United States Patent [19]

Bosshardt

[11] **3,804,012**

[45] **Apr. 16, 1974**

[54] **INK SUPPLY WITH MOTION ACCUMULATOR FOR STENCIL DUPLICATOR**

[75] Inventor: **William Bosshardt,** Armonk, N.Y.

[73] Assignee: **Bohm Benton Inc.,** Mineola, N.Y.

[22] Filed: **Oct. 21, 1971**

[21] Appl. No.: **191,369**

Related U.S. Application Data

[62] Division of Ser. No. 873,042, Oct. 31, 1969, Pat. No. 3,652,083.

[52] **U.S. Cl.** **101/122,** 101/119, 101/366, 222/52

[51] **Int. Cl.** **B41l 13/08,** B41f 31/02

[58] **Field of Search** 101/366, 44, 119, 122; 222/52, 61, 63, 70, 162, 383, 385; 74/84

[56] **References Cited**

UNITED STATES PATENTS

3,608,483	9/1971	Kaminstein	101/366
2,821,910	2/1958	Mazzio et al.	101/132.5
3,521,560	7/1970	Schmidlin et al.	101/145
3,242,860	3/1966	Gates	101/366
2,787,216	4/1957	Gates	101/366
3,439,609	4/1969	Dorr	101/366
2,893,318	7/1959	Kreher	101/366
1,081,429	12/1913	Bullis	101/366 X
3,154,218	10/1964	Aubert	222/70
3,133,673	5/1964	Buss	222/70
2,143,886	1/1939	Kline	101/366
1,598,759	9/1926	Wilson	101/366
396,471	1/1889	Derby	101/366
362,966	5/1887	Hyatt	101/366 UX
3,345,943	10/1967	Rakowicz	101/366
3,312,165	4/1967	Strom	101/119
3,090,302	5/1963	Johnson	101/366 X

FOREIGN PATENTS OR APPLICATIONS

789,785	1/1958	Great Britain	101/366

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—R. E. Suter
Attorney, Agent, or Firm—Amster and Rothstein

[57] **ABSTRACT**

An automatic inking system in a twin cylinder stencil duplicator including a movable ink stand having a disposable sealed ink container mounted thereon and an indexing mechanism operatively connected to the stand for effecting step-by-step movement of the ink container against its cover which acts as a piston. The indexing mechanism is actuated in response to a predetermined and preset number of revolutions of the main shaft of the machine thereby adjusting the inking rate in accordance with paper type and degree of coverage required.

5 Claims, 11 Drawing Figures

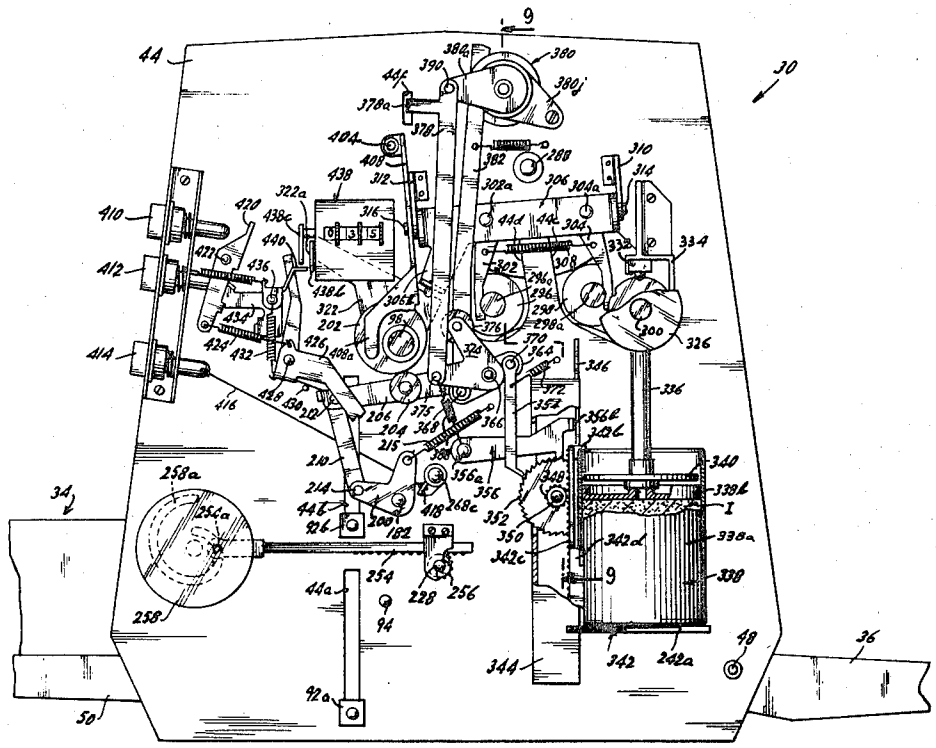


FIG. 1.

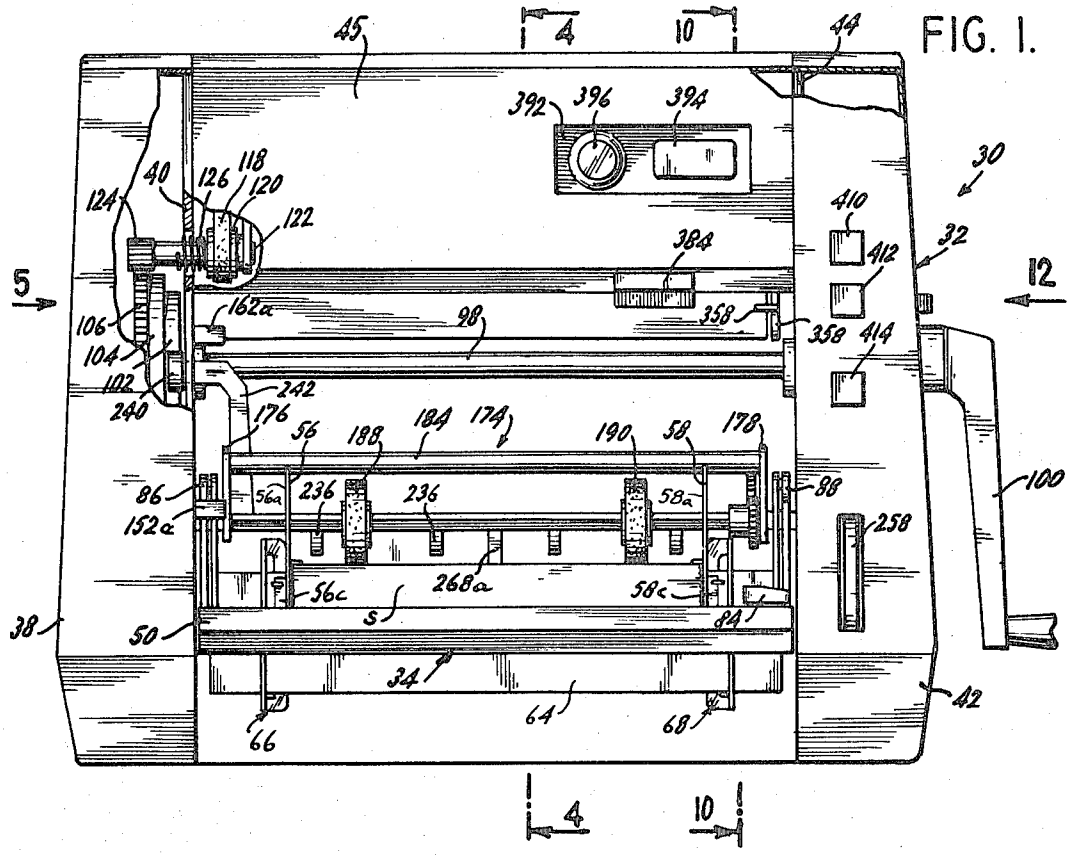


FIG. 2.

