Dec. 26, 1967 H. J. LUEHRS 3,359,899

SPRING TENSIONED WRAP-AROUND PLATE CYLINDER CLAMPING ARRANGEMENT

Filed Feb. 1, 1965 5 Sheets-Sheet 1

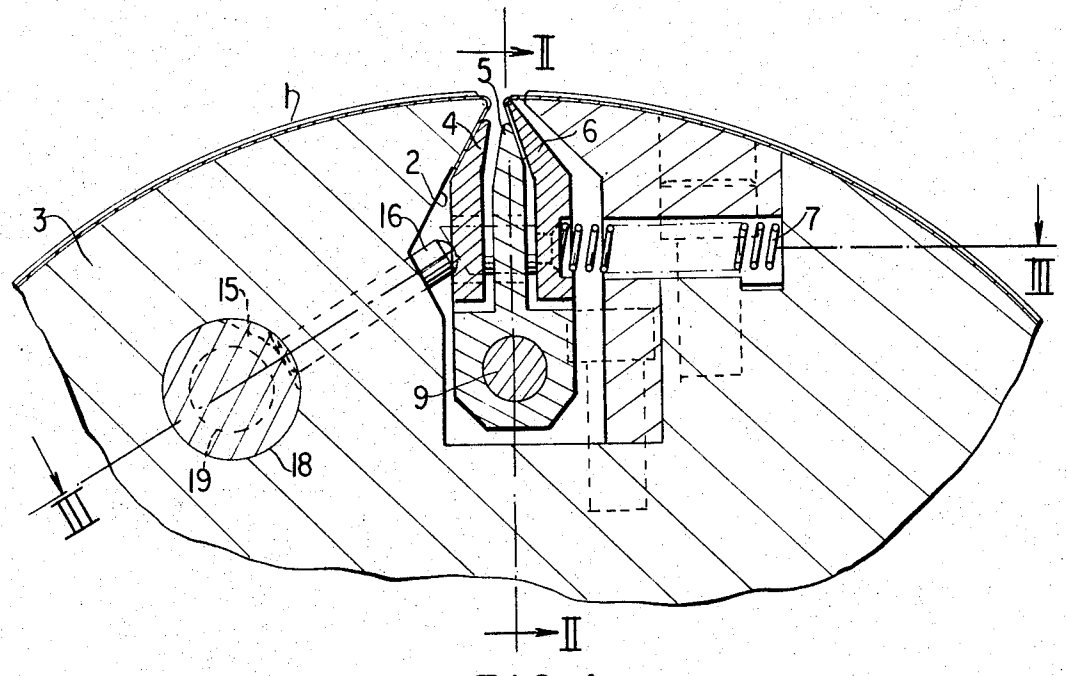



