# United States Patent

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[54] **REGISTRATION ALIGNMENT DEVICE FOR EMBOSSING MACHINE**
**8 Claims, 11 Drawing Figs.**


[52] U.S. Cl. ..... 197/6.4, 74/527, 197/6.7
[51] Int. Cl. ..... B41j 1/30
[50] Field of Search ..... 197/6.4–6.7, 18; 74/530, 575, 535; 178/527, 826; 188/69



[56] References Cited

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,489,626 | 11/1949 | Doucette | 74/527 X |
| 2,627,945 | 2/1953 | Hooker | 74/527 X |
| 3,059,498 | 10/1962 | Boyd | 74/527 |
| 3,167,972 | 2/1965 | Durgin | 74/527 |
| 3,226,999 | 1/1966 | Allison | 74/527 |
| 1,271,231 | 7/1918 | Schroder | 197/6.4 |
| 1,453,867 | 5/1923 | Fanslow | 197/6.4 |
| 2,862,595 | 12/1958 | Toggenburger | 197/84 B |
| 2,941,645 | 6/1960 | Toggenburger | 197/84 B |
| 2,951,571 | 9/1960 | Colyer et al. | 197/6.7 |
| 2,972,401 | 2/1961 | Salto | 197/84 B |
| 3,236,352 | 2/1966 | Schacht | 197/6.6 |



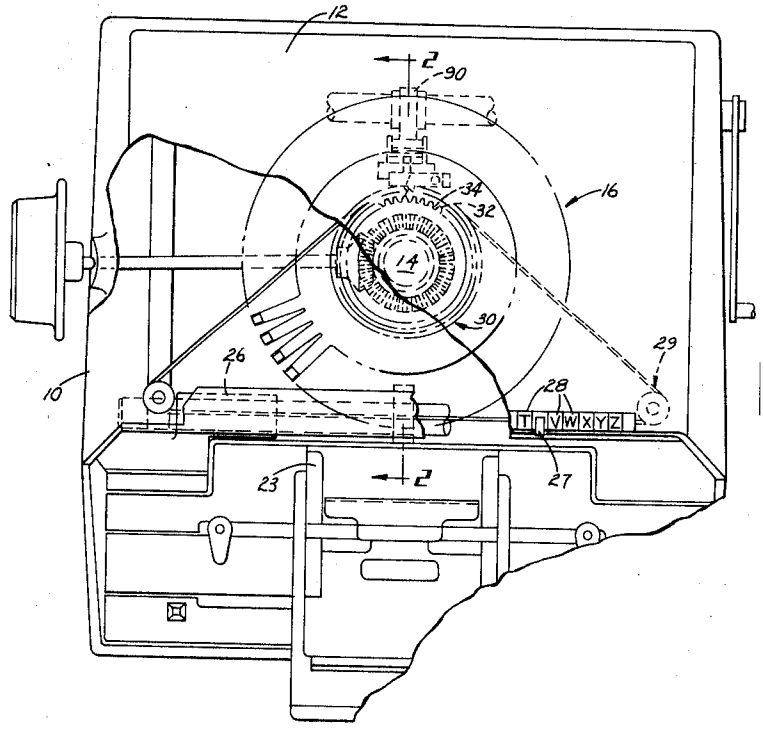
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**ABSTRACT:** A registration device of the rack-and-pawl type designed to accurately position the rack in the event said rack is misaligned with the pawl member.

A circular rack carries a device that must be accurately positioned but because of the speed at which it rotates a detent mechanism is objectionable.

The pawl assembly consists of a sensing pawl pivotally mounted to an engaging pawl and arranged slightly out of alignment and in advance of the engaging pawl. If the rack is stopped in a position where a tooth on the rack is in line with the tooth of the engaging pawl the sensing pawl will rotate the rack slightly to prevent tooth-on-tooth damage.