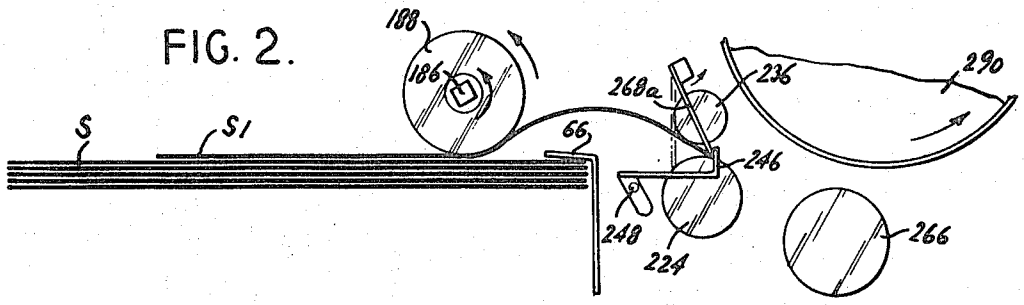
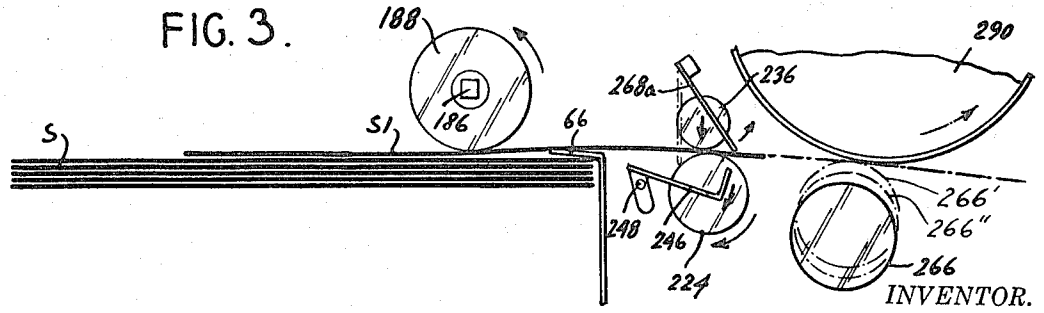


FIG. 3.



INVENTOR.
WILLIAM BOSSHARDT
BY
Amster Rothstein
ATTORNEYS

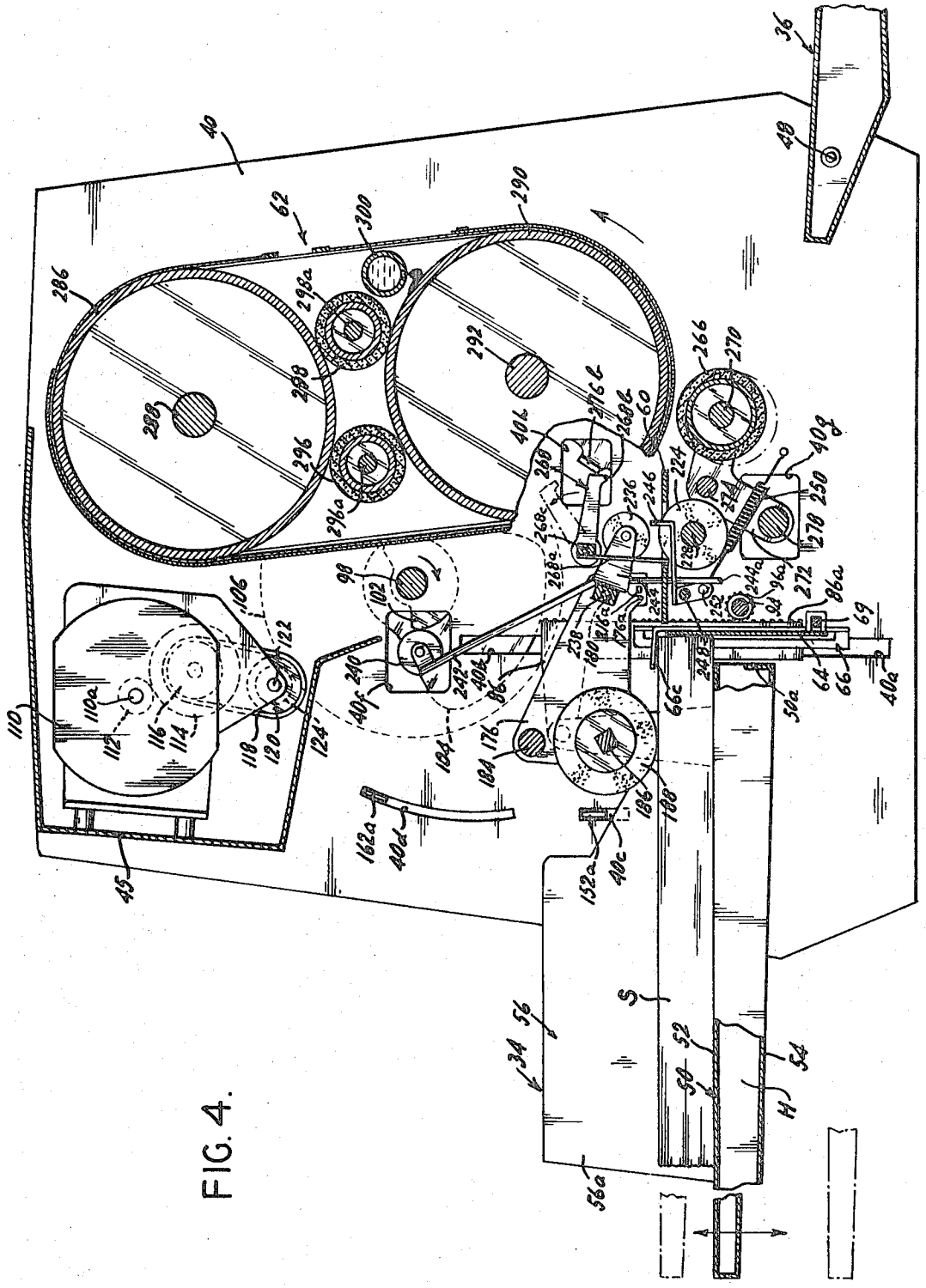


FIG. 4.

FIG. 5.

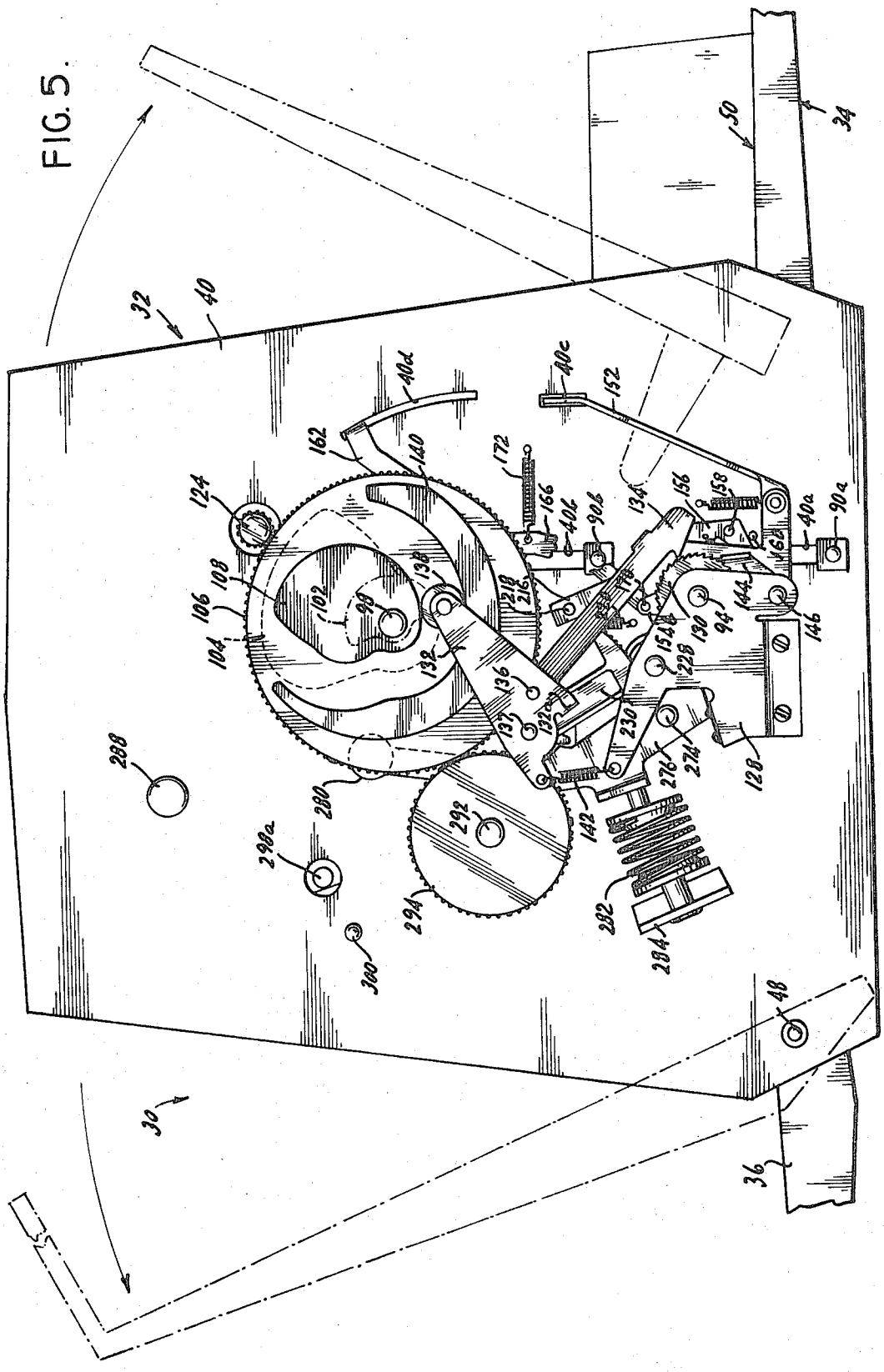

32
40
50
34
30
36
48
124
108
106
104
102
98
138
132
136
137
132a
140
162
172
166
40d
90b
40c
152
134
156
158
168
40a
90a
144
146
94
130
154
228
230
274
276
128
142
288
280
298a
292
294
300
282
284

FIG. 6.

