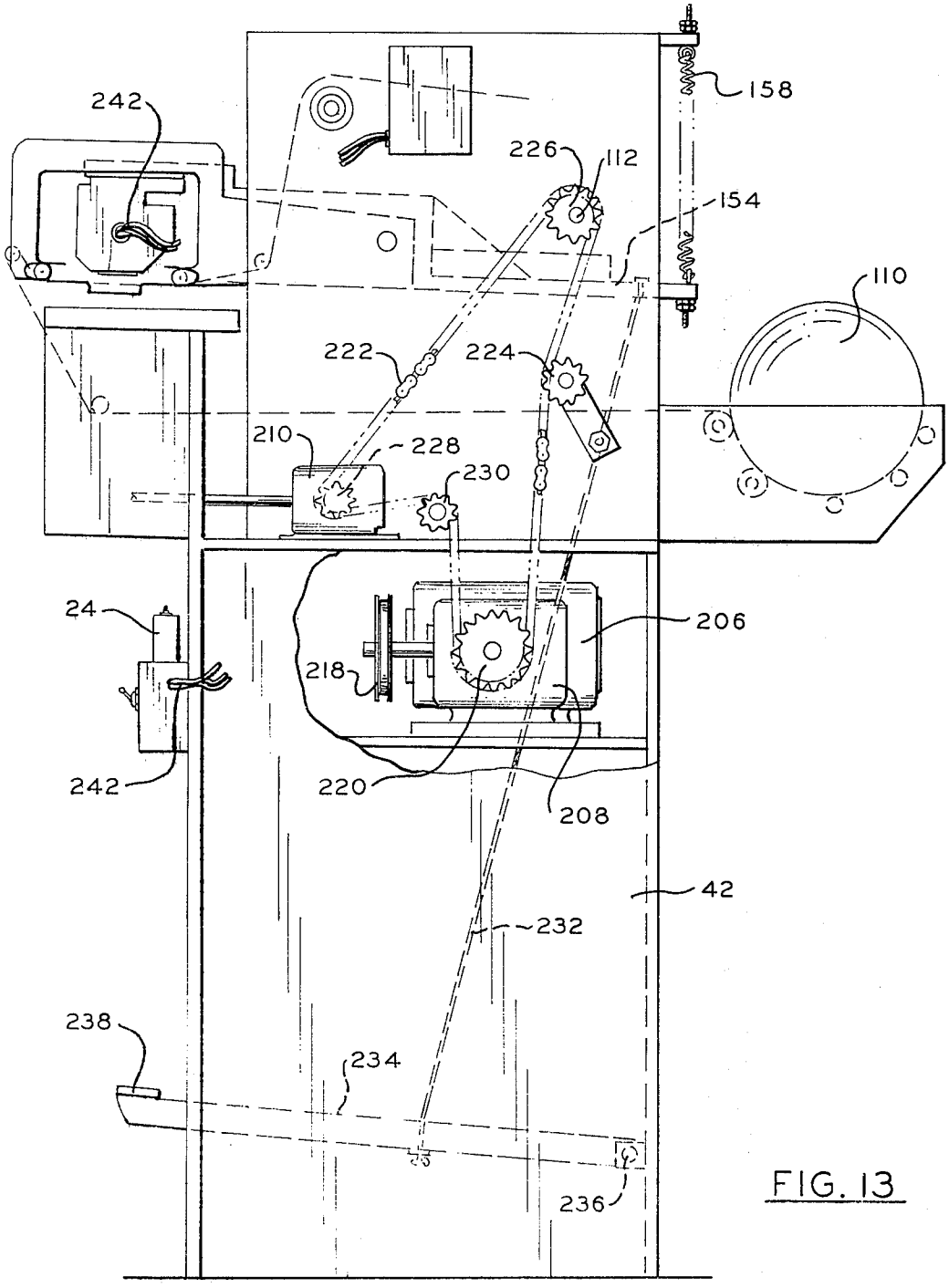
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FIG. 13

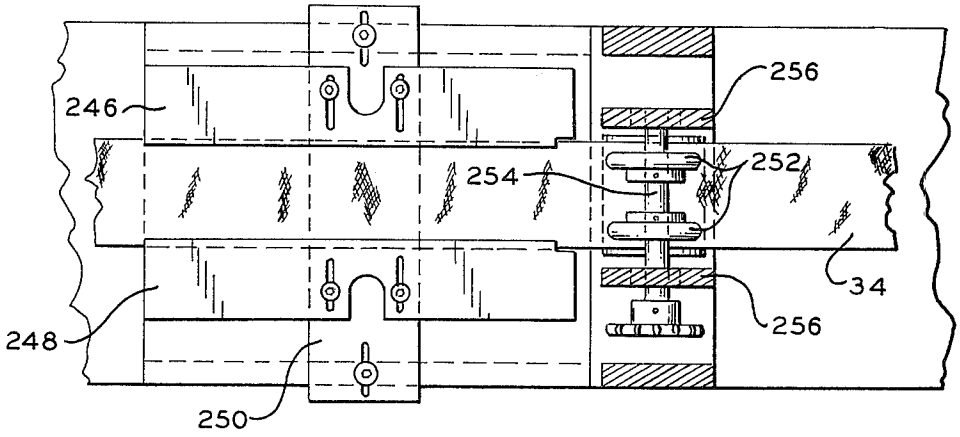
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FIG. 15