FIG. 1

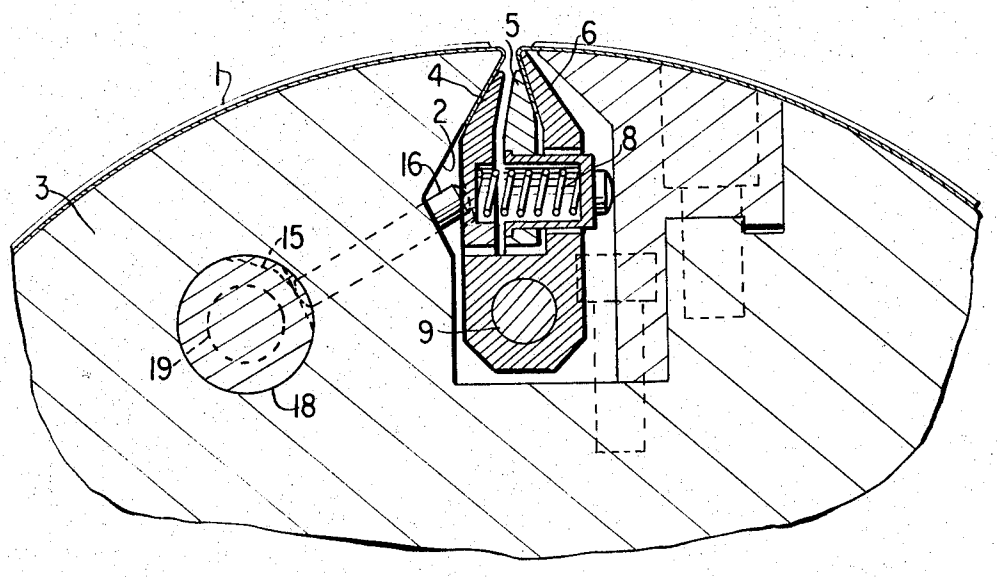



FIG. 4

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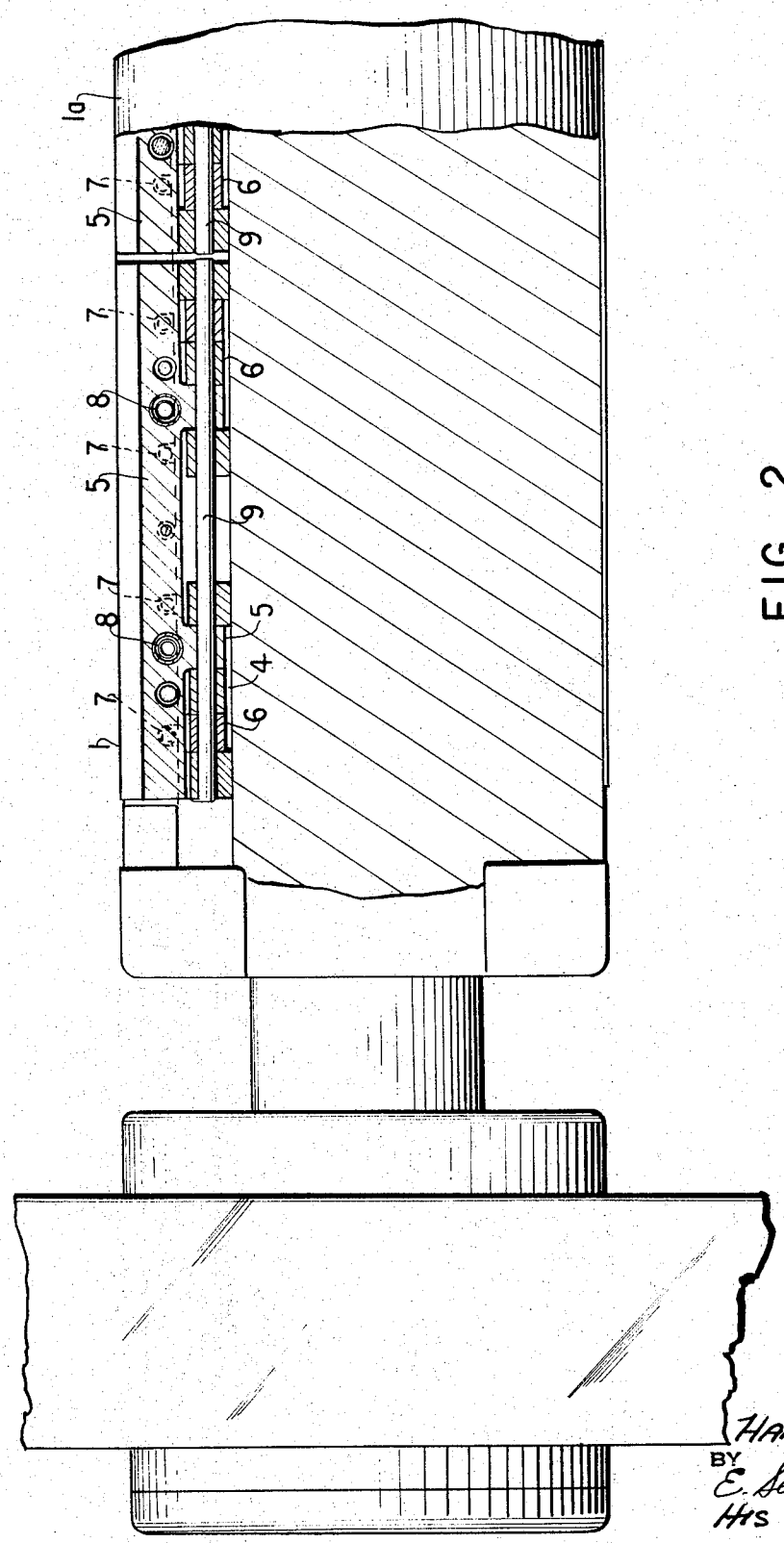