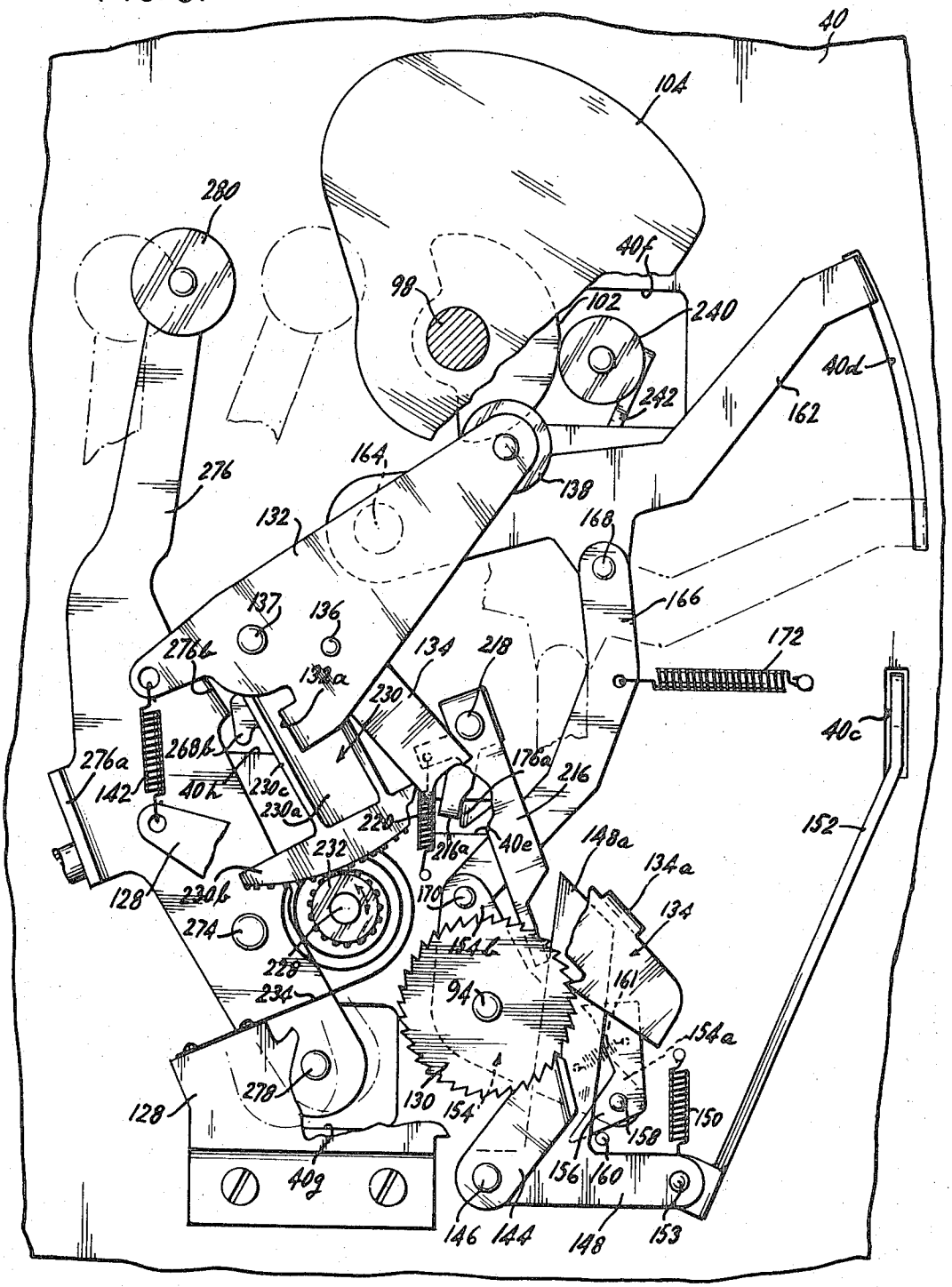

40
104
280
40f
98
102
240
242
40d
162
164
276
138
132
168
166
137
136
172
276b
134
218
138a
230
40c
276a
268b
142
40k
230c
230a
176a
216
152
220
216a
40e
148a
232
134a
128
230b
170
134
274
164
228
161
234
94
154a
278
130
154
150
128
158
156
160
40g
146
144
148
153

FIG. 7.

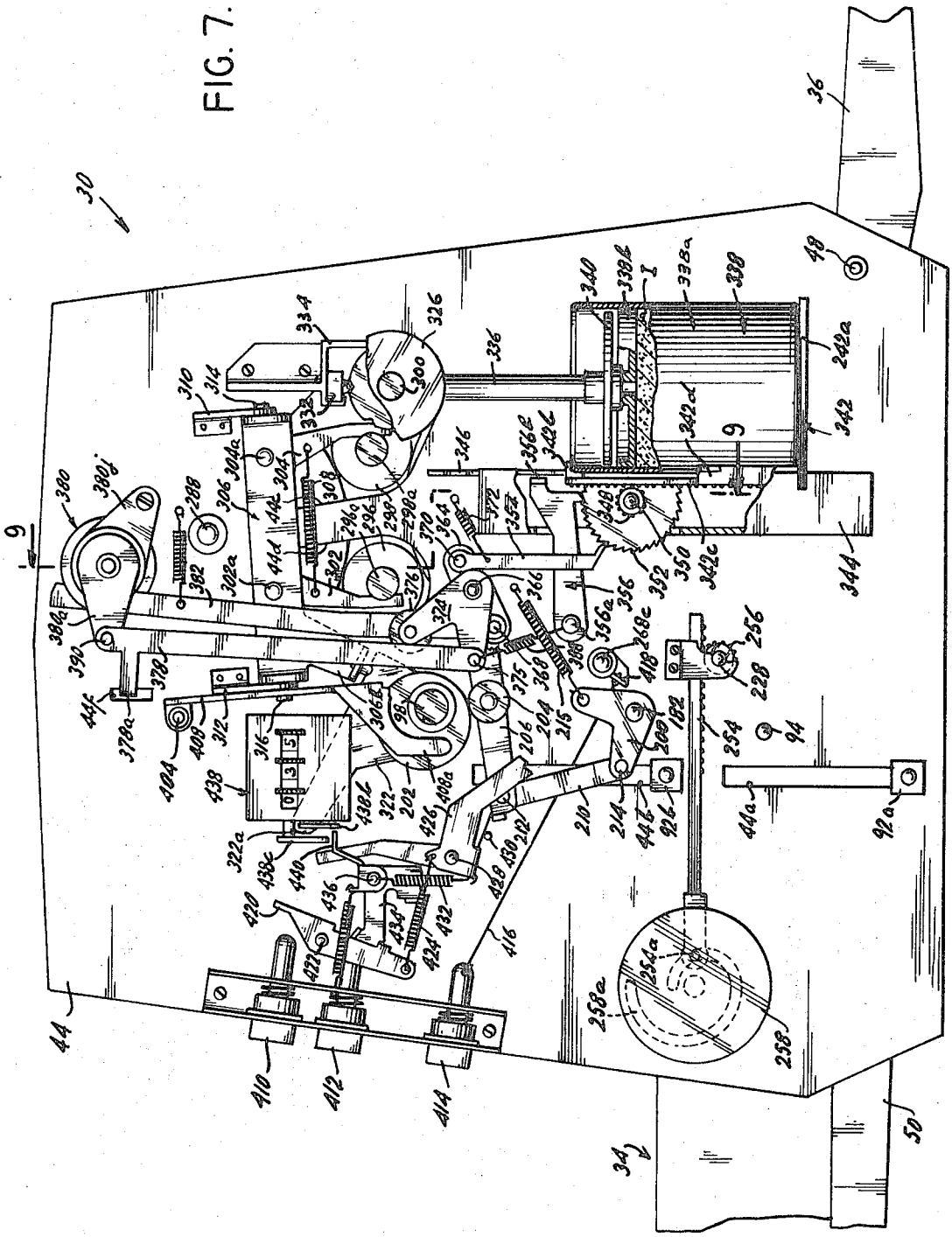


FIG. 8.