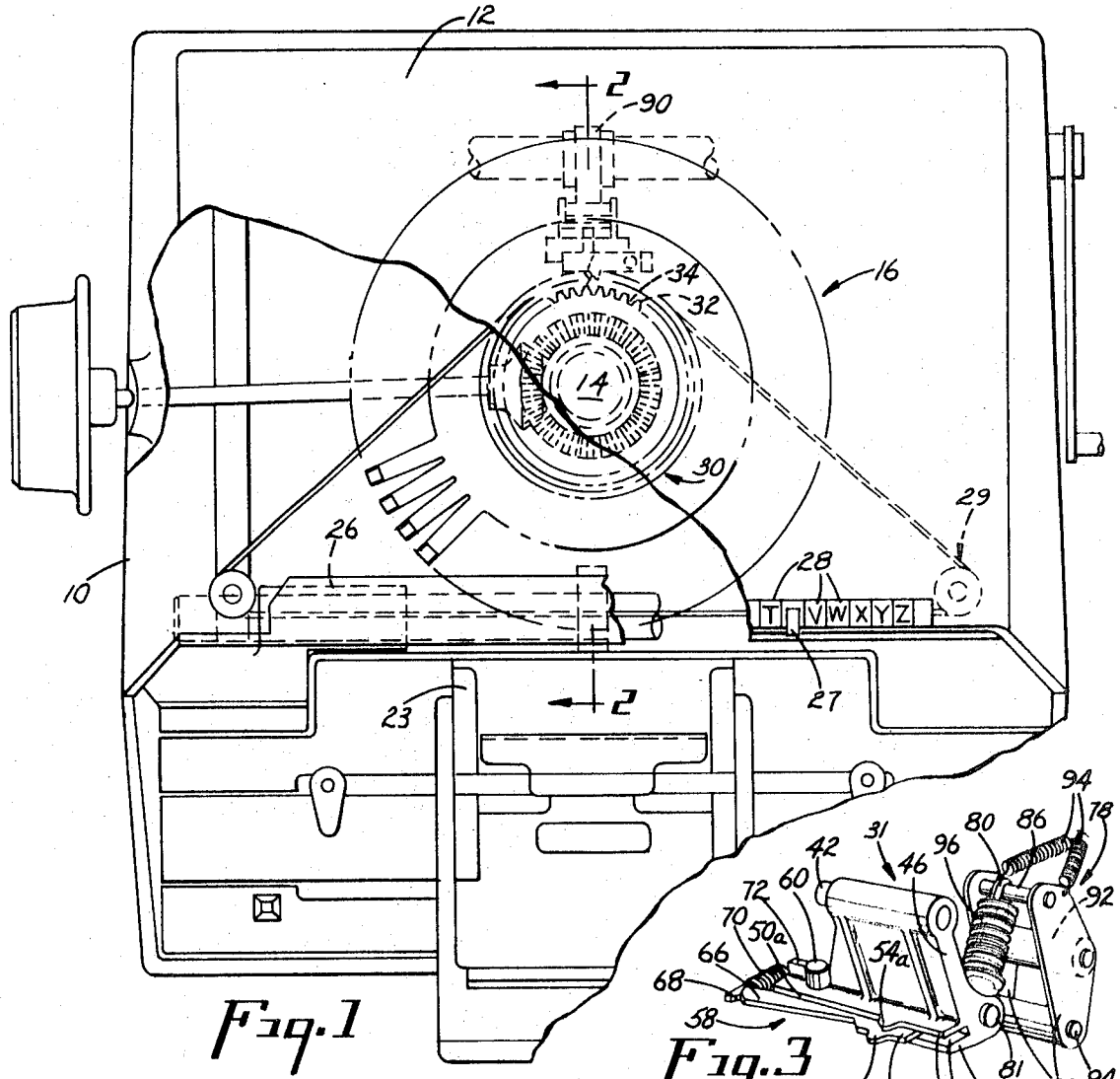



Fig. 1




Fig. 3

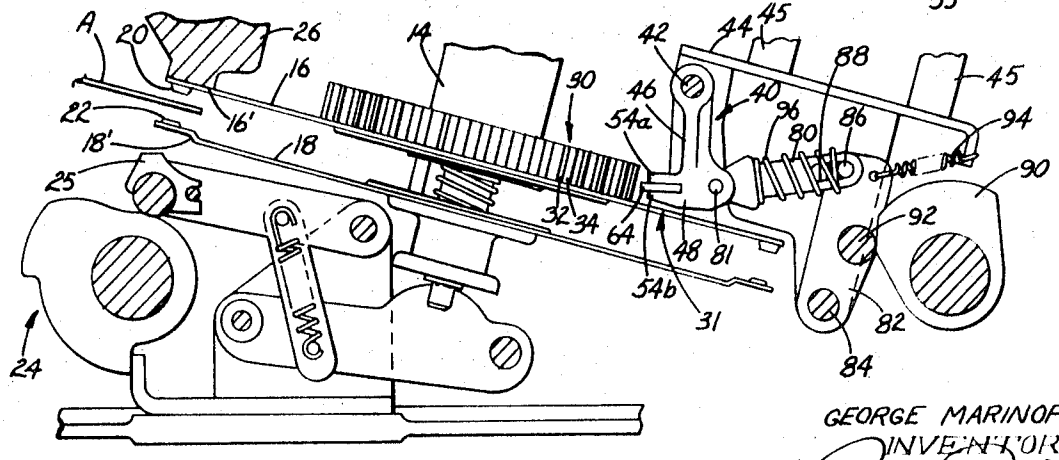



Fig. 2

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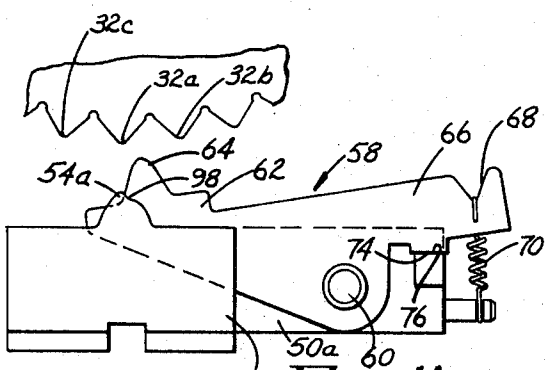