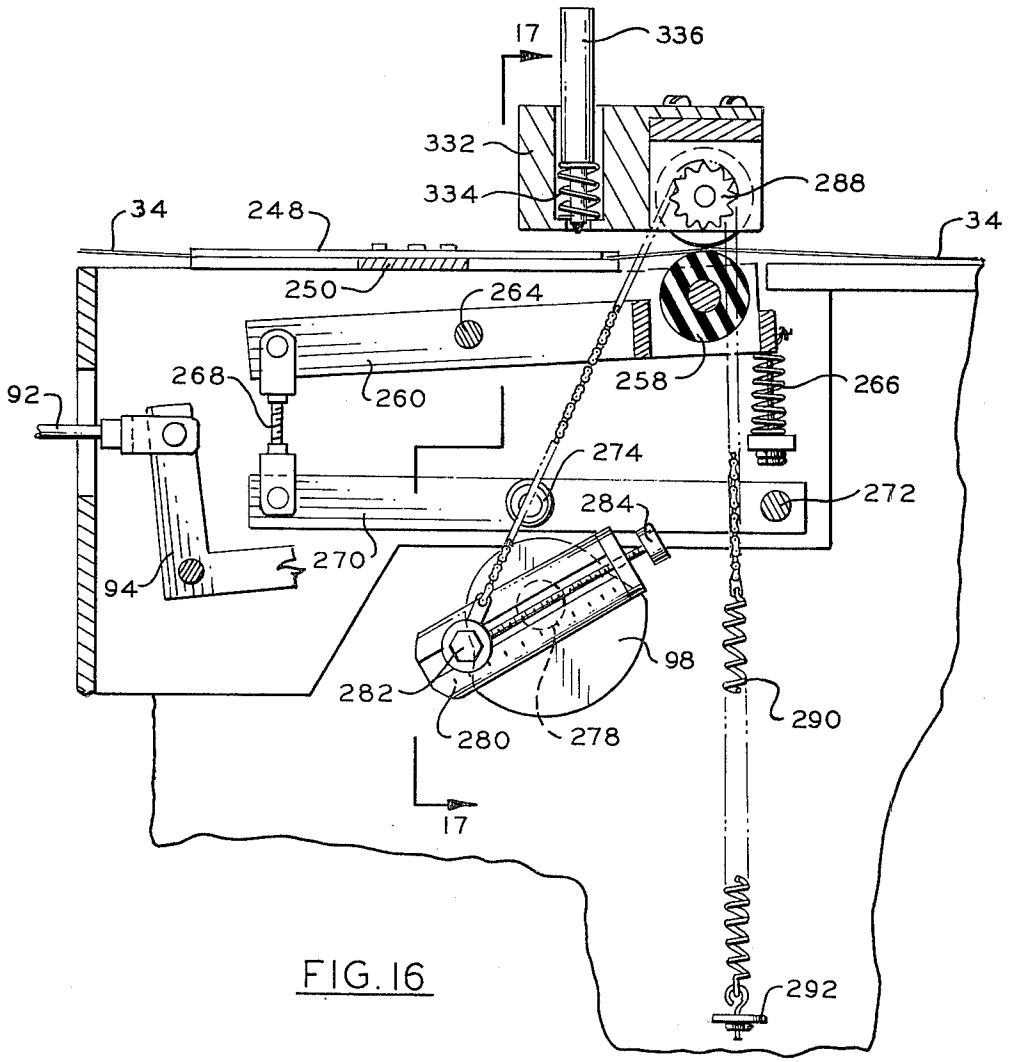
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FIG. 16