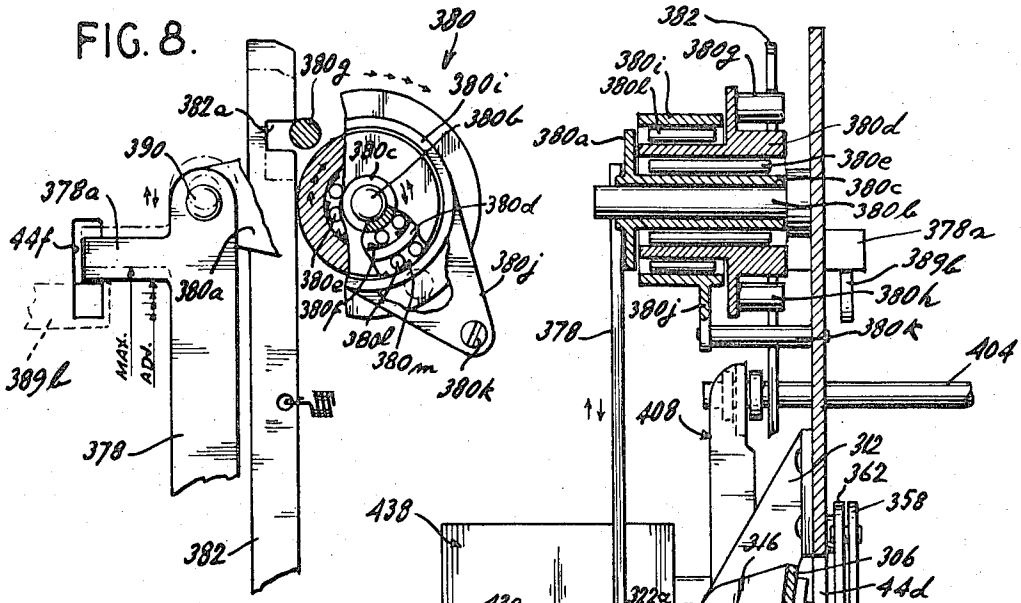
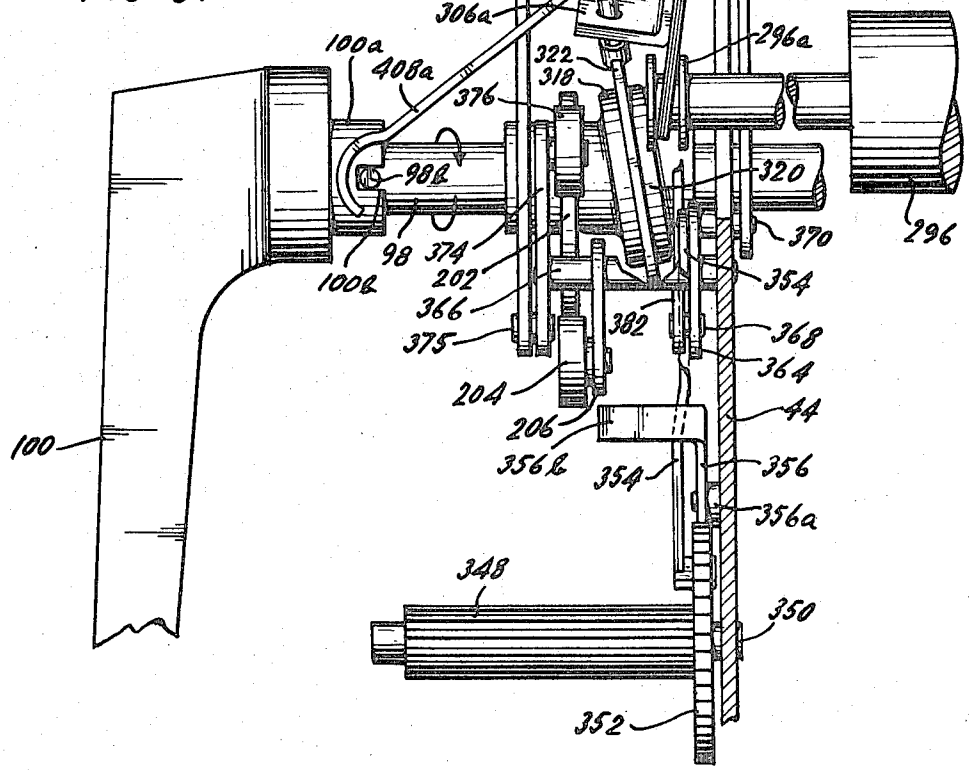

380
382
380g
380i
380b
382a
390
380c
380d
378a
44f
380a
380e
380f
380l
380m
380k
380j
389b
MAX.
ADJ.
378
382
380l
380a
380d
380e
380c
380b
378a
389b
380h
380j
380k
378
404
408
312
362
358
438
316
306
44d
438c
322c
302a
302
438b
308
324
306b
306a
296a
322
318
376
320
370
296
354
368
364
44
356
356a
348
350
352

FIG. 9.


100a
408a
98b
98
374
100b
202
366
375
204
206
356b
100
382
354
348
352

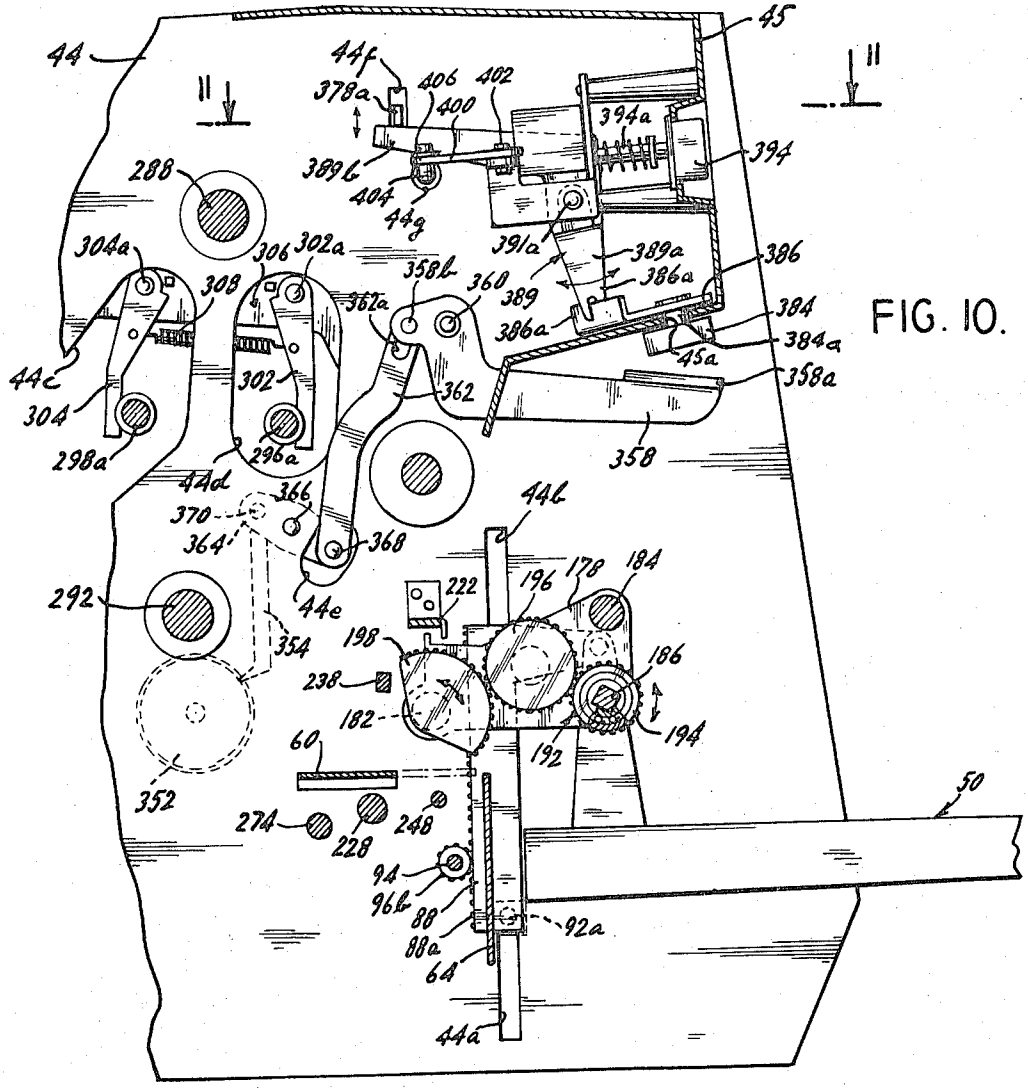

44
45
II
II
44f
406
402
378a
400
394a
394
389b
404
44g
288
391a
389a
386
386a
304a
306
302a
308
358b
360
389
384
362a
386a
384a
44c
304
302
362
45a
358a
298a
296a
358
44d
366
370
364
368
44b
292
222
196
178
184
44e
198
354
186
238
182
194
192
60
352
50
274
228
248
94
96b
88
92a
88a
64
44a

FIG. 10.