Fig. 4a

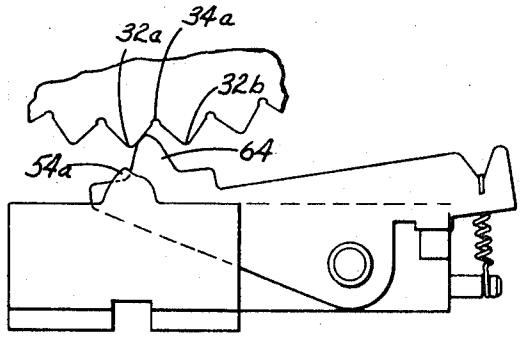



Fig. 4b

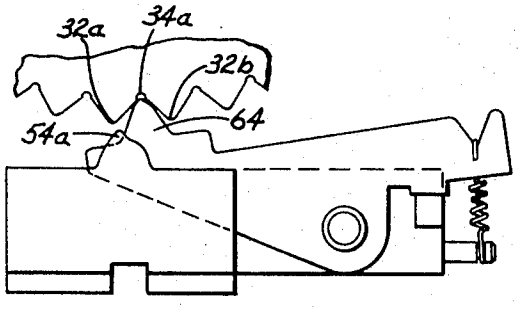



Fig. 4c

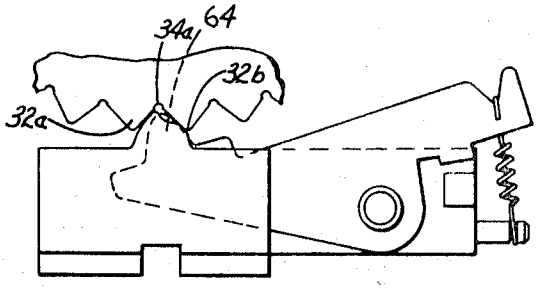



Fig. 4d

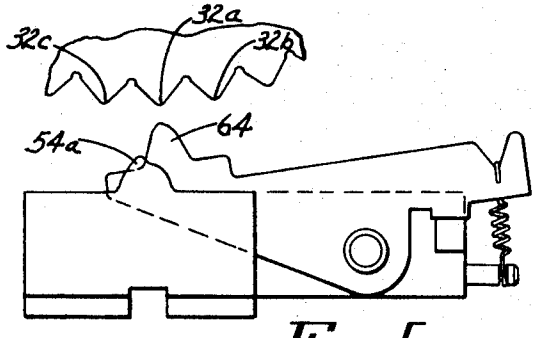



Fig. 5a

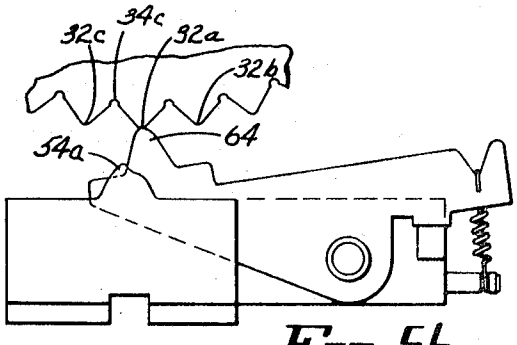



Fig. 5b

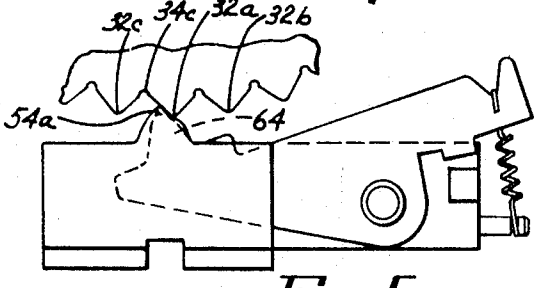



Fig. 5c

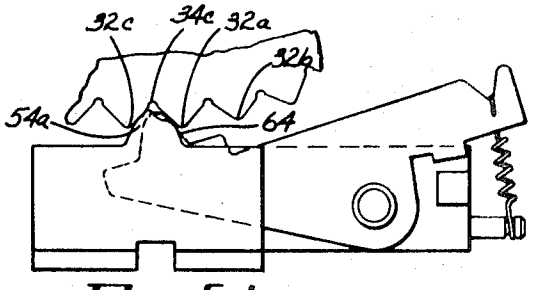



Fig. 5d

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# REGISTRATION ALIGNMENT DEVICE FOR EMBOSSING MACHINE

This invention relates generally to registration devices and more particularly to registration devices for precisely positioning character-embossing dies and punches on embossing machines.

Although the invention has wider application, it will be described in conjunction with its use in embossing devices of the type shown in application, Ser. No. 784,558 filed Dec. 18, 1968 entitled Embossing Device.

In embossing machines of the type described in said application Ser. No. 784,558 a pair of embossing discs are provided which have radiating flexible fingers. The fingers are provided with mating punch and die sets for embossing characters on plastic or metal plates. The embossing discs are rotatable together on a shaft to move the desired punch and die sets to embossing station, at which place the embossments on the plates are made. In order to determine which punch and die set is located at the embossing station, some type of external indicia and pointer system is provided.

In the embossing of plates or cards, especially the type that are to be used for addressing mail or for printing, such as credit cards, the spacing between the characters should be uniform. One of the factors effecting this uniformity is the exact position at the embossing station of each punch and die set. One of the easiest ways to obtain this exact positioning is by means of a rack-and-pawl mechanism. With this type of mechanism, a rack is normally formed in association with the discs or the shaft on which the discs are carried, and a pawl is provided to selectively engage the rack in the groove between the teeth. The spacing between the teeth and hence the spacing of the grooves is equal and each groove corresponds to one of the punch and die sets on the discs. The pawl moves to a given rack engagement position upon actuation. When the pawl is exactly aligned with the bottom of the groove, its movement into engagement position upon actuation. When the pawl is exactly aligned with the bottom of the groove, its movement into engagement will not move the rack either way. However, if the pawl is slightly out of alignment with the groove, it will strike one side of the tooth or the other and tend to rotate the rack, and hence the discs carried thereby to a position wherein the pawl upon the completion of its engagement movement is exactly in alignment with the bottom of the groove. This type of rack-and-pawl action for precise locating of a device is well known in the art.