FIG. 2

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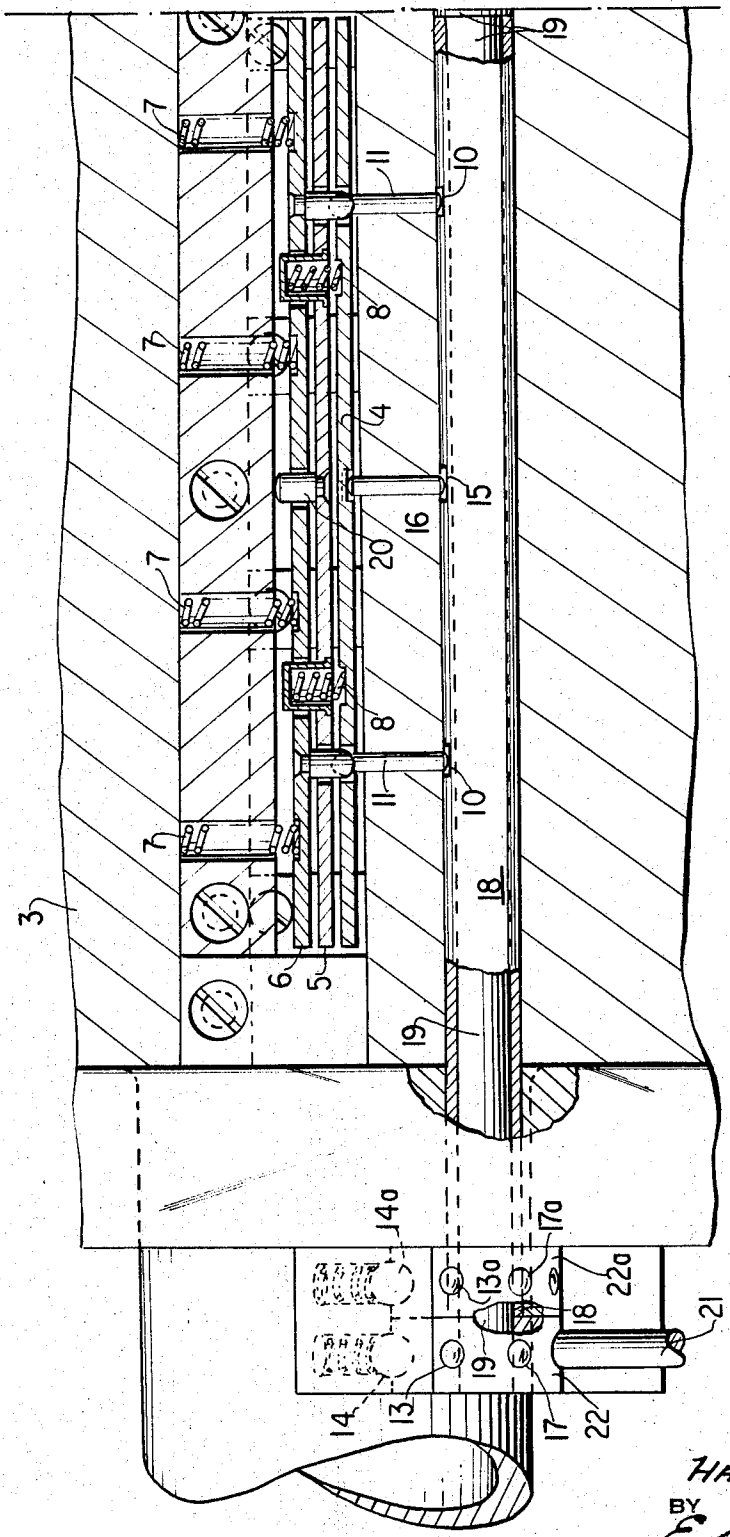