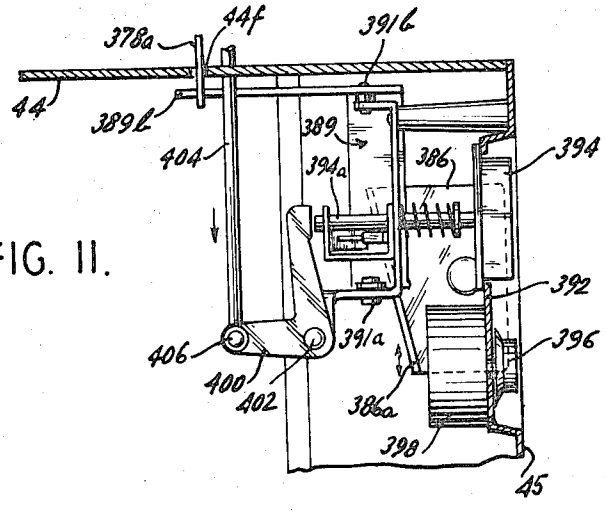

378a
44f
391b
44
389b
389
404
394a
386
394
392
391a
396
406
400
402
386a
398
45

FIG. 11.

INK SUPPLY WITH MOTION ACCUMULATOR FOR STENCIL DUPLICATOR

This application is a division of copending U.S. patent application Ser. No. 873,042, filed Oct. 31, 1969 now U.S. Pat. No. 3,652,083 and assigned to the same assignee.

The present invention relates generally to printing machines, and in particular to a twin cylinder stencil duplicator for printing from a stencil master.

Among the equipments available for producing relatively large numbers of copies at relatively low cost are the so-called single cylinder and twin cylinder stencil duplicators, also known as mimeograph machines. In the typical single cylinder machine, there is provided a hollow inking drum which is perforated in its cylindrical surface and provided with an ink pad through which ink penetrates through a stencil mounted on the drum to the paper sheets as they are fed. The second type is the twin cylinder stencil duplicator in which two cylinders are mounted in spaced parallel relation around which a silk screen stencil carrier is mounted. Provision is made for applying a sufficient amount of ink to the surface of the cylinders for transfer to the copy paper through the silk screen and thereafter through the stencil and onto the impression paper during the printing function.

Twin cylinder stencil duplicators can use a viscous paste ink which tends not to leak and produces good quality mimeograph copies. They can be operated by untrained office personnel with little instruction. The fully automatic stencil duplicators that minimize the skills required by the operator have steadily become more complex mechanically and more expensive until in some cases they approach the cost of offset duplicators. However, if it were possible to provide a twin cylinder duplicator of simplified design and comparatively low cost which was easy to operate and could produce good quality copies with minimum operative complexity and servicing requirements, such a machine would find broad acceptance.

Accordingly, it is an object of the present invention to provide a twin cylinder stencil duplicator which realizes one or more of the aforesaid objectives. Specifically, it is within the contemplation of the invention to provide a twin cylinder stencil duplicator which provides all the functional, sensing and control features for machines of this type, yet is of relatively simple construction and is capable of mass production manufacture at a relatively low unit cost.

It is a further object of the invention to provide an improved duplicating machine of this type which incorporates an automatic inking system with the capability of adjusting inking rate in accordance with paper type and degree of coverage required.

In accordance with the present invention, provision is made to provide the requisite ink supply for all machine speeds and copy characteristics. Ink feeding requirements vary as a function of copying speed, type of paper being printed and the degree of ink coverage for the copy being duplicated. Advantageously, the present machine incorporates an automatic inking system which is much less complicated than comparable systems on existing twin cylinder equipments, is reliable and trouble-free in operation and is readily adjusted by the operator to provide the amount of ink required. The machine includes a movable ink stand having a disposable sealed ink container mounted thereon. An indexing mechanism is operatively connected to the stand for effecting step-by-step movement of the ink container against its cover which acts as a piston, to supply ink in discrete amounts. Actuating mechanisms, including motion transfer means, are operatively connected to the indexing mechanism and are operative in response to a predetermined and preset number of revolutions of the main shaft of the machine for imparting an indexing stroke to the indexing mechanism to effect ink dispensation. By a simple manual adjustment, the operator can preset the automatic inking mechanism to deliver more or less ink to the printing mechanisms in accordance with various printing requirements. Alternately, the automatic inking can be disengaged and ink provided by a hand-operated lever.

The above brief description, as well as further objects, features and advantages of the present invention will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment demonstrating the present invention, when taken in conjunction with the accompanying drawing, wherein:

FIG. 1 is a front elevational view of an improved duplicating machine embodying features of the present invention, with some parts broken away;

FIG. 2 is a diagrammatic view taken longitudinally through the machine and showing the relationship of the paper feeding and paper control mechanisms at the start of paper feed;

FIG. 3 is a view similar to FIG. 2 but further advanced in the paper-feeding cycle;

FIG. 4 is a medial sectional view, on an enlarged scale, taken substantially along the line 4—4 of FIG. 1 and looking in the direction of the arrow;

FIG. 5 is an elevational view taken from the left of FIG. 1 as indicated by the directional arrow, with the left cover removed and the front and rear covers swung to their respective open positions and showing the mechanisms mounted on the left side plate of the machine;

FIG. 6 is an enlarged elevational view similar to FIG. 5 but with parts removed for clarity;

FIG. 7 is an elevational view of the right side of the machine taken along the directional arrow 12 in FIG. 1, with the right side cover removed, with the front and rear covers shown respectively in their open positions and illustrating the mechanisms mounted on the outer side of the right side plate of the machine;

FIG. 8 is an enlarged elevational view of a portion of the mechanisms shown in FIG. 7;

FIG. 9 is a sectional view, on an enlarged scale, taken substantially along the line 9—9 of FIG. 7;

FIG. 10 is a sectional view taken substantially along the line 10—10 of FIG. 1, with parts broken away, showing the mechanisms mounted on the inner side of the right side plate of the machine;

FIG. 11 is a sectional view taken along the line 11—11 of FIG. 10 and looking in the direction of the arrows.

Referring now specifically to the drawings, and in particular to FIGS. 1 to 6, the present duplicating machine, which is generally designated by the reference numeral 30, is seen to include a housing 32 having a pivoted front cover and paper feed tray assembly 34 (see FIG. 4), a pivoted rear cover and paper-receiving tray assembly 36, a removable left side cover 38

mounted to house the mechanisms supported on the left side plate **40** of the machine and a removable right side cover **42** mounted to house the mechanisms mounted on the right side plate **44** of the machine. Straddling the machine is a removable front top cover **45** which is mounted on the left and right side plates, as by easily disengaged machine screws. As seen best in FIG. **5** and as shown by the dotted lines and indicated by the respective directional arrows, the front cover and tray assembly **34** and the rear cover **36** may be swung to their respective closed positions wherein they cooperate with the remainder of the housing **32**, including side covers **38, 42** and front top plate **45** to completely enclose the duplicating mechanisms and to form a dust-proof case. The front cover and tray assembly **34** is pivotally mounted at opposite side pivots which are in turn movably mounted on the frame of the machine such that assembly **34** may be swung to its horizontal and operative position. The rear cover **36** is directly pivoted on the frame of the machine at side pivots **48** and may be swung about its pivots to a horizontal position projecting rearwardly of the machine **30** in which position it serves as the receiving tray for the machine.