However, there are some drawbacks to the above described rack-and-pawl positioning mechanism. One of the principal drawbacks to this type of mechanism is the action of the devices when the end of the pawl is substantially aligned with the tip of one of the teeth rather than between two teeth. When such alignment of the end of the pawl with the tip of the tooth occurs and the pawl starts forward for engagement with the rack, the end of the pawl will strike the tip of the tooth and will tend to bind thereon rather than shifting the rack to the right or left and engaging properly with the groove. When this happens, the punch and die sets on the discs are out of position at the embossing station, and an embossment in this position can ruin the entire article since it may tend to be a double embossment partly interferring with the previous embossment and partly offset. Even if the article is not completely ruined, substantial "erasure" or repair is required to correct the card.

There have been some prior art attempts to shape the pawl and the teeth of the rack to minimize the range over which the pawl will bind against the end of a tooth, abut there have not eliminated the problem.

It is therefore, the principal object of this invention to provide a rack-and-pawl mechanism for precisely positioning a member which will minimize the tendency of a pawl to bind on the end of a tooth and will shift the rack properly.

Basically, this invention solves this problem by the provision of a compound pawl device which includes a sensing pawl adapted to shift a rack out of a position where the engagement pawl would normally bind on the end of a tooth to a position where the engagement pawl will fall between the teeth of the rack into a groove to allow proper shifting of the rack.



These and other objects, together with a fuller understanding of the invention, will become apparent from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a plan view partially in section showing an embossing machine incorporating a device of this invention;

FIG. 2 is a sectional view taken substantially along the plane designated by line 2—2 of FIG. 1;

FIG. 3 is a perspective view of the compound pawl mechanism;

FIGS. 4*a*, 4*b*, 4*c* and 4*d* are bottom plan views, somewhat schematic, showing sequence the operation of the positioning device when the engagement pawl is in alignment with the tip of a tooth on the rack;

FIGS. 5*a*, 5*b*, 5*c* and 5*d* are views similar to FIGS. 4*a*, 4*b*, 4*c* and 4*d*, but showing the operation in sequence when the sensing pawl is aligned with the tip of a tooth of the rack.

Referring now the drawings, and for the present FIGS. 1 and 2, an embossing machine incorporating the rack-and-pawl registration device of this invention is shown. The embossing machine includes a base member **10** and a cover member **12**. The cover member **12** has a depending shaft **14** on which a pair of embossing discs **16** and **18** are mounted for rotation. The discs **16** and **18** have radially extending fingers **16'** and **18'**. At the end of the fingers **16'** and **18'** are embossing dies **20** and embossing punches **22** respectively. Mating punch and die sets **20** and **22** are in alignment with each other so that they will emboss a character on an object held therebetween when the punch and die are squeezed together.

Rotation of the shaft **14** will rotate the discs **16** and **18** together, moving corresponding punch and die sets to an embossing station. An article A, to be embossed, is positioned between the punch and die sets **20** and **22** and can be advanced by a carriage mechanism **23**. An embossment is made by actuating cam drive **24** which will raise an embossing head **25**, causing the punch **22** at the embossing station to be raised. The coaction of the mating punch **22** and die **20** acting against an anvil **26**, located at the embossing station squeezes an embossment into the article A.

An external pointer **27** is operably connected to the shaft **14** and indicia marking **28** are provided on the cover. As the shaft **14** rotates, the pointer **28** is driven by a cable and pulley system **29** along the indicia markings to indicate which character is at the embossing station.

However, because of many factors, a pointer and indicia markings are not satisfactory to get the precise position of the characters at the embossing station which is necessary. This precise positioning is accomplished by means of the coaction of a circular rack **30** and a compound pawl device **31** which, together constitute a registration device which will precisely and accurately position each punch and die set a the embossing station each time.

The rack **30** includes a plurality of circumferentially spaced teeth **32** which are equally and precisely spaced from each other with corresponding grooves **34** therebetween the grooves also being equally and precisely spaced.

The compound pawl device, which can best be seen in FIGS. **2** and **3**, includes a positioning member **40** pivotally mounted on and depending from a pivot pin **42** carried by a bracket **44**. The bracket **44** is secured to the cover **12** by braces **45**. The positioning member **40** includes a stem portion **46** terminating in an end assembly **48**. The end assembly **48** includes an upper flange **50** and a lower flange **52**. The flange **50** has a portion **50***a* extending laterally beyond the end of the flange **52**. Where the flanges **50** and **52** are coextensive, they form a groove **53** therebetween.