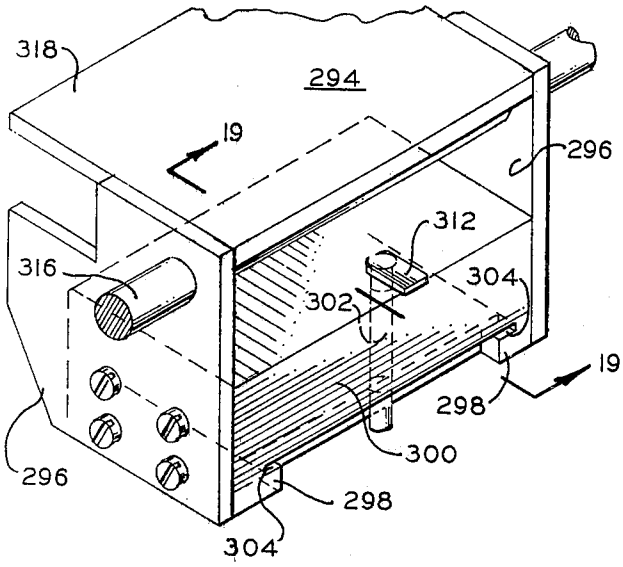

FIG. 18

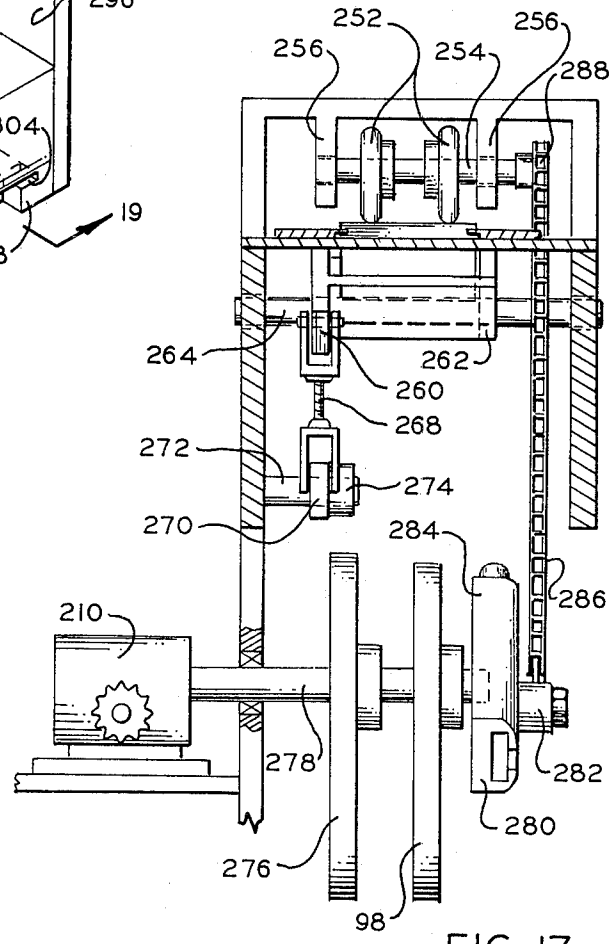

FIG. 17

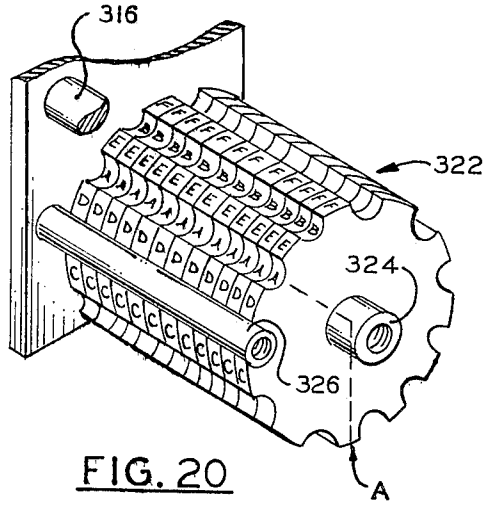

FIG. 20

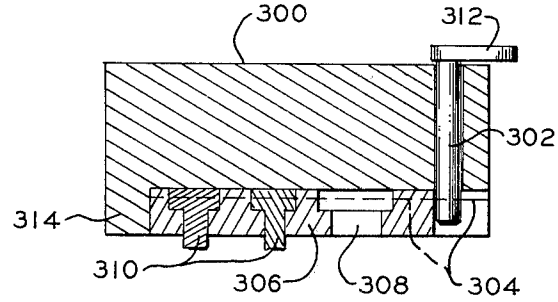

FIG. 19

PRINTING APPARATUS HOLD DOWN MEANS

REFERENCE TO RELATED APPLICATION

This application is a division of application Ser. No. 272,922, filed Sept. 13, 1972, of the same inventors, for Automatic Textile Marking Machine.

BACKGROUND OF THE INVENTION

This invention relates to printing apparatus and, more particularly, to means associated with apparatus for printing on a strip of textile material to prevent sticking together of the strip and a ribbon from which the printing medium is transferred.

In printing operations involving sequential transfer of indicia to a continuous strip of textile fabric, a printing member carrying raised type face and a ribbon with the transfer medium thereon is moved into and out of contact with the strip. The arrangement of parts is such that, as the printing member is moved toward the strip, the ribbon first contacts the strip and continued movement brings the type face into printing contact with the ribbon on the side opposite the strip. The type face may be heated to effect transfer to the strip of the ink or other painting material from the portion of the ribbon contacted by the type.

The printing member is then moved back to its original position with the ribbon spaced from the strip and the type face spaced from the ribbon. Due to the nature of the printing medium the ribbon and textile strip may tend to stick together after contact of the ribbon by the type face. This is particularly objectionable and may result in malfunction in printing apparatus operating at high speeds with the textile strip fed laterally with respect to movement of the printing member between each printing cycle.

Accordingly, it is an object of the present invention to provide printing apparatus wherein a printing member moves a ribbon and type face sequentially in and out of contact with a continuous textile strip fed laterally of the printing member and having means to prevent the ribbon and strip from sticking together.

A further object is to provide simple and economical, yet thoroughly effective means for holding a textile strip in position after transfer thereto of a printing medium from a ribbon as the latter is lifted out of contact with the strip.