The front cover and feed tray assembly **34** is operable successively to deliver the topmost sheet from a paper stack along a predetermined feed path to the duplicating mechanisms of the machine.

Assembly **34** includes a tray platform **50** which includes top platform wall **52** and bottom platform wall **54** which are spaced apart and define a mechanism-receiving housing H therebetween. Projecting upwardly from and movably mounted on platform **50** (which is horizontal in the operative position of the machine) are left and right paper guides or tray sides **56, 58** which are adjustable towards and away from each other in accordance with stack width to laterally position and guide the paper stack therebetween. The symmetrically disposed and adjustable tray sides **56, 58** respectively include upstanding guide flanges **56***a*, **58***a* and horizontal support flanges **56***c* and **58***c*, the latter overlying and resting against the top platform wall **52.**

Extending from side to side of the machine at a location spaced in the direction of feed from the tray platform **50** is a horizontal fixed feed table **60** along which the topmost sheets pass in succession to the duplicating mechanisms **62.** Fixed feed table **60** is fixed to the opposite side plates **40, 44** of the machine in any appropriate fashion and is at a fixed level in relation to the duplicating mechanisms **62** for guiding the topmost sheets along the requisite feed path to the duplicating mechanisms **62.**

Fixed to and depending from feed table **60** is an upstanding stack-abutment wall **64** against which the leading end edges of the stack of paper stock S abuts when the feed tray is loaded. The stack-abutment wall **64** is mounted such that it may serve as an unobstructed guide track for left and right corner separator assemblies **66, 68** which are of identical and mirror image construction and are symmetrically disposed relative to the longitudinal center line of the adjustable tray **50,** and side guides **56, 58.**

The corner separator assemblies **66, 68** are laterally adjustable in two ways: simultaneously with and independently of the respective side guides **56, 58.** At any adjusted position of the side guides **56, 58,** the corner separator assemblies **66, 68** are independently adjustable to overlap the left and right front corners of paper stack S in varying amounts in order to provide adjustable interference at the front corners of the stack S to assure proper feed for different paper weights and stiffness, machine feed rate, etc.

Turning now to a consideration of the machine's main drive, as shown in FIG. **1,** there is provided a main shaft **98** which extends from side to side of the machine above the tray assembly **34** and forwardly of the duplicating mechanism **62** and is journalled in appropriate bearings on the opposite side plates **40, 44** of the machine. Main shaft **98** extends through the right side plate **44** and through the right side cover **42** and carries a disengageable handle **100.** Additionally, main shaft **98** extends beyond left side plate **40** into the adjacent housing where it carries, in succession from plate **40** outwardly, idler-actuating cam **102,** impression roller release cam **104,** main drive gear **106** and second feed roller drive cam **108.** In lieu of manual turning of the main shaft **98** by crank **100,** provision is made for a motor to drive main drive gear **106.** As seen in FIGS. **1** and **4,** the motor and reduction gear assembly and related parts are all behind front top plate **45** and coupled by obvious reduction and coupling arrangements **112, 114, 116, 118, 120** and **122** to driving pinion **124** engaging main drive gear **106.** Spring clutch **126** is provided such that the motor **110** and reduction gears are effectively decoupled from the main drive and main shaft **98** when the machine is turned by crank **100.**

The machine may be provided as either hand-operated or motor-driven. However, since motor **110** and all related components, including reduction gearing, clutch, controls (i.e., controls **394, 396**) are all mounted on front top plate **45,** a manually operated machine may be converted to motorized operation by the simple substitution of the appropriate top plate **45** containing the motor and related components and utilizing predrilled holes in the left side plate **40** of the machine frame for wiring and line plug.

Moving along the paper feed path to the duplicating mechanisms **62,** there is provided a second pair of feed rollers **224,** (only one of which is shown is FIG. **4**) which are received in corresponding cutouts formed in feed table **60,** with feed rollers **224** being faced with rubber or any other appropriate elastomeric material and projecting through the cutouts to contact the bottom of the sheet being fed into duplicating mechanisms **62.** The second pair of feed rollers **224** is fixed to a feed roller shaft **228** appropriately journalled on the side plates **40, 44,** with the shaft extending into the housings at the left and right of the machine, as seen in FIGS. **5** and **7.** As shown in FIG. **6,** drive is periodically imparted to feed roller shaft **228** from the main shaft **98** of the machine via an adjustable lost-motion mechanism which includes driving rack **230,** drive gear **232,** coiled biasing spring **234,** follower lever **132** to produce lost motion travel of tab **132***a* relative to follower **230***c*, and permits the adjustment of the sheet feed in relation to the duplicating mechanisms **62** to achieve varying registrations between the sheets fed and the stencil or master, as shown in U.S. Pat. No. 3,652,083.

Successive sheets of paper are clamped against the feed rollers **224** by an idler or pinch roller assembly which includes a plurality of pinch rollers **236** (FIG. **4**) mounted on a pinch roller shaft **238** journalled coaxi-

ally with pivots **180, 182.** To feed paper, pinch rollers **236** are rocked in the counterclockwise direction about their pivots; as shown diagrammatically in FIGS. **2** and **3**, pinch rollers **236** engage the sheet of paper trapped between feed rollers **224** and the pinch rollers. The sheet is fed into duplicating mechanisms **62** in response to actuation of the second feeding rollers **224.** The pinch rollers **236** are raised and lowered under control of cam **102**, FIGS. **1** and **4**, through provision of cam follower roller **240** mounted on follower arm **242**, which projects through cutout **40***f* in side plate **40** and engages cam **102.** Follower arm **242** is rigidly connected to the shaft **238** carrying the mounting brackets **244** for the pinch rollers **236.**

Projecting above feed table **60** at a location substantially corresponding to the bight of the second feed rollers **224** and the pinch rollers **236** is a paper stop **246** which is pivoted at **248** and biased into its paper-blocking position by spring **250** (see FIG. **4**). Stop **246** carries an actuating pin **252** which is in position to be engaged by depending finger **244a** on mounting bracket **244** such that in response to clockwise turning movement of bracket **244**, and engagement of the pinch rollers **236** with the second feed rollers **224**, stop **246** is withdrawn from the feed path to permit unobstructed paper feed, as seen in FIGS. **2** and **3.**

It will be appreciated that the time in the machine cycle that drive is imparted to the second feed rollers **224** in relation to the initiation of any particular machine cycle will determine the position of the leading edge of the paper in relation to the image on the master mounted on the duplicating mechanisms **62.** This relative position is controlled by the adjustable lost-motion mechanism.

The final aspect of the paper feeding system includes impression roller **266** (FIG. **4**) which is separated from the duplicating mechanisms **62** during the non-printing part of the machine cycle under control of an impression roller blocking assembly **268.** Considering first the impression roller **266** and its actuating mechanism, the impression roller **266**, which has an appropriate elastomeric face, is mounted on impression roller shaft **270** which in turn is journalled on one arm of a bell crank **272** which is pivoted at **274** on the machine frame. The other arm of bell crank **272** is connected to a double-arm follower lever **276** which is pivoted at **274** on the outer side of left side plate **40** (see FIG. **6**). Lever **276** is connected at pivot **278** to bell crank **272** through window **40***g* in the left side plate **40** (see FIGS. **4** and **6**). Double-arm follower lever **276** carries a follower **280** which engages impression roller release cam **104** on main cam shaft **98.** As seen in FIG. **5**, an impression roller tension spring **282** is mounted by an appropriate bracket **284** on the left side plate **40** and is coupled at mounting tab **276***a* to the double-arm lever **276.** Spring **282** is effective, when released for activation under control of cam follower **280**, to turn pivot **278** at the lower end of double-arm lever **276** in the clockwise direction (see FIG. **6**) to thereby turn the bell crank **272** (see FIG. **4**) in the counterclockwise direction to raise the impression roller **266** into contact under pressure with the duplicating mechanism **62.** The pressure on the impression roller **266** is determined by the adjustment of coil spring **282**, as is generally understood.