The upper flange **50** has formed at the front edge thereof an engagement pawl segment **54***a*, and the lower flange **52** has a similarly shaped engagement pawl segment **54***b* formed thereon and in alignment with the pawl segment **54***a*. The pawl segments **54***a* and **54***b* together constitute an engagement pawl **54**.

Pivot arm **58** is mounted on portion **50***a* of flange **50** by a pivot pin **60**. The pivot arm **58** has an operating portion **64**

disposed in the groove 53 between the flanges 50 and 52. The operating portion 62 has formed thereon a sensing pawl 64. The pivot arm 58 also has an extension portion 66 on the other side of the pivot pin 60 which is provided with a notch 68. A spring 70 extends between notch 68 and an anchor pin 72 projecting from the flange 50. Coacting stop surfaces 74 and 76 are provided on the pivot arm 58 covered by the bias of spring 70 (see FIG. 4*a* ). These stop surfaces are so positioned that when they are in contact, the sensing pawl is forwardly and laterally spaced with respect to the engagement pawl 54.

The positioning member 40 pivots about pin 42 to move the pawls 54, and 64 in and out of engagement with the rack 30 and is operated by means of an actuating mechanism designated generally as 78. The actuating mechanism 78 includes a link arm 80 connected to the positioning member 40 by a pin 81. The link arm 80 in turn is operated by a bifurcated actuating arm 82 pivotally mounted on a shaft 84. The arm 82 is slidably mounted to link arm 80 by a pin 86 residing in a slot 88 formed in the link arm 80. The actuating arm 82 is operable by a cam 90 bearing against a cam follower 92.

The actuating mechanism 78 is held in retracted position by means of a pair of springs 94 extending between the rear end of the bracket 44 and the actuating arm 82. Also a compression spring 96 is provided around the link arm 80 which, in conjunction with the pin 86 and slot 88, provides a lost motion mechanism.

When the character to be embossed has been selected by rotating the disc to bring the proper punch and die sets to the embossing station, the machine is actuated to cause the embossment. This actuation of the machine includes the actuation of the compound pawl device for the precise registration of the selected punch and die set. The compound pawl mechanism 31 is urged into engagement with the rack 30 by means of rotation of the cam 90 in a counterclockwise direction (as viewed in FIG. 2) when the embossing mechanism is actuated. The rotation of the cam 90 is synchronized so as to cause the compound pawl mechanism 31 to engage the rack 30 before closure of the die 22 against the article A is effected, as described in said application, Ser. No. 784,558.

As the cam 90 rotates in a counterclockwise direction, it bears against cam follower 92 causing the actuating arm 82 to also move in a counterclockwise direction pivoting about shaft 84. The action of the pivoting of the actuating arm 82 will cause the link arm 80 to pivot the positioning device 40 about pin 42 which will cause the pawls 54, and 64 to come into engagement with the rack 30. The engagement of the engagement pawl in the proper groove of the rack will precisely position the rack. Hence, precisely positioning the punch and die sets at the embossing station. FIG. 4*a* through 4*d* show in sequence the action of the compound pawl device on the rack where the engagement pawl 54 is in alignment with the tip of tooth 32*a* at the commencement of the embossing operation. In the absence of a sensing pawl, movement of the engagement pawl from the position shown in FIG. 4*a* into engagement with the rack would bring the tip of tooth 32*a* and the tip of pawl 54 into contact with the strong possibility that there would be insufficient lateral cam thrust to cause the rack to rotate. However, FIGS. 4*b* through 4*d* show how the sensing pawl 64 prevents this from happening.

FIG. 4*b* shown the positioning device 40 having pivoted to the position wherein the sensing pawl 64 just comes in contact with the rack 30. As can be seen, the sensing pawl 64 is forwardly of and laterally out of alignment with the engagement pawl. Since the sensing pawl 64 is forward of the engagement pawl 54, it strikes the tooth 32*a* first, and since the sensing pawl 64 is out of alignment with the engagement pawl 54, it is necessarily out of alignment with the tip of the tooth 32*a*. Thus, the pawl 64 rather than striking the tip of the tooth 32*a*, strikes the side edge of the tooth 32*a* and 32*b*. The force of the spring 70 is selected so that it is strong enough to overcome the frictional resistance of the rack 30 to movement. Therefore, continued movement of the positioning device 40 toward the rack 30 will cause the sensing pawl 64 to push against the side of tooth 32*a*. The rack 30 will move to the left. The pawl 64 will slide into the groove 34*b* to the position shown in FIG. 4*c*. The tip of the tooth 32*a* is moved out of alignment with the engagement pawl.