Another object is to provide means incorporated and operable with a movable printing member to effect separation of a printing ribbon carried by the member from a strip of material upon which a printing operation is performed as the ribbon is moved out of contact therewith.

Other objects will in part be obvious and will in part appear hereinafter.

SUMMARY OF THE INVENTION

The invention is disclosed in a form embodied in printing apparatus disclosed in the above-referenced parent application. A continuous strip of textile material is intermittently fed through the apparatus which includes four printing stations spaced along the direction of strip advance. At each station a printing member is movable toward and away from the strip which is supported on an underlying planar surface. All four printing members are movable in unison so that printing on four spaced portions of the strip is effected with each movement of the printing members.

A printing ribbon in the form of a continuous, flexible web carries on one surface the printing ink or other transfer medium, one such ribbon being guided over each of the four printing memebers. The ribbons are advanced between each printing cycle, as is the strip, so that a fresh portion of the ribbon is positioned for transfer at the next cycle and the strip is positioned at the next printing station. The directions of movement of the printing members, ribbons and strip are mutually perpendicular.

The printing member over which the ribbon passes carries on each side of the strip contacting portion of the ribbon a resilient member having a central portion extending from the plane of the ribbon toward the strip. As the printing member is moved toward the strip the two resilient members contact the strip on each side of the portion to be contacted by the ribbon. Continued movement of the printing member after contact of the resilient members with the strip deflects the members about fixed end portions thereof, the strip contacting portion being intermediate of the ends. The ribbon is then brought into contact with the strip, between the resilient members, and a printing plate having raised type face is pressed into contact with the ribbon as the printing member reaches its terminal position.

The printing member is then moved in the opposite direction, first moving the plate away from the ribbon and then moving the ribbon away from the strip. Since the resilient members tend to return to their original, unflexed condition, the central portion remains in contact with the strip after the ribbon has been removed. Thus, the strip is held against its underlying support and any adhesion between the strip and ribbon is broken as the ribbon is raised. Continued movement of the printing member raises the resilient members out of contact with the strip prior to longitudinal advance thereof.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** is a perspective view of a four-station label printing machine incorporating the apparatus of the inventions;

FIG. **2** is a fragmentary, plan view of a portion of the textile label tape as it is advanced through the four printing stations;

FIG. **3** is a front elevational view of the upper portion of the apparatus of FIG. **1**;

FIG. **4** is a plan view thereof;

FIG. **5** is a fragmentary, exploded, perspective view of selected elements of the printing machine, including the portion thereof embodying the present invention;

FIGS. **6** and **7** are fragmentary, side elevational views, in section on the line **6—6** of FIG. **4**, showing the printing unit carriage in the retracted and contacting positions;

FIGS. **8** and **9** are fragmentary, side elevational views, in section on the line **6—6** of FIG. **4**, showing the ribbon carriage in the retracted and contacting positions and showing particularly the operation of the present invention;

FIGS. **10** and **11** are side elevational views of a motion transfer mechanism of the printing machine shown in two positions;

FIG. **12** is a top plan view of the mechanism of FIGS. **10** and **11**;

FIG. **13** is a side elevational view of the complete printing machine with portions broken away;

FIG. 14 is a plan view of portions of the printing machine drive system;

FIG. 15 is a fragmentary, plan view of the tape feed portion of the printing machine;

FIG. 16 is a front elevational view of the tape feed portion;

FIG. 17 is a side elevational view taken on the line 17—17 of FIG. 16;

FIG. 18 is a perspective view of a first form of printing unit;

FIG. 19 is a sectional view on the line 19—19 of FIG. 18; and

FIG. 20 is a perspective view of a second embodiment of printing unit.

DETAILED DESCRIPTION

The label printing machine shown in FIG. 1 includes four printing stations, as that term is explained more fully hereinafter. It will be readily appreciated, from an understanding of the disclosed embodiement, that any desired number of printing stations, up to a maximum dictated by practical considerations, may be incorporated. The printing units are arranged in side-by-side relation and are generally indicated in FIG. 1 by reference numerals **10, 12, 14** and **16,** detailed construction and operation thereof being disclosed in connection with other figures.

The printing units each include raised type faces with electrical means for providing heat thereto. Temperature control units **18, 20, 22** and **24** are provided for maintaining the temperature of the respective type faces at a desired level in a conventional manner. A separate strip of printing ribbon is provided for each printing unit and threaded through the apparatus to pass between the type face and the material to be printed upon. A portion of each of the strips, numbered **26, 28, 30** and **32,** may be seen in FIG. 1 adjacent the respective printing units. The printing ribbons are preferably of a standard commercial variety, comprising a paper base having a heat sensitive resin coating of any desired color. As heated type face is pressed against the ribbon, with its coated face against the textile to be marked, the coating is transferred to the cloth and permanently set therein by the heat to produce indicia corresponding to the type face. The width of the ribbon is commensurate with that of the type face to be transferred.