Basically, the impression roller **266** includes an inoperative position illustrated in FIG. **4** and shown diagrammatically by the full lines in FIGS. **2** and **3**, an operative position **266'** against the duplicating mechanisms as shown by the dotted lines in FIG. **3** and an intermediate position **266''** established under control of the blocking assembly **268** which, if it does not sense a partially fed sheet, blocks the impression roller **266** from contacting the duplicating mechanisms **62** and picking up an inked impression which would foul the impression roller **266.** The blocking assembly **268** which achieves this function includes a sensing finger **268***a* and a follower lever blocking arm **268***b* (see FIG. **4**) which are rigid with each other and mounted on a single shaft journalled on the machine frame at pivot **268***c*. Blocking arm **268***b* extends through cutout **40***h* in the left side plate **40** in position to be contacted by a tab **276***b* on cam follower arm **276.** Thus, as cam follower arm **276** begins to move from its fully retracted position (shown by the dot-dash showing to the left of the full line illustration in FIG. **6**) to the full line illustration, the blocking member **268***b* will block follower **280** from following cam **104** (as shown by the dot-dash showing at the left of FIG. **6**), thereby establishing the blocked position for impression roller **266** wherein the machine rotates, but impression roller **266** is not fouled due to the failure of a sheet of feed.

Duplicating mechanism **62** is in the form of a twin cylinder, silk screen assembly (see FIG. **4**), including upper cylinder **286** mounted on upper cylinder shaft **288** and lower cylinder **290** mounted on lower cylinder shaft **292.** The twin cylinder assembly **62** carries the usual mechanisms for attaching a stencil master to the silk screen, and for connecting both cylinders with a suitable belt drive for simultaneous rotation of the entire assembly. As seen in FIG. **5**, drive is imparted to the lower cylinder shaft **292** by cylinder drive gear **294** which is driven from main drive gear **106** and transferred to the upper cylinder and silk screen in a conventional manner not shown.

Disposed between the upper and lower cylinders **286, 290** are the usual ink-spreading rollers **296, 298** and a removable and replaceable ink distributing tube **300.** Reference will now be made to FIGS. **7, 9** and **10** for a description of the mechanisms which axially reciprocate the ink-spreading rollers **296, 298** during machine operation. At the right side of the machine, right side plate **44** is provided with appropriate cutouts **44***c*, **44***d* through which roller shafts **296***a*, **298***a* project. Shafts **296***a*, **298***a* are provided with circumferential grooves and receive respective oscillating arms **302, 304** which are pivoted at **302***a*, **304***a* on a common actuating yoke **306.** Oscillating arms **302, 304** are biased toward each other and into engagement with shafts **296***a*, **298***a* by spring **308**, with limits being established by stops on yoke **306.** As seen in FIG. **7**, yoke **306** is pivoted on the outer side of right side plate **44** by brackets **310, 312** which afford yoke pivots at **314, 316.** Yoke **306** is rocked about the coaxial pivots **314, 316** from the main shaft **98** through the provision of a wobbler mechanism which includes (see FIG. **9**) angularly disposed wobbler drive discs **318, 320** fixed to shaft **98** and having an oscillating wobbler plate **322** trapped therebetween. Wobbler plate **322** is coupled to a right angle connecting tab **306***a* on rocker arm **306***b* integral with yoke **306** by an appropriate connecting pin **324.** Thus, in response to rotation of main shaft **98**, reciprocal motion will be imparted to the ink rollers **296, 298**, which are simultaneously rotated by cylinders **286, 290.** By the simple expedient of spreading the oscillating arms **302,**

304 against their bias of spring **308**, the rollers may be removed.

Reference will now be made to the mechanisms for supplying ink to the ink distributing tube **300**, both manually and automatically during machine operation. As shown in FIG. **7**, the ink distributing tube is a conventional unit which includes internal provision for regulating the ink supply to the cylinders **286, 290** through control knob **326**. The assembly of ink tube **300**, related gears, and knob **326** are all mounted on a common carrier plate **332** which is slidably and removably mounted on a supporting bracket **334** fixed to the outer side of right side plate **44**. Additionally, carrier plate **332** supports a depending and fixed ink supply tube **336** which connects with the interior of an ink-supply cartridge **338** including a container, such as **338***a* and a cover **338***b* serving as a piston. In response to movement of the cover **338***b* from its upper position when can **338***a* is full to a lower position contiguous to the bottom of the can, the ink I therein is forced upwardly through ink supply tube **336** and into tube **300**. Ink supply tube **336** carries a pressure plate **340**. As is generally understood, can **338***a* of cartridge **338** moves upwardly relative to the piston cover **338***b*. This movement progressively supplies ink to distributing tube **300**. To this end, there is provided a rising ink stand **342** which includes cartridge-supporting platform **342***a* and upstanding carrier **342***b* appropriately mounted for vertical movement on a mounting bracket **344** fixed to right side plate **44**. At its rearward side, the ink stand **342** is provided with a rack **342***c* which is engaged by elevating pinion **348** on pinion shaft **350**. Pinion shaft **350** also carries elevating ratchet **352** which is engaged by actuating pawl **354** and holding pawl **356**. A downward stroke imparted to actuating pawl **354** turns ratchet wheel **352** counterclockwise driving the elevating piston **348** in the same direction and lifting the cartridge supporting platform **342***a* for extruding ink from cartridge **338** through ink tube **346** onto the cylinders **286, 290**. Holding pawl **356** is pivoted at **356***a* on right side plate **44** and is urged by gravity into its holding position. Holding pawl **356** includes a disabling tab **356***b* which is in the path of upward movement of the pawl-release finger **342***d* on platform **342** such that the holding pawl **356** is lifted clear of the elevating ratchet **352** when cartridge **338** is empty.

The machine includes systems for imparting the downward actuating stroke to actuating pawl **354**, both manually and automatically. The automatic ink-pumping system includes a mechanism which adjusts the frequency of pumping strokes to actuating pawl **354** over a wide range for providing the required amount of ink to the printing mechanisms **62**. The adjustment can range from one stroke for ten machine cycles to one stroke for **70** machine cycles, depending upon the ink required for the stencil master used.

The manual ink supply system includes (see FIG. **10**) a forwardly extending ink supply lever **358** mounted inwardly of the right side plate **44** of the machine beneath the top cover plate **45** with the lever having a finger tab **358***a* in a convenient position at the front of the machine to be depressed by the operator (see FIG. **1**) as ink is required. Lever **358** is pivoted at **360** on the inner side of plate **44** and is coupled by a connecting link **362** through cutout **44***e* to pawl-actuating lever **364** pivoted on the outer side of plate **44** at pivot **366**. Connecting link **362** has an override slot **362***a* at one end to receive actuating pin **358***f* on lever **358**. The opposite end of connecting link **362** is pivotally connected to one arm of the pawl-actuating lever **364** by pin **368**, with the other arm of lever **364** being connected at pivot **370** to actuating pawl **354**. Spring **372** (FIG. **7**) biases actuating pawl **354** against elevating ratchet wheel **352**. Thus, upon depressing finger tab **358***a*, manual ink supply lever **358** turns in the clockwise direction about its pivot **360** and pin **358***b* bears against the outer end of slot **362***a* to pull upwardly on connecting link **362**. This motion is transmitted via pawl-actuating lever **364** into a downward supply stroke on actuating pawl **354** to elevate ink stand **342***a* through rotation of ratchet wheel **352**.

When pawl-actuating lever **364** is actuated automatically to achieve a supply stroke, override slot **362***a* effectively isolates the movement of connecting link **362** from supply lever **358** which remains stationary.

The automatic ink-supply system is adjustable by the operator and provides supply strokes to the actuating pawl **354** after any predetermined number of machine cycles and is seen best in FIGS. **7, 8** and **9**. A double-arm cam follower lever **374** pivoted at **366** and one arm carrying follower roller **376** adjustably engages cam **202** on main shaft **98**, and the second arm of lever **374** is connected via a motion input link **378** to a motion transfer mechanism **380** which periodically imparts an actuating motion to a motion output link **382**. When link **382** is moved, one arm of the ratchet-actuating lever **364** automatically depresses pawl **354** to provide an automatic supply of ink. Such supply strokes are provided after a preset number of machine cycles, as determined by the adjustment of a slidable finger piece **384** mounted beneath the front cover **45** of the machine (see FIGS. **1, 7** and **10**). Specifically, motion input link **378** is adjusted by a sliding camming plate **386** to control the stroke of lever **374** at pivot **375**. Bias spring **388** urges follower **376** toward cam **202** at the adjusted clearance position determined by adjustment of link **378** via a stroke-adjustment tab **378***a* which extends through cutout **44***f* on the side plate **44**. This adjustment will be described subsequently in conjunction with FIGS. **8, 10** and **11**. Input link **378** has a pivotal connection at **390** to the drive arm **380***a* of the motion transfer mechanism **380** which is a form of one-way clutch which precludes backlash.