In the position shown in FIG. 4*c*, the sensing pawl 64 is at the bottom of the groove 34*a* and, hence, continued movement of the positioning device 40 toward the rack will cause the arm 58 to pivot against the bias of spring 70. This continued movement will cause the engagement pawl 54 to strike the edge of the tooth 32*a*, rather than the tip. Continued movement of device 40 from the position shown in FIG. 4*c* to the position shown in FIG. 4*d* will cause the engagement pawl 54 to first strike the edge of the tooth 32*a* and then push the rack to the left, sliding into groove 34*b* to the bottom thereof, as shown in FIG. 4*d*. The bottom portion of the engagement pawl 54 constitutes a precise positioning of the rack 30. In this position, the sensing pawl is fully retracted between the pawl segments 54*a* and 54*b*.

Continued movement of the cam 90 after this bottom position of the engagement pawl 54 has been reached will be taken up by the lost motion mechanism.

When the embossment has been completed, the cam 90 is rotated back again to the position shown in FIG. 2, and the springs 94 withdraw the positioning device 40 from engagement with the rack 30.

FIGS. 5*a* through 5*d* show the action of proper positioning also being obtained when the sensing pawl 64 is in alignment with the tip of the tooth 32*a* at the start of the pawl movement.

FIG. 5*b* shows the positioning device 40 having been moved toward the rack 30 until the end of the sensing pawl 64 has engaged the tip of the tooth 32*a*. Since this will cause the sensing pawl 64 to bind against the tooth 32*a*, continued movement of the positioning device 40 from the position shown in FIG. 5*b* to position shown in FIG. 5*c* will not cause the rack to rotate, but rather the arm 58 will pivot about pin 60 against the bias of spring 70. At the position shown in FIG. 5*c*, the sensing pawl 64 is fully retracted between the pawl segments 54*a* and 54*b* and the engagement pawl 54 is engaging the side of the tooth 32*a* defining groove 34*c* between the teeth 32*a* and 32*c*. Continued movement of the positioning device 40 from position shown in FIG. 5*c* to that shown in FIG. 5*d* will cause the rack to move to the right until the pawl 54 contacts the bottom of the groove 34*c*. This then constitutes a precise position of the rack 30.

FIGS. 4*a* through 4*d* and 5*a* through 5*d* shown only two of the infinite number of positions possible of the compound pawl device with respect to the rack when embossing is initiated. These two initial positions were selected because each represents a condition where a pawl is in line with the tip of a tooth which in the prior art constituted a potential binding situation. Thus, from the action of the device in these two positions, it can be seen that binding is virtually eliminated. It will be observed that, when the sensing pawl is located in a position where it will bind on the end of a tooth, the engagement pawl segments will be located to one side of the tooth and will properly engage in the groove between two teeth. However, when the sensing pawl is located where it will not bind on a tooth, it will shift the rack to a position where the engagement pawl segments will shift the rack to a position where the engagement pawl segments will properly engage a groove between two teeth, even if initially the engagement pawl segments were aligned with the tip of a tooth. Thus, since the positioning device 40 always travels the same path for engagement and the rack is provided with equally spaced grooves, precise registration is achieved for each embossment, irrespective of any initial misalignment.

An examination of the drawings will show that it is possible in certain positions for the sensing pawl 64 to strike the right side of the tooth when the engagement pawl has been originally lined up on the left side of the tooth and which, in the absence of the sensing pawl, would be engaged in the groove 34*c* rather than 34*b*. However, because the sensing

pawl moves the rack, the engagement pawl 54 will actually engage in groove 34c. It will be noted, however, that this condition exists only in a very narrow area or band between two adjacent characters and can be at least partially compensated for by proper calibration of the indicia with respect to the pointer. Further, the operator will be warned of an improper disc rotation by the movement of the pointer, but if not observed, it is preferable in these instances that a wrong character be embossed at the proper location which can then be erased, rather than a misaligned embossment which is difficult to erase.