FIG. 3

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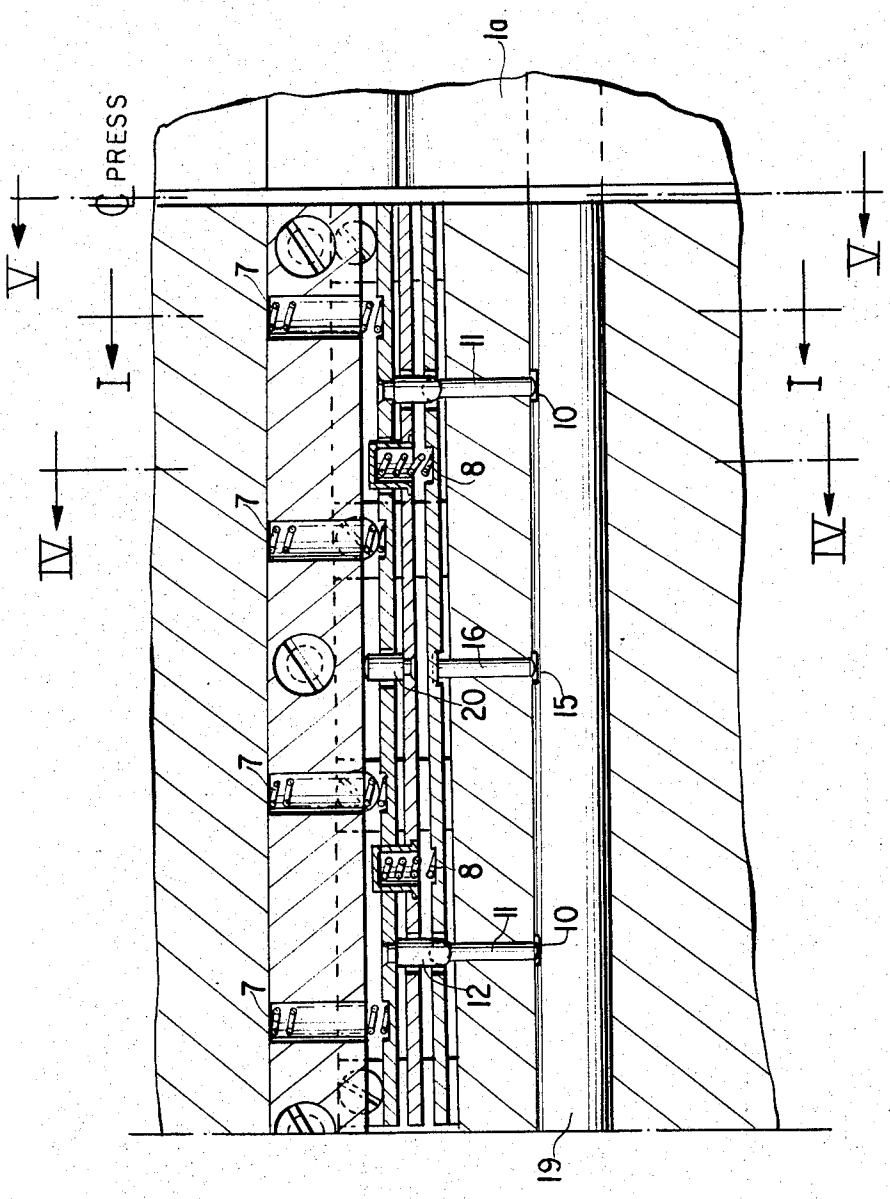