The textile material upon which the inscription is to be printed is supplied in the form of a continuous tape **34,** fed from rotatably mounted supply roll **36,** through a position sensing and indexing mechanism indicated generally by reference numeral **38,** under each of the four printing units and ribbons, and through feed mechanism **40.** The latter grasps tape **34** and pulls it longitudinally through the apparatus in an intermittent manner, between printing cycles.

A fragment of tape **34** is shown in FIG. 2 to illustrate the sequential printing operation. The printing units and ribbons are mounted on reciprocally movable carriages and are driven back and forth between contacting and retracted positions with respect to the tape. Each time the carriages are moved downwardly, the coated face of the printing ribbon contacts the tape and the heated type faces contact the ribbon so that a print transfer takes place at each station, i.e., the position of the tape adjacent each printing unit. The stations are numbered **1, 2, 3** and **4** in FIG. **2** and the direction of travel of the tape indicated by an arrow. As indicated by the example in the drawing, a distinct portion of the total indicia, e.g., a separate line, is applied at each station so that a complete inscription is incorporated on the tape when it leaves station **4.** In a later, separate operation the tape is cut between each inscription to form individual labels, which may be then folded as required and applied to garments or other articles.

Referring again to FIG. **1,** base **42** serves to enclose and support major components of the apparatus. Side plates **44** and **46** also serve as stationary supports and mounting units. Ribbon advance mechanism **48,** shown in detail later, is mounted on side plate **44** and transfers motion from a drive shaft to printing ribbon drive roll **50,** rotatably supported between the two side plates. All of the tape ribbons are held in frictional engagement with ribbon drive roll **50** by respective tension rolls **52, 54, 56** and **58,** mounted for free rotation on the forked end of arms **60, 62, 64** and **66,** respectively. The arms are mounted on shaft **68,** extending rigidly between side plates **44** and **46,** and biased by springs **70, 72, 74** and **76,** respectively, toward engagement of the tension rolls with the ribbon drive roll. The springs are affixed at the ends opposite the connection with the tension arms, to cross piece **78,** rigidly connected between side plates **44** and **46.**

Many of the elements shown generally in FIG. **1** are also seen in the front elevation and plan views of FIGS. **3** and **4,** respectively. Roll **36,** from which tape **34** is fed, is mounted on support **80** as is motor **81.** The tape is fed off roll **36** by movement of motor **81,** and is threaded around a laterally extending portion of arm **82** which is connected to microswitch **84.** The speed and/or shutoff control for motor **81** is connected through microswitch **84** in order to maintain proper loop length in the tape feed and to prevent damage in case of malfunction in the tape feed.

The tape position sensing and index mechanism **38** is also shown in somewhat more detail in FIG. **3.** Feed mechanism **40,** as described in detail later, includes rollers between which tape **34** passes and which alternately engage and release the tape. When the tape is engaged between the feed rolls it is advanced through the apparatus by a distance equal to or slightly longer than the distance between printing stations, i.e., the tape is moved beyond the desired point since the amount of movement imparted by the feed rolls is not precisely controlled. When the feed rolls release the tape, gripper **86** is lowered to engage the tape between the edge of the gripper and the underlying support. Gripper **86** is biased toward engagement with the tape and is movable out of engagement therewith by actuation of solenoid **88.** The gripper and solenoid are mounted on linearly reciprocating carriage **90.** Rod **92** connects carriage **90** with one end of crank arm **94.** The outer end of the crank arm carries follower **96** and is spring biased to maintain the follower in contact with cam **98.**

Rotation of cam **98,** by drive means disclosed later, effects reciprocal rotation of crank **94,** and thus reciprocal linear movement of carriage **90.** Tape **34** is precisely indexed by providing markings thereon at intervals equal to the desired distance of movement at each cycle, sensing the position of such markings by a light-photocell arrangement, a portion of which is indicated by reference numeral **100,** and actuating solenoid **88** in response to sensing of the presence of a mark. That is,

after tape 34 has been fed forwardly and released by the feed rolls, solenoid 88 is deactuated to allow the tape to be engaged by gripper 86. At this time, movement of rod 92 and carriage 90 will be toward the left as seen in FIG. 3. Thus, the tape will be drawn toward the left until one of the markings on the tape is sensed by light-photocell arrangement 100 which, through control box 102, actuates solenoid 88, thereby lifting gripper 86 out of contact with the tape and leaving the latter properly indexed for the next printing cycle. Of course, the amount of overtravel imparted to tape 34 by feed mechanism 40 must be less than the stroke of rod 92; otherwise, the amount of overtravel is not important since the gripper may release the tape at any point in its return (leftward) travel.

In FIG. 4 the individual supply rolls 104, 106, 108 and 110 of printing ribbon are shown. Tension arms 60, 62, 64 and 66 are also shown more clearly, pivoted on rod 68, and cooperating with ribbon drive roll 54. Drive shaft 112 is journaled at each end in side plates 44 and 46, and carries cams 114 and 116. Rod 118 extends rigidly between side plates 44 and 46 only for lateral stability.

Turning now to FIG. 5, two of the major subassemblies of the apparatus are shown in exploded perspective. The upper unit is designated generally by reference numeral 120 and termed the ribbon carriage, while lower unit 122 is termed the type carriage. The two carriages are mounted between side plates 44 and 46 for rotation about a common axis defined by rod 124. Ribbon carriage 120 includes a pair of side members 126 and 128 joined by a plurality of ribbon guide rods 130, 132, 134 and 136. Springs 138 which constitute a major portion of the present invention and are described in more detail later, are supported adjacent members 126 and 128, respectively, by guide rods 132 and 134. positioning blocks 140 and 142 are fixedly attached to the inner sides of the respective side members.

Type carriage 122 likewise includes a pair of side members 144 and 146, through which rod 124 extends and which fit between the side members of ribbon carriage 120. Front cross piece 148 serves as a rigid support for type carriers 150. To rear cross piece 152 is affixed arm 154 which supports cam follower 156. Spring 158 is tensioned between arm 154 and cross piece 78 (FIGS. 1 and 4) to exert a biasing force on type carriage 122 tending to move arm 154 in an upward direction.

As seen in FIGS. 6 and 7, the biasing force of spring 158 urges follower 156 toward contact with cam 114. As drive shaft 112 rotates, the high parts of cam 114 maintains type carriage 122 in the position of FIG. 6, termed the "retracted" position. Printing unit 16 is shown affixed to carrier 150, the latter secured to cross piece 148 of the carriage. Raised type face 160 is removably positioned on the printing unit by means described later, and is heated by conventional electrical means. Block 162 is supported by stiff springs 164, and carries one or more tape backers 166 in registration with type face 160. Backers 166 are made of neoprene, or other suitable material, not rigid but of limited resiliency and capable of withstanding the heat applied by the type face (e.g. 450° F.)

As drive shaft 112 continues to rotate,the low part of cam 114 comes into registration with follower 156, as shown in FIG. 7. As spring 158 urges printing unit carriage 122 toward counterclockwise rotation about rod 124 (as seen in FIGS. 6 and 7) type face 160 presses the ribbon and tape into contact against backers 166. It is preferred that cam 114 leave follower 156, as shown, when type face 160 is in the contacting position to insure a uniform and repeatable pressure. If desired, tension on spring 158, and thus pressure of type face 160, may be altered by adjusting the position of units 168 on threaded hook 170 which supports the spring. Support of block 162 on stiff springs 164 (four springs would normally be provided for each block) provides a self-leveling action, thereby assuring uniform pressure despite irregularities in alignment.

FIGS. 8 and 9 illustrate the retracted and contacting positions of ribbon carriage 120, which is biased by its own weight and by light spring 172 toward rotation in a counterclockwise direction about rod 124. Movement is limited in this direction by contact of positioning block 140 with the upper edge of side member 144 of type carriage 122, and of block 142 with side member 146 on the opposite side, when held in the retracted position by cam 114. Printing unit 16 is shown in dotted lines to illustrate that type face 160 is spaced from ribbon 32 in the retracted position of the carriages, just as the ribbon is spaced from tape 34. As carriage 122 rotates under the biasing force of spring 158, as previously described, ribbon carriage 120 will also rotate with blocks 140 and 142 remaining in contact with side members 144 and 146 until the ribbons contact tape 34. Type carriage 122 continues to rotate the remaining distance until type faces 160 contact the ribbon, thus transferring the printing medium to the fabric of tape 34 as previously described. Continued rotation of drive shaft 112 and cam 114 moves both carriages back to the retracted position, and the cycle is repeated.

It will be noted in FIG. 9 that spring 138 is resiliently compressed against tape 34. Springs 138 are provided in the manner indicated on carriage 120 on each side of all four ribbons (a total of eight springs 138). As the carriages move upwardly after the printing operation, the type faces will first move out of contact with the ribbons, until side members 144 and 146 contact blocks 140 and 142. The ribbons will then move out of contact with the tape. However, springs 138 will still contact tape 34 as they move back to their unflexed configuration. This provides the useful function of holding tape 34 against the underlying support as the ribbons are removed, thus insuring that the tape does not wrinkle or otherwise move in spite of any tendency of the ribbon to stick to the tape after the printing operation. Attention is particularly directed to this portion of the apparatus, wherein major components of the invention, as set forth in the appended claims, are embodied.

Also seen in FIGS. 8 and 9 is the complete path of the ribbon as it is fed from the supply roll, around guide 174, the four guides on the ribbon carriage, and between rolls 54 and 58. After passing between the latter, the used ribbon is allowed to slide down trays 176 to a waste collection receptacle, or the like. The trays may be supported in any convenient manner on the side plates, tension arms, etc.

After each printing operation a fresh portion of ribbon must be positioned between the type faces and the tape. When the carriages are in the retracted position, ribbon drive roll 54 is rotated by an appropriate increment to effect such positioning. The outer surfaces of

roll 54 preferably has a high coefficient of friction to assure that the ribbon will not slip when the drive roll is rotated.

The mechanism for imparting the desired amount of rotation is shown in FIGS. 10–12. Drive shaft 112 and cam 116 rotate continuously in the direction indicated. Follower 178 is mounted on crank 180 which rotates about fixed pivot 182 and is connected to arm 184 at movable pivot 186 and pivot 188 on rotatable element 190, mounted on the same shaft that carries drive roll 54, and biased toward leftward movement as seen in FIGS. 10 and 11 by spring 192. The spring is tensioned between arm 184 and extension 194 affixed to side plate 44. Element 190 carries pawl 196 for engagement with ratchet wheel 198, affixed to the shaft of drive roll 54.

As cam 116 rotates with the high part thereof in contact with follower 178, arm 186 is moved toward the right and element 190 rotates clockwise, as indicated, with pawl 196 riding over the teeth of ratchet wheel 198. When the low part of cam 116 moves into registration with follower 178 (FIG. 11) spring 192 pulls arm 184 to the left until block 200, affixed to the arm, contacts the end elongated screw 202, threaded through block 204 on side plate 44. As arm 184 moves to the left, element 190 is rotated counterclockwise and pawl 196 engages and rotates ratchet wheel 198. Since the latter is affixed to the shaft on which drive roll 54 is mounted, the drive roll is likewise rotated to move the printing ribbons. The increment of movement of the ribbons may be conveniently adjusted by turning screw 202 to position the end thereof for contact by block 200 at the desired point.

In FIGS. 13 and 14 are shown the primary drive system, comprising electric motor 206 and gear boxes 208 and 210. Motor 206 is mounted and movable upon laterally extending lead screws 212 to allow adjustment of the tension on belt 214 which transmits rotation from motor pulley 216 to gear box pulley 218. The output shaft of gear box 208 drives sprocket 220. Chain 222 is trained around drive sprocket 220, tension sprocket 224, sprocket 226 on the end of drive shaft 112, sprocket 228 on the input shaft of gear box 210, and guide 230. Cable 232 extends between arm 154 and lever 234, pivotally connected to base 42 at 236. End portion 238 of lever 234 extends through a slot in base 42 and lever 234 may be depressed conveniently as a foot pedal to rotate carriages 120 and 122 to an inoperative position, with the forward ends thereof raised beyond the retracted position. Sufficient slack in cable 232 permits movement of the carriages between the retracted and contacting positions during normal operation without movement of lever 234. Easier access to portions of the printing units and other elements mounted on the carriages may be had in the inoperative position. A side portion 240 (FIG. 1) of the slot through which end portion 238 extends is provided for releasably retaining the lever with the carriages in the inoperative position. Also shown in FIG. 13 is electrical cord 242 which connects the printing unit to the voltage source through temperature control units 18, 20, 22 and 24. Block 244 in FIG. 14 indicates the housing for electrical power supply and control components.

Tape 34 is guided laterally at each end of the apparatus by grooves through which the edges of the tape travel. The grooves are defined by the underlying support and a pair of plates affixed in spaced relation, the plates adjacent the tape feed mechanism end of the apparatus being shown in FIG. 15 and designated by reference numerals 246 and 248. Plates 246 and 248 are adjustably secured to laterally extending adjustment plate 250 by screws extending through elongated slots in the plates. Plate 250 is similarly secured to the underlying support, thus allowing adjustmemt of the spacing between the grooves, if a different width of tape is to be used, or of the lateral position of the grooves while maintaining the same spacing.

A pair of gripper rolls 252 are affixed to shaft 254 which is journaled in supports 256. Tape 34 passes between gripper rolls 252 and friction roll 258, as seen in FIG. 16, the latter being mounted on a shaft resting in grooves in spaced arms 260 and 262 (FIG. 17). Shaft 264 serves as a pivotal mounting for arms 260 and 262 which are biased by spring 266 toward movement in a counterclockwise direction as seen in FIG. 16. That is, the spring is compressed and urges the ends of the arms carrying the friction roll in an upward direction, toward engagement thereof with tape 34.

Arm 260 is connected by linkage 268 to one end of arm 270, mounted at the other end for pivotal movement about stub shaft 272 and carrying follower 274 at a central location. Cam 276 is carried on output shaft 278 of gear box 210, as is cam 98 previously described in connection with FIG. 3. Cam 276 cooperates with follower 274 to effect reciprocal rotation of arm 270, and thus of arms 260 and 262 about their respective pivotal mountings. Whe the high part of cam 276 engages follower 274, arms 260 and 262 are rotated against the force of spring 266 to move friction roller 258 out of engagement with tape 34.

Arm 280 is also carried on the end of shaft 278 for rotation therewith. Element 282 is positionable a variable distance from the center of rotation of arm 280 by means of the setting of screw 284. Chain 286 is secured at one end to element 282, passes over sprocket 288, and is connected to spring 290 at the other end. The spring is anchored at 292, whereby rotation of arm 280 and the bias of spring 290 produce reciprocal movement of chain 286 and reciprocal rotation of sprocket 288 and gripper rolls 252. When the low part of cam 276 is in registration with follower 274, tape 34 is frictionally engaged between roll 258 on the lower side and rolls 252 on the upper side; the direction of rotation of rolls 252 at this time is such that tape 34 is longitudinally advanced through the apparatus. When the high part of cam 276 engages follower 274, roll 258 is moved out of engagement with tape 34, which remains stationary as the direction of rotation of rolls 252 is reversed.

In FIGS. 18–20 are shown two embodiments of type units to be mounted on type carriage 122. The embodiment of FIGS. 18 and 19 incorporates a flat plate carrying the individual dies or lines of type face. Upper plate 294 is appropriately secured to side plates 296, each having inwardly directed flanges 298 to define grooves along the sides of the printing unit, into which may be inserted lateral edges 304 of plate 306 having one or more appropriately shaped openings 308 for accepting printing dies carrying raised type face 310. Pin 302 includes manually engageable tab 312, extending over block 300 to facilitate lifting the pin to permit sliding withdrawal and insertion of plates such as 306. When in operating position the plates are retained between pin 302 and rear portion 314 of block 300.

The printing units are supported upon rod **316** which extends through openings in the side plates. Rod **316** is also shown in FIG. **3**, extending laterally across the apparatus, and in section in FIGS. **6** and **7** wherein details of mounting of the type units, comprising the type face and supporting structure, is shown in detail. Each unit is slidable laterally on rod **316** and is retained against pivotal movement about the shaft by engagement of lips **318** in a groove defined by holder **150** and plate **320**, secured thereto in spaced relation. Rod **316** may be supported with respect to printing unit carriage **122** by supports at the center, and end supports which are removable to permit the individual type units to be removed when necessary.

The type unit embodiment of FIG. **20** comprises a plurality of separate disks, indicated collectively by reference numeral **322**, each carrying a plurality of circumferentially spaced raised characters and rotatably mounted on spindle **324**. A fragment of rod **316** is also shown in FIG. **20**, to indicate that the type units are mounted on the carriage in essentially the same manner as that previously described. Locking spindle **326** is removably secured to one or both end plates of the type unit and may be removed to allow rotation of the individual disks to place the desired type face in the lowermost, or printing position. Indicia are also preferably provided in the grooves between the raised type so that the characters in the groove immediately above locking spindle **326** correspond to those of the type face in printing position, as indicated by the dotted line. Thus, the individual characters of the type face in printing position may be conveniently observed from above.

A type unit of the rotatable disk type, while more expensive than a flat plate or die, is susceptible of a wide variation of printed indicia merely by repositioning the disks, On the other hand, a new plate, or new type characters must be provided each time the inscription is to be changed when using flat dies or plates. The use of rotatable disk type units would not be possible in a single station marking machine wherein two or more closely spaced lines are to be printed. Thus, the multistation machine of the present invention makes possible the use of more versatile and ultimately more economical type units than prior art machines of this type.

An additional feature of the machine is counter **328**, seen in FIGS. **1** and **3**. The counter is incremented each cycle to indicate the number of complete labels printed, beginning with the fourth cycle after start-up, when the first label is completed in the four-station machine disclosed. An automatic shut-off may also be incorporated with the counter to stop the machine after a desired number of labels have been printed so that the indicia at one or more printing stations can be changed for the next group of labels.

Still another feature, shown in FIG. **16**, is a convenient means for marking portions of tape **34** which are to be scrapped. Marking pen **336** extends loosely into an opening in block **332** and is supported by spring **334**. An inspector may, upon observing defective labels entering the feed mechanism, press down on pen **336** to compressing spring **334** and bring the point of the pen into contact with the textile tape, marking it as scrap. As soon as pen **330** is released it will be moved by spring **334** out of contact with the tape.

From the foregoing disclosure it may be seen that the invention provides means for printing textile labels in a fully automatic manner which is reliable and efficient, as well as economical. The present invention, providing resilient means to hold the tape in position as the printing ribbon is pulled away contributes to reliability and efficiency of the machine by insuring that the tape does not wrinkle or otherwise tend to get out of alignment or registration in spite of any tendency of the heated ribbon to stick to the tape as it is moved away.

What is claimed is:

1. Apparatus for imprinting an inscription on a textile material by transferring a printing medium from a continuous strip of printing ribbon pressed into contact with said material by raised type face corresponding to the inscription, said apparatus comprising, in combination:

a. first movable support means definingg a path for said printing ribbon and movable to bring said ribbon alternately between spaced and contacting positions with respect to said material;

b. second movable support means for mounting said type face and cooperatively movable with said first support means to move said type face from a spaced position into contact with said ribbon after movement of the latter into contact with said material and to move said type face back into a spaced position with respect to said ribbon prior to movement of the latter out of contact with said material; and

c. resilient means movable with said first and second movable support means between a position spaced from said material and a position contacting said material and a position contacting said material closely adjacent said ribbon, said resilient means being constructed and arranged to remain in contact with said material until after said ribbon is moved out of contact therewith.

2. The invention according to claim **1** wherein said ribbon contacts a discrete portion of said material, when in contact therewith, and said resilient means contacts said strip on both sides of said portion.

3. The invention according to claim **2** wherein said resilient means comprise a pair of springs mounted on said first support means on opposite sides of said ribbon and having portions normally extending toward said material from the plane of the portion of said ribbon which contacts said material.

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