It will be noted that there are slight involutions 98 (see FIG. 4a ) on each of the engagement pawl segments 54a and 54b. This configuration also aids in reducing binding of the engagement pawl 54 when the pawl strikes the left-hand side of a tooth.

I claim:

1. In a character-forming device, a mechanism for selectively positioning and holding a pair of members which are relatively movable along a position path of travel in any one of a plurality of preselected positions, comprising a longitudinally extending rack having spaced teeth and grooves carried by one of said members and an engagement pawl carried by the other of said members, said members being relatively movable inwardly toward each other and outwardly away from each other on an engagement path of travel between a pawl engaged position and a pawl disengaged position to engage and disengage said engagement pawl with said rack in the grooves between the teeth, means for first driving said members in a longitudinal relative movement to a preliminary selected relationship, and thereafter while said members are longitudinally at rest driving said members in said inwardly direction, and positioning means for moving said rack from said preliminary selected relationship longitudinally from an interference position in which a tip of said engagement pawl is aligned with an end of a tooth of said rack to another position in which the tip of said engagement pawl is at least slightly offset relative to the end of the tooth of said rack, said positioning means including a sensing pawl carried by said other member and disposed inwardly of said engagement pawl in a spaced-apart relationship with said rack when said engagement pawl in a spaced-apart relationship with said rack when said engagement pawl is at the disengaged position, said sensing pawl including a tip with a pair of cam side surfaces extending therefrom, actuator means for moving said sensing pawl and rack into engagement when said rack is in the interference position and for pressing a cam side surface of said sensing pawl against a tooth of said rack to move said rack longitudinally from the interference position to the other position solely under influence of a force applied to said rack by said sensing pawl, said actuator means being operable to move said engagement pawl and rack into engagement after movement of said rack from the interference position to the other position by said sensing pawl to precisely locate said rack at a preselected position

2. The invention as defined in claim 1 wherein said sensing pawl is mounted for movement between an extended position wherein the tip thereof is inwardly of and laterally offset from the tip of the engagement pawl and a retracted position, and biasing means normally urging said sensing pawl to said extended position.

3. The invention as described in claim 2 wherein said sensing pawl is pivotally mounted with respect to said engagement pawl.

4. The invention as described in claim 1 wherein said engagement pawl is disposed for movement toward and away from said rack.

5. The invention as defined in claim 4 wherein said other member is mounted for pivotal movement for moving said engagement pawl into and out of engagement with said rack.

6. The invention as defined in claim 1 wherein said one member is rotatable to a plurality of positions and said other member is rotatable to a plurality of positions and said other member is movable along said engagement path to engage said engagement pawl with said rack.

7. The invention as defined in claim 6 further characterized by means normally biasing said other member to a position wherein said engagement pawl is out of engagement with said rack, and cam means disposed to selectively urge said other member to move said engagement pawl into engagement with said rack.

8. The invention as defined in claim 6 wherein said one member includes means for performing embossments, and means to actuate said one member for embossment, and means to actuate said one member for embossment, and wherein said one member is rotatable on said positioning path of travel to select embossment characters, further characterized by means to operate said second member prior to the performing of the embossing operation.

* * * * *

# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,625,330 Dated December 7, 1971

Inventor(s) George Marinoff

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

Column 1, lines 34 to 36, "When the pawl is exactly aligned with the bottom of the groove, its movement into engagement position upon actuation." should be deleted; line 64, "abut there" should read -- but these --. Column 2, line 12, after "showing" there should be inserted -- in --. Column 3, line 63, "shown" should read -- shows--. Column 4, line 47, "shown" should read -- show --. Column 5, line 31, after "rest" there should be inserted a -- , --; lines 40 and 41, "in a spaced-apart relationship with said rack when said engagement pawl" should be deleted. Column 6, line 9, after "position" there should be inserted a -- . --; line 27, "member is rotatable to a plurality of positions and said other" should be deleted; lines 38 and 39, "and means to actuate said one member for embossment" should be deleted.

Signed and sealed this 13th day of March 1973.

(SEAL)
Attest:

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Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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