FIG. 3a

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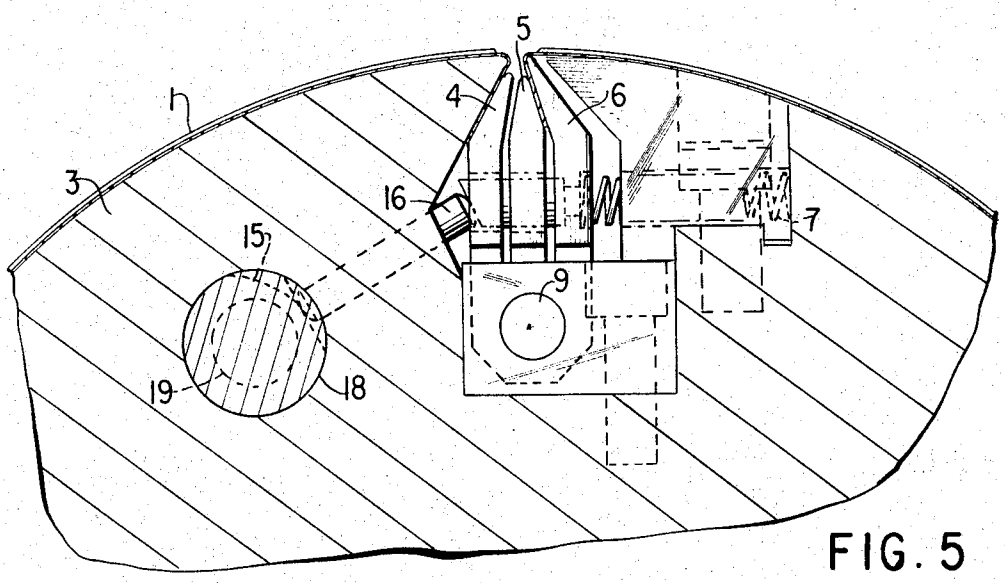
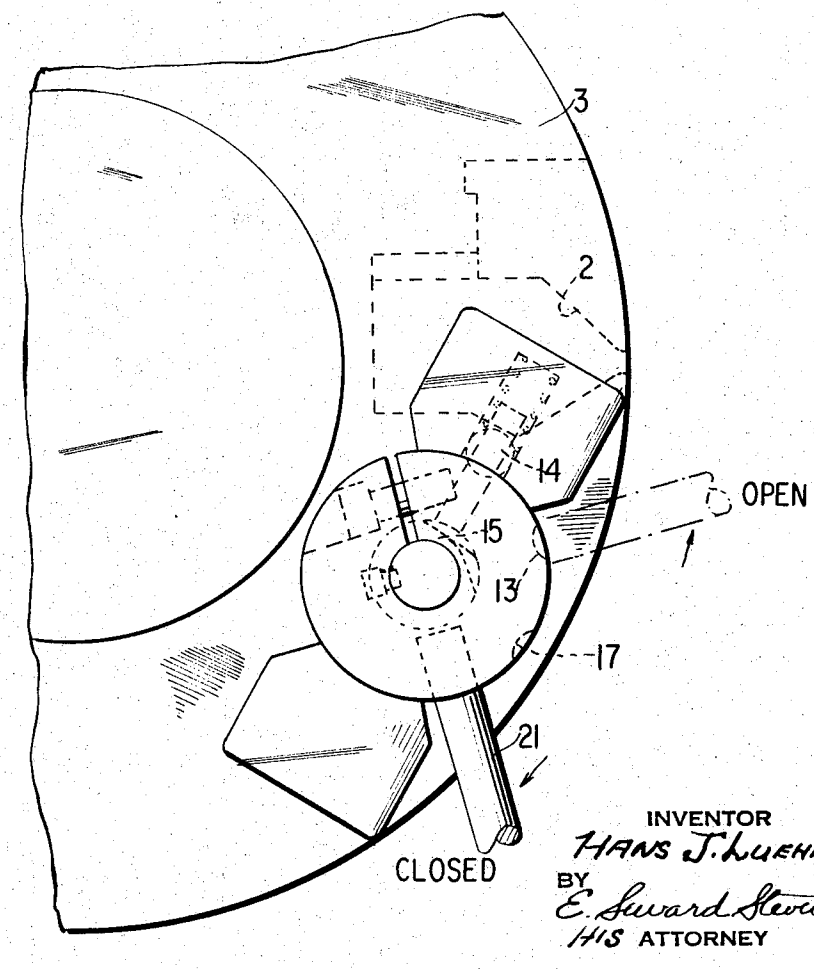



FIG. 5

FIG. 6




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3,359,899

# SPRING TENSIONED WRAP-AROUND PLATE CYLINDER CLAMPING ARRANGEMENT

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7 Claims. (Cl. 101—415.1)

The object of this invention is to quickly lock so-called wrap-around printing plates to a plate cylinder. Plastic steel-backed plates, shallow-etched zinc or magnesium plates, manila-paper-backed rubber or plastic plates, standard offset plates or metal and non-metallic base sheets can be used with the arrangement.

Another object is to provide a lead clamp in a predetermined position in a cylinder slot to locate the plate on the cylinder and a spring-loaded tail clamp to automatically align and tension the plate to a predetermined value.

Another object is to provide both a fixed and a movable plate clamp, the latter consisting of a plurality of coacting spring-pressured jaws which provide a predetermined self-aligning clamping load upon both crimped ends of the plate.

Another object is to provide multiple groups of independently operable clamps across the plate cylinder to accommodate and locate double or single page width plates closely adjacent but independent from each other.

Another object is to provide a plate clamping arrangement whereby all movable clamping components for a plate are mounted on a single pivot to limit the physical space requirement for the arrangement in order to maintain maximum plate cylinder rigidity.

A practical embodiment of my invention is shown in the accompanying drawings in which:

FIG. 1 represents a transverse vertical section through a plate clamping arrangement embodying my invention;

FIG. 2 represents a partial section (on a smaller scale) taken on the line II—II of FIG. 1, looking in the direction of the arrows;

FIGS. 3 and 3*a* represent partial sections taken on the line III—III of FIG. 1, looking in the direction of the arrows, said figure being partly broken away and having added thereto a portion of the cylinder mounting including means for actuating the plate clamping device;

FIG. 4 represents a detailed partial section taken on the line IV—IV of FIG. 3*a*, looking in the direction of the arrows;

FIG. 5 represents a detailed partial section taken on the line V—V of FIG. 3*a*, looking in the direction of the arrows; and

FIG. 6 represents an end view of a portion of the embodiment shown in FIG. 3 to illustrate the operation of the actuating mechanism for the plate clamping arrangement.

Referring to the accompanying drawings, suitable printing plates are designated by **1** and **1***a* and these plates are shaped to fit the outer surface of the plate cylinder **3** and precrimped at their ends for engagement by the crimped plate end engaging jaws denoted in each case by **4**, **5** and **6**. The jaw, or jaws, **4** coact to clamp the crimped leading plate edge against the cylinder inner surface **2** whereby the plate is located in the desired alignment on the cylinder outer surface and jaws **5** and **6** are adapted for coaction, as will be explained below, to clamp between them the crimped tail of the plate and thereby tension the plate to the cylinder when so urged, automatically, by sets of springs **7**, **8**.

The plate clamping and tensioning effect is accomplished through a mechanism including sets of springs, denoted by **7** and **8**, which are used both to provide the clamping



pressure on the plate ends as well as the tensioning forces for the plates. These spring sets **7** and **8** are arranged in tandem with jaws **5** and **6** which are subjected to the differential forces of the two groups of springs, i.e. the group comprising springs **7** and the group comprising the springs **8**, the former being stronger than the latter as set forth below.

Referring to the sections taken on the lines III—III, and IV—IV it will be noted that four springs **7** with an approximate total capacity of 100 pounds urge jaw **6** in a counterclockwise direction. It will thus be seen that, as this furnishes a differential in spring loads of 50 pounds, over springs **8** the clamping assembly **5** is urged in anticlockwise direction to provide 50 pounds of tension to the plate. As noted above, this tension is applied to the clamped plate tail through jaws **5** and **6**.

The reaction of springs **8** also provides the clamping load for jaw **4** to hold the lead edge of the plate against the inner surface **2** of the printing cylinder. As noted above, any stretch of the plate or plates **1**, **1***a* during the printing operation, will be accommodated by the action of the plate tail clamp, consisting of jaws **5** and **6**, urged in a counterclockwise direction.

It will be understood that the limited inherent flex of the spring urged jaws **4**, **5** and **6**, all of which have a common pivot on pins **9** (see FIGS. 5 and 6), provides a limited amount of self-alignment due, in part, to the length and shape of the jaws to accommodate slight inaccuracies in either the clamping mechanism or the end crimp of the plate or both.

The length of said jaws in proportion to the cross-sections of same, together with the angled upper ends of same as illustrated in FIGS. 1, 4 and 5 contribute to the desired flexing of same set forth above. A non-flexible jaw might cause an insecure engagement of the plate at the point or points at which the inaccuracy existed, whereas the flexibility of the plate clamping jaws affords greater frictional contact between the jaw and plate, therefore affording greater security.

The plate leading edge crimp is engaged by jaw **4** and forced against cylinder surface **2**. Said jaw **4** is actuated by the manual rotation of shaft **19** transmitted by means of cam **15** and pin **16**, the latter engaging jaw **4**. Simultaneously detent **17** engages ball **14**, the detents being denoted alternately as **17** and **13** on collar **22**, and **17***a* and **13***a* on collar **22***a*. Tool **21** is inserted in collar **22** or **22***a* to accomplish the rotation of shaft **19** or hollow shaft **18** as desired. (See FIGS. 3, 3*a* and 6.) Collar **22** is fixed on shaft **19** and collar **22***a* on shaft **18**.

It will be noted that closing the clamps is accomplished by the rotation of shaft **19** in a clockwise direction which closes the leading edge clamp **4** on the leading plate end and clamps same against cylinder inner surface **2**, whereas the continued rotation of said shaft **19** closes the tail clamps **5**, **6** on the trailing plate end crimp, it being understood that the clamps near the cylinder bearers may be similarly operated through the rotation of tubular shaft **18** by use of a tool **21** as shown in FIG. 6, detent **17***a* engaging ball **14***a*.

In order to remove a plate from the cylinder, shaft **19**, and/or tubular shaft **18**, is rotated anticlockwise by use of tool **21** which causes the tail clamp assembly to rotate in a clockwise direction through the operation of cams **10**, pins **11** and pins **12**, the latter being riveted to jaw **6**. (See FIGS. 3 and 3*a*.) Additional rotation of shaft **19** (or shaft **18**) in the anti-clockwise direction will cause further clockwise rotation of jaw **6** while the rotation of jaw **5** is terminated by the stop pin **20** riveted to jaw **5**, thus opening the clamp comprising jaws **5** and **6** and releasing the tail end of the plate. Pins **11** are now on the high of cams **10** and the detent **13** is engaged with

the spring rod ball **14** and **13***a* with **14***a*. The plate cylinder may now be rotated through 360° to unwind the plate therefrom.

Since it is evident that various changes may be made in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention, I do not intend to be limited to the specific embodiment herein shown and described except as set forth in the appended claims.

What I claim is:

**1.** A wrap-around plate cylinder clamping mechanism in combination with a cylinder and at least one printing plate thereon having crimped leading and trailing edges, a longitudinal cylinder surface slot having leading and trailing side portions for receiving said leading and trailing edges, groups of leading and trailing edge plate clamp units spaced and pivotally mounted along said slot, each unit comprising a swingable leading edge plate aligning clamp and a swingable pair of first and second circumferentially opposed trailing edge clamps, jaws on each of said clamps for engaging the respective plate edges, means for actuating each clamp unit toward and from plate edge engaging position and other means for biasing parts of said unit toward plate clamping and tensioning positions, said other means comprising sets of opposed springs of different strengths, said springs of greater strength being mounted between the said trailing side portion of the cylinder slot and the said first trailing edge clamp and in contact therewith, and the springs of lesser strength being mounted between and in contact with the said second trailing edge plate clamp and the leading edge clamp for normally urging the leading edge clamp into the leading edge engagement and the trailing edge jaw of said second trailing edge clamp toward the other trailing edge jaw of said first trailing edge clamp for engaging a plate trailing edge and tensioning the plate to cylinder.

**2.** The combination according to claim **1** in which all plate clamp jaws of a unit are mounted on a common single pivot.

**3.** The combination according to claim **1** in which all plate clamp jaws of a unit are mounted on a common single pivot and have a limited inherent flex to automaticaly accommodate slight inaccuracies in any crimped plate edge.

**4.** The combination according to claim **1** in which more than one group of plate clamp units is located in the cylinder slot to tension one or more plates to the cylinder.



**5.** The combination according to claim **1** in which the means for actuating said groups of leading and trailing edge plate clamp units comprise longitudinal concentric shafts, elements on said shafts engaging said clamp jaws of different groups and means located at a cylinder end and fixed to each shaft for turning each shaft and actuating said elements to move the jaws in contact therewith for clamping the plate end engaged by said actuated jaws to the cylinder.

**6.** The combination according to claim **1** in which means are provided for holding the means for actuating said clamp units in a predetermined position, said first named means comprising detents in the actuating means and spring loaded balls for engagement with said detents when the means for actuating have been rotated for holding said last named means in rotated position.

**7.** The combination of claim **1** in which the means for actuating each clamp unit includes elements for overcoming the clamping and tensioning action of said sets of springs for releasing a plate or plates from the cylinder, said elements including concentric shafts, cam surfaces on each shaft, pins engaged thereby, other pins on a leading edge clamp jaw and other pins on a trailing edge clamp jaw and a stop on a trailing edge clamp jaw plus pins on a second trailing edge clamp jaw and means for rotating each of said concentric shafts, the parts being so constructed and arranged that rotation of a concentric shaft in one direction tends to urge plate clamp jaws through the contact of said cam surfaces and pins into plate engaging and tensioning position and reversal of such rotation tends to release the plate ends and separate the clamping jaws when the stop contacts the cylinder.


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