Referring now to FIGS. **8** and **9**, the motion transfer mechanism **380** which receives its input from link **378** via actuating arm **380***a* includes a fixed central pin **380***b* on which is journalled an inner driving raceway member **380***c*. Surrounding driving raceway member **380***c* is an outer raceway member **380***d*. Plural clutch rollers **380***e* are interposed between raceway members **380***c*, **380***d* and have appropriate seats **380***f* on member **380***d*. In response to clockwise turning motion of the driving raceway member **380***c* (see FIG. **8**) by upward motion of input link **378**, interposed rollers **380***e* via seats **380***f* turn the driven raceway member **380***d* in the clockwise direction. This in turn imparts incremental motions in the clockwise direction to the diametrically opposed driving pins **380***g*, **380***h* which, after 180° of rotation, are coupled in succession to the output motion link **382** at seating cutout **382***a*. Thus, in response to incremental motions imparted to motion input link **378** from cam follower **376** (which incremental motions are indicated by the multiple small clockwise arrows in FIG. **8**), the driving pins **380***g*, **380***h*

periodically come into link cutout **382***a* to pull the link **382** through an actuating stroke which is sufficient to impart a supply stroke to actuating link **354** for the requisite automatic supply motion to ratchet wheel **352.**

In order to assure that the motion transfer mechanism **380** will accurately accumulate and transfer the incremental clockwise motions imparted thereto, any appreciable backlash or counterclockwise motion must be avoided. Backlash would tend to cancel the small incremental accumulations during each machine cycle, and therefore a holding raceway member **380***i* is provided surrounding the driven raceway member **380***d*. Member **380***i* is fixed by mounting arm **380***j* and anchor pin **380***k* to the right side plate **44.** Interposed between the driven raceway member **380***d* and the stationary holding raceway member **380***i* are plural clutch roller **3801** which bear against seats **380***m* on member **380***i* and oppositely arranged to seats **380***f*. Thus, driving motion is accumulated in the mechanism **380** and passed to driven raceway member **380***d* and thence to the motion output link **382** in response to clockwise input, with all counterclockwise motion effectively blocked by the counteracting rollers **3801** which wedge against the stationary seats **380***m* on holding raceway member **380***i*.

From the foregoing it will be appreciated that the total stroke of motion input link **378** is determined by the throw of cam **202** and the adjusted position of follower roller **376** relative thereto. Thus, if follower roller **376** moves quite close to cam **202,** it will contact a rising cam surface sooner and provide a greater upward thrust to motion input link **378.** Link **378** is biased by spring **388** to move cam follower **376** in the counterclockwise direction about pivot **366** (see FIG. 7) into a limit position close to cam **202** determined by the bottom wall of cutout **44***f*. As link **378** is moved upwardly by adjustments of tab **378***a*, less and less of the total throw of the cam **202** is transmitted via follower **376** to motion input link **378** and the clockwise incremental motions to arm **380***a* correspondingly decrease. Accordingly, it will take a greater number of machine cycles and rotations of cam **202** to accumulate sufficient motion in mechanism **380** to drive output link **382** between its full and broken line positions which correspond to one step of the elevating ratchet **352** to provide a predetermined supply of ink into the ink distributing tube **300.** As previously pointed out, adjustment of tab **378**a is accomplished by the slidable inking control finger piece **384** on the front top plate **45** of the machine. Referring now to FIGS. **1, 10** and **11,** the inking control finger piece **384** is seen to be mounted for side-to-side sliding movement by a mounting block **384***a* which extends into cutout **45***a* on top plate **45.** Connected to finger piece **384** is a camming plate **386** having an angularly disposed camming ledge **386***a*. Camming ledge **386***a* is engaged by cam follower **389** which is pivoted at **391***a* to rock about a substantially horizontal axis in response to side-to-side displacement of cam plate **386.** Cam follower bracket **389** includes a cam follower arm **389***a* (see FIG. **10**) which engages the cam ledge **386***a* and an output arm **389***b* (see FIG. **11**) disposed in spaced parallel relation to the follower arm **389***a* and substantially at right angles thereto in position to lie beneath and engage adjustment tab **378***a* on motion input link **378.** As finger piece **384** is pushed to the right (see FIG. **1**), follower arm **389***a* will turn in the counterclockwise direction about pivot **391***a* (see FIG. **10**) to lower arm **389***b* and permit tab **378***a* to drop under bias of spring **388.** This in turn brings cam follower roller **376** closer to its actuating cam **202** and thereby utilizes a greater portion of the cam throw, and provides a more rapid accumulation of rotary motion in mechanism **380** which is translated into more frequent pumping action of the automatic ink-supply system. Correspondingly, adjustment of finger piece toward the left in FIG. **1** utilizes less of the cam throw and a corresponding slower motion accumulation and a less frequent pumping action.

Disposed above the finger piece **384** on the top plate **45** is a motor control panel **392** which includes a motor on-off push-button **394** and a speed control knob **396** controlling the usual rheostat (see FIG. **11**). Motor pushbutton **394** turns the motor **110** on and off through a conventional circuit and switch. Additionally, pushbutton plunger **394***a* is coupled to the handle or crank **100** on main shaft **98.** As seen best in FIG. **9,** handle or crank **100** includes an inwardly facing coupling collar **100***a* which is provided with diametrically opposed cutouts **100***b* which receive corresponding pins **98***b* on shaft **98.** Outward displacement of handle **100** on shaft **98** (to the left in FIG. **9**) decouples handle from shaft **98.** This is accomplished in advance of energization of the motor **110** to assure that the handle **100** will not rotate during motorized operation. As seen in FIG. **11,** plunger **394***a* engages crank-disengaging double-arm lever **400** which is pivoted by appropriate bracketing at **402** and is connected to a pull rod **404** at pivot **406.** Pull rod extends through cutout **44***g* in the right side plate **44** and engages a double arm actuating lever **408** (see FIGS. **7** and **9**) which is pivoted at **316** and includes arm **408***a* which displaces the handle **100** in advance of motor turn-on. Provision is made intermediate lever **408** and push rod **404** for achieving adjustment of the position of lever **408** to the extent required to assure complete handle disengagement in response to rocking motion of lever **408.**

For operator convenience, three ways are provided for feed turn-off: manually by pushing button **412,** automatically in response to countdown of a counter **438** and automatically when the paper supply in tray **50** is exhausted as signalled by the position of slide block **92***b*.

What is claimed is:

1. An automatic inking mechanism for a printing machine including a rotatable main shaft comprising a movable ink stand, an ink container mounted on said stand adapted to contain a supply of ink and including a cover, an indexing mechanism operatively connected to said stand for effecting stepwise relative movement of said container and cover to dispense ink from said container in discrete amounts and actuating mechanisms including motion transfer means operatively connected to said indexing mechanism and operable in response to each of a series of revolutions of said main shaft for accumulating a series of incremental rotary motions and after said series of incremental rotary motions have been accumulated, transferring an indexing stroke to said indexing mechanism to effect ink dispensation, said motion transfer means including a one-way clutch having a driving raceway member, a driven raceway member and clutch rollers interposed therebetween, and said actuating mechanism further including motion input means actuated in response to each revolution of said main shaft and connected to said driving

raceway member for imparting incremental rotary motion thereto and motion output means coupled to said driven raceway member and to said indexing mechanism for providing said indexing stroke after transfer to said one way clutch of said series of incremental rotary motions.

2. An automatic inking mechanism according to claim 1 wherein said motion transfer means further includes an anti-backlash mechanism operatively connected to said one-way clutch and arranged to preclude rotation in a direction opposite to the direction of said incremental rotary motion.

3. An automatic inking mechanism according to claim 2 wherein said anti-backlash mechanism includes a fixed holding raceway member surrounding said driven raceway member and clutch rollers interposed between said holding raceway member and said driven raceway member.

4. An automatic inking mechanism according to claim 1 wherein said actuating mechanisms includes an actuating cam on said main shaft, a follower adapted to engage said actuating cam, motion input means actuated in response to movement of said follower and operatively connected to said motion transfer means and means for adjusting said motion input means to initially position said follower relative to said cam to vary the amount of motion imparted to said motion transfer accumulating means from said cam and follower during each revolution of said main shaft.

5. An automatic inking mechanism according to claim 1 further including manual actuating means and means including a lost-motion coupling for imparting indexing strokes to said indexing mechanism in response to operation of said manual actuating means, said lost-motion coupling serving to decouple said manual actuating means from said indexing mechanism during operation of said actuating mechanisms.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,804,012 Dated April 16, 1974

Inventor(s) William Bosshardt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the first page, the fifth line of the left column, Item No. [73], delete "Bohm" and substitute therefor -- Bohn --.

Signed and sealed this 10th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents