Sept. 25, 1956 C. O. BACHMAN 2,764,089

HOLDING ARRANGEMENT FOR PRINTING PLATES

Filed Feb. 16, 1953

3 Sheets-Sheet 1

Fig. 1

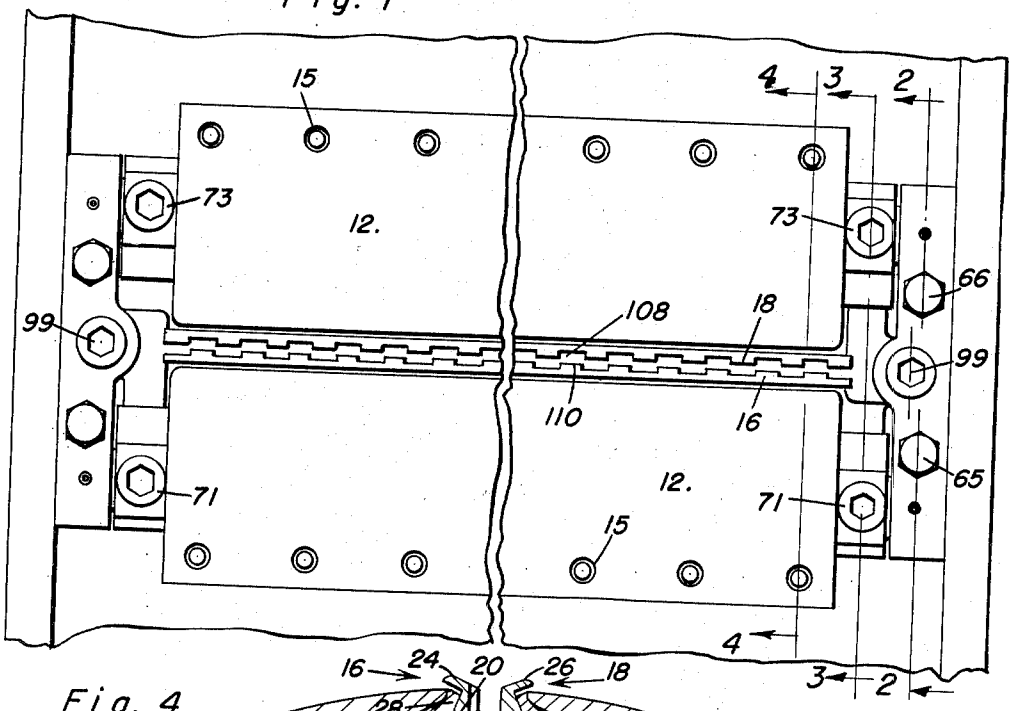


Fig. 4

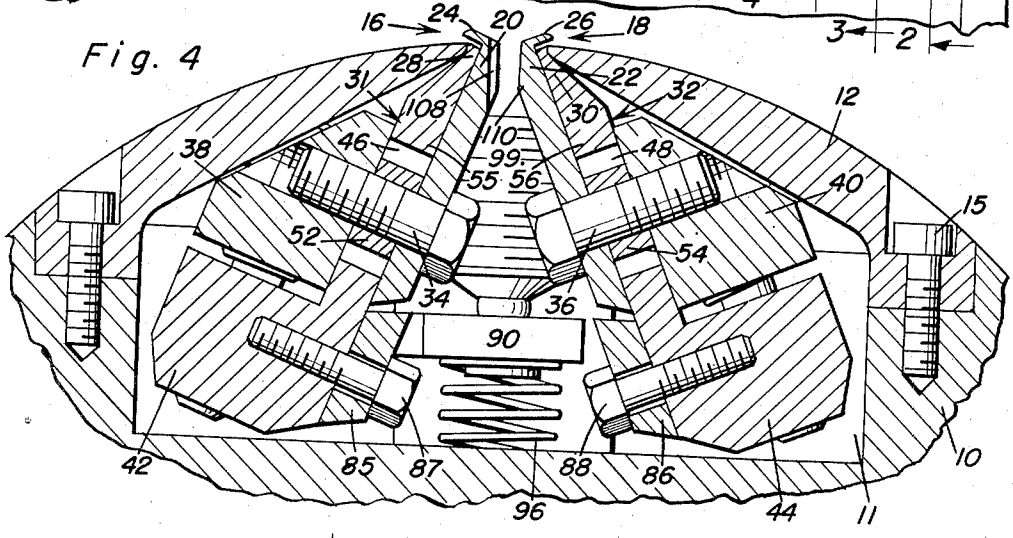
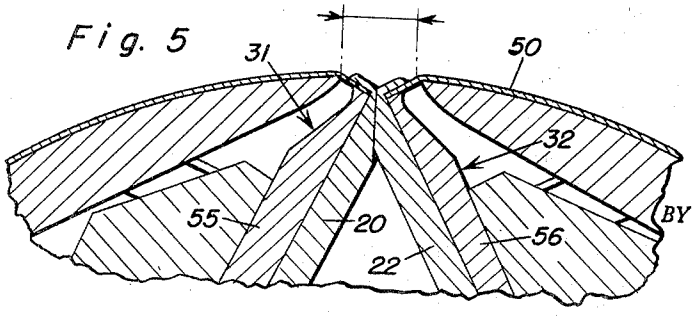


Fig. 5



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3 Sheets-Sheet 2

Fig. 2

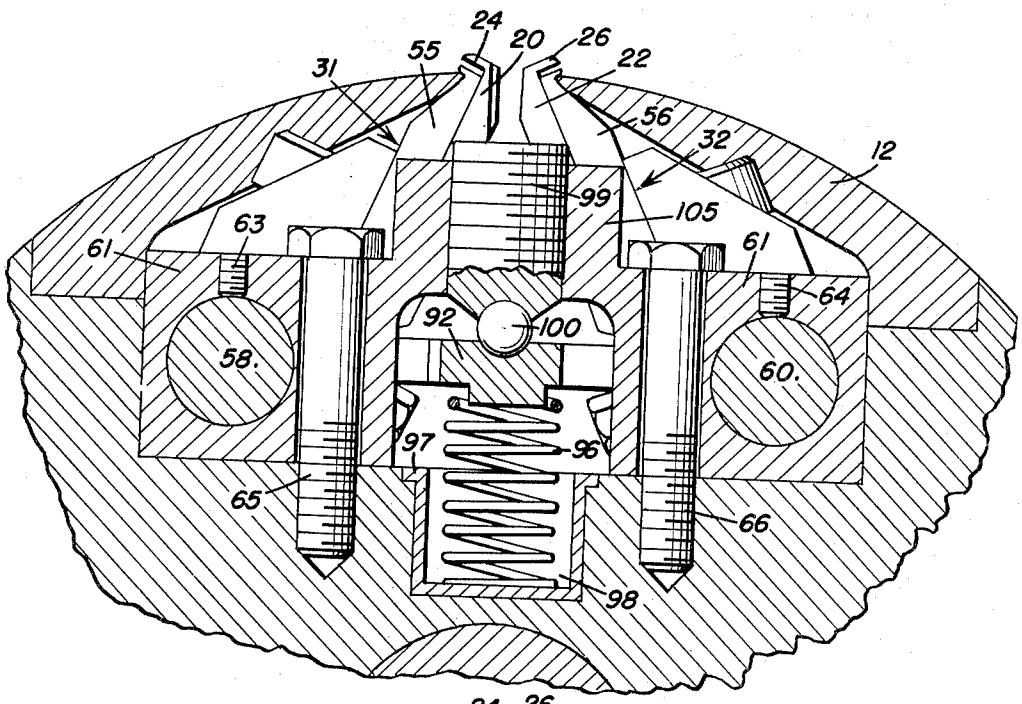
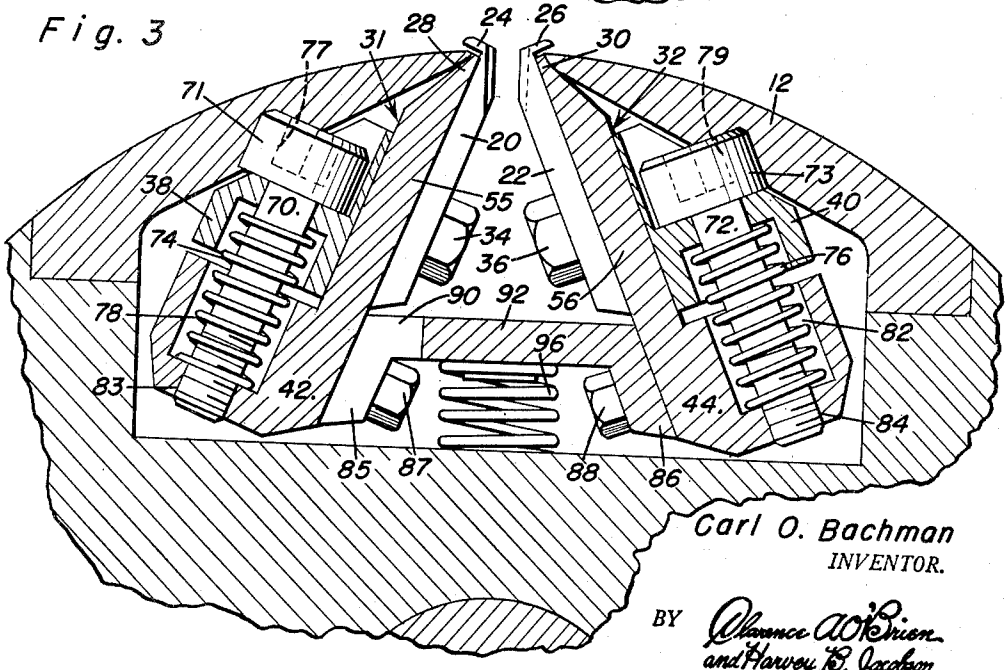


Fig. 3



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Fig. 7

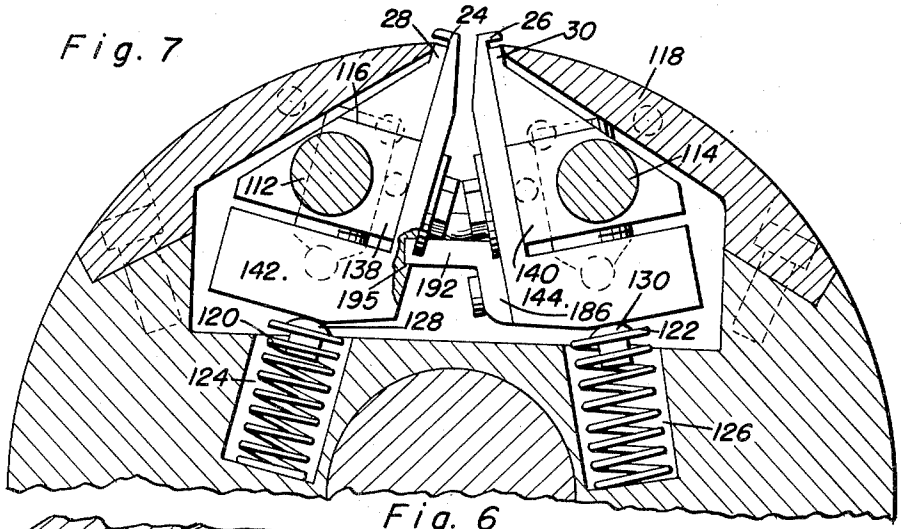


Fig. 6

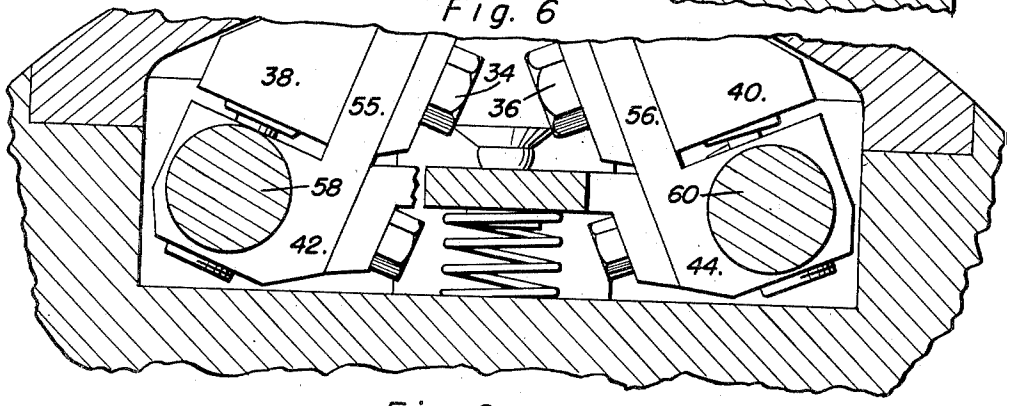
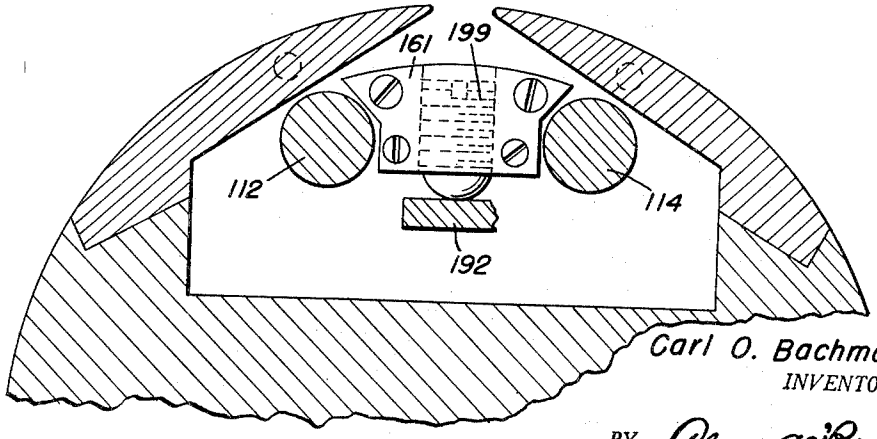


Fig. 8



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HOLDING ARRANGEMENT FOR PRINTING PLATES

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3 Claims. (Cl. 101—415.1)

This invention relates to printing presses and more particularly to offset printing presses and similar printing presses in which a printing plate is wrapped around and tightly fastened on a printing cylinder.

With printing cylinders of this type the printing plates are fastened on the cylinder and it is a highly desirable object that the number of operations to be performed is small and simple and that the method of tightening does not shorten the life of the printing plate which is regrained after use, and that the said tightening does not waste valuable printing space or impair the smoothness of the cylinder, thus giving rise to vibrations of the inking rollers, inking blades or the like which are directly or indirectly in contact with the cylinder.

The above named desirable objects could not be attained by the currently used arrangements and it is a primary object of the invention to provide an arrangement in which all the above named desirable advantages are obtained.

The invention further provides an improved retractible clamping mechanism for the printing plate of type cylinders which can be mounted and adjusted on the cylinder in a simple and efficient manner and which produces only an insignificant gap on the cylinder which is filled when the mechanism is retracted so that the drawbacks of the gap are minimized.

The objects of the invention and its advantages are stated in the following specification.

The invention is illustrated in the accompanying drawing which shows two modifications by way of example. It is to be understood that the examples shown illustrate merely the principle of the invention and the best modes of applying said principles, but do not represent the sole modes of application of said principle.

In the drawing:

Figure 1 is a plan view of the printing cylinder.

Figure 2 is a fragmentary elevational sectional view of the printing cylinder the section being taken along line 2—2 of Figure 1.

Figure 3 is a fragmentary elevational sectional view of the printing cylinder the section being taken along line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional elevational view of the printing cylinder the section being taken along line 4—4 of Figure 1.

Figure 5 is a view similar to Figure 4 but with the clamping mechanism in its retracted position.

Figure 6 is a fragmentary sectional elevational view of the printing cylinder the section being taken along line 6—6 of Figure 1.

Figures 7 and 8 are fragmentary sectional elevational views of a modification, the section being taken on a printing cylinder not different in plan view from the plan view of Figure 1 along lines indicated at 3—3 and 2—2 in Figure 1, respectively.

As above explained the invention is mainly concerned with the means for positioning or securing a flexible sheet on the printing cylinder of offset printing presses and the special design of these means intends, in the first place, to reduce to a minimum the gap between the clamped ends of the plate which reduction not only reduces the shocks imparted to the inking roller, but which also reduces the loss and waste which is due to the gap and which leaves a strip unprinted, a waste which is quite marked when printing on metal or plastics. In the second place, the invention is intended to reduce and simplify the labor necessary to "make ready" when proceeding to change the plates.

Further the invention is applicable without change whether printing is done by means of copper, zinc, aluminum alloy plates or by means of a resilient rubber sheet taking up the ink and it can therefore be used whatever the material of the sheet or object which is printed. This material, as above mentioned may be metal or plastic, which cannot be treated like paper where the waste material or space does not count for much.

The present clamping devices or plate holders require the bending of both ends of the printing plates at angles which vary from 120° to around 30°, the bent ends forming a strip of a width which varies between ½" and 2" or more. The bending of the plates is the cause of many difficulties and delays. In fact with the plates normally used tightening of the plates produces an elongation of the bent ends and in order to overcome this and to keep the plate tightened notwithstanding the elongation at the ends, the plates are usually overtightened and are liable to be fractured at the ends.

A fracture may of course cause great damage to the press and may injure the operator. Also the plates which consist of thin sheets of various metal alloys, when regrained for reuse, must be straightened, and this causes a weakness at the line at which repeated bending and straightening occurs and the plates are soon fractured and are no longer usable.

The leading idea of the construction according to the invention is therefore to avoid the bending of the edges.

According to the invention, therefore, the clamping bars or rails not only have jaws which are capable of seizing the edge of the sheet without bending it, and therefore project into and above the level of the printing cylinder when the plate is seized but they also retract when adjusted for clamping and move towards each other, so that in operative position the clamping jaws are not only essentially below the surface of the cylinder, but are also moved towards each other to such an extent that the gap is reduced to a minimum and is usually as small as or smaller than ¼ inch. As this movement of the clamping jaws takes place automatically upon tightening of the fixation means, the labor and time for "making ready" is in fact materially reduced by the arrangement whereby an additional advantage is obtained.

In the Figures 1–6 one modification of the arrangement is shown, which is used in offset printing presses.

The printing cylinder **10** is provided with a cavity **11**, as usual, to accommodate the clamping arrangement which cavity is covered by the cover or wing plates **12** forming part of and secured to the cylinder **10** by the screws **15**, to facilitate mounting of the clamping arrangement without loss of printing space.

Within the cavity the clamping members **16**, **18** are arranged, each of which comprises two clamping jaws, operated and moved by an operating mechanism arranged near the cylinder ends.

As seen in Figure 4 each clamping member **16**, **18** is equipped with a member **20**, **22** with an overhanging or projecting jaw **24**, **26**, respectively and a second member **31**, **32** carrying counter-holding or gripping jaws **28**, **30** respectively which may be moved relatively to the overhanging jaw **24**, **26** so that the edge of the printing plate

50 (shown in Figure 5 only) may be gripped between them.

In the non-gripping position, in which the printing plate is wrapped around the cylinder for the purpose of being mounted on the latter, the members 20, 22 which carry the overhanging jaw 24, 26 respectively are so positioned that their gripping surface is arranged near the surface of the cylinder, at a distance not substantially exceeding the thickness of the printing plate 50 and at an angle relative to the periphery of the cylinder which only slightly deviates from the tangent to the cylinder periphery. The ends of the printing plate thus can be gripped without bending.

To effect such clamping the other jaw member 30, 31 must be moved towards the overhanging jaw 24, 26 respectively and after the gripping operation the entire clamping mechanism must be retracted into the cavity.

To make these movements possible the jaw carrying members 20, 22 are joined by means of screw bols 34, 36 respectively to holding bars 38, 40 which in their turn are fixed in a manner to be described to the body or main portion 42, 44 of the counter-jaw members 31, 32.

As the members 20, 22 and 38, 40 are arranged on different sides of the counter-jaw members 31, 32, they have to pass through openings 46, 48 of the latter and a washer or annular seating member, 52, 54 on the screw bolt preferably fills the space between the two members joined by the screw bolts producing a firm fixation and holding of these parts without impairing relative movements between the two clamping jaw members.

As above mentioned, the counter-jaw members 31, 32 consist of an elongated outwardly projecting portion 55, 56 and of a body portion 42, 44. The latter, near the ends, as seen in Figures 2 and 6, are pivotally mounted on stub shafts 58, 60 which project from a block assembly 61, held by screw bolts 65, 66 near the ends of the cylinder. The stub shafts or pivot bolts 58, 60 are fixedly held within the block by means of setscrews 63, 64.

It will therefore be seen that the entire clamping mechanism can be rocked around the pivots.

The two clamping members must also be moved relatively to each other to produce clamping between the jaws 24, 28 and 26, 30 respectively, and therefore the members 38, 40, carrying the overlapping or projecting jaw carrying members 20, 22 are fixed to the body members 42, 44 of the second or counter-gripping jaw carrying members by means of screw bolts 70, 72 the heads 71, 73 of which press on the members 38, 40 while the threaded portion of the bolts engages a threaded bore 83, 84 in each of the body portions 42, 44. The latter as well as the members 38, 40 are each provided with a cavity 78, 82 respectively, each of which houses a spring 74, 76, respectively, opposing the screwing down of members 38, 40 on the body members 42, 44. It will thus be clear that the turning of the screw bolts 70, 72, produced by inserting a suitable socket wrench into the cavity 77, 78 of the heads 71, 73, draws the members 20, 22 with the jaws 24, 26 towards the jaws 28, 30 of the members 55, 56 thus producing gripping of the printing plate edge which has entered the space between the jaws when wrapped around the cylinder.

After the sheet edges which, as clearly seen from Figures 2, 3 and 4, have not been bent but which enter the jaws without any preceding permanent deformation, have been secured in the jaws by tightening the screws 71, 73 in the two sides of the cylinder, it is now necessary to retract or withdraw the clamping mechanism into the cavity, while at the same time tightening the cylinder plate on the cylinder to eliminate all possible loose fitting. This is accomplished by the mechanism illustrated in Figures 2 and 4, the former figure showing a section through the mechanism and the latter showing an elevational view of the mechanism in the background.

As seen in Figure 4 angle plates 85, 86 are fixed to the body portions 42, 44; either one angle plate is fixed to each body portion at one end, or two such angle plates may

be provided, one at each end. In the latter case the two angle plates must be so arranged that they are mechanically coupled so that they can be moved simultaneously by one and the same mechanism.

Each angle plate is provided with a pressure plate 90, 92 extending in a direction at right angles to a radial plane of the cylinder which is preferably also a plane of symmetry of the entire clamping arrangement. This pressure plate member 90 or 92 or both pressure plate members, if coupled mechanically, rest on a strong spring 96 which presses the angle plate outwardly. Against the other side of the pressure plate a pressure screw 99 is applied. The pressure screw may end in a cylindrical or spherical bearing either for a ball or a roller 100 to be applied against the pressure plate member 90 and 92, which may also be supplied with a cylindrical or spherical cavity taking up the roller or ball on the opposite side. The interposition of the ball or roller reduces the sliding friction which would otherwise occur upon movement of the members.

The pressure screw 99 is preferably threadedly held in a fixed connection with the cylinder in an extension 105 of the block assembly 61 which is fixed on the printing cylinder. Therefore upon advancing of the pressure screws 99 towards the pressure plates 90 or 92 a downward movement of the pressure plates initiates a movement of the members 31, 32 with which the angle plate is fixedly connected, around the fixed stub shafts or pivots 58, 60 and thereby an inward or retraction movement of the clamping mechanism, described below in more detail.

As the space is limited a special bore 98 of the cylinder may be provided to take up the spring 96. This bore may be lined with a suitable metal lining 97.

The pressure spring 96 and the pressure plates are therefore continuously under tension and under the influence of balancing forces. Whenever the pressure screw 99 is released or moved back the pressure plate moves with it and the pressure spring expands, thus bringing the clamping apparatus into the initial or non-tension position. Whenever the pressure screw 99 is moved against the pressure plate 90 or 92 the said plate moves and starts to rock the two clamping mechanisms which, previously have been tightening so that they grip the edge of the printing plate firmly.

The back of the members 20 and 22 have regular indentations or serrations 108, 110 which fit into each other so that their gripping portions may come very closely together upon retraction without weakening the material strength of the members.

The retracted and operative gripping position of these members is illustrated in Figure 5. The gripping jaws after having firmly gripped the edges of the printing plate, upon manipulation of the screws 71, 73, start to move backwardly around the pivots 58, 60 and thus move into the cavity 11 of the cylinder only the nose of the projecting jaw remaining near the cylinder surface. The jaw carrying members close up on each other with the serrations or indentations 108 taking up corresponding projections on the other member 110 and vice versa. The edges of the printing plate are slightly bent but not enough to suffer permanent deformation and the seat of the printing plate on the printing cylinder is tightened as the inward movement of the jaws removes any slack of the seat.

Thus all the above explained disadvantages of the conventional arrangements are removed.

Figures 7 and 8 show a modification of the arrangement which will be readily understood as essentially merely the location of the parts is changed.

The trunnions or stub axles 112, 114 in this case carry the members 138 and 140 which correspond to the members 38 and 40 of Figures 1–6. The screws 116 and 118 permit to shift the two jaw carrying members and to close the jaws 24, 28, 26, 30. The springs 120, 122 counteracting the screws 116, 118 are arranged on the outside

and are housed in bores **124**, **126** of the cylinder. It will therefore be clear from Figure 7 that the members **142**, **144** are always under the influence of balancing forces and that by tightening or loosening the screws **116** or **118** the jaws are brought into gripping action or that they are released.

The retracting of the jaw carrying members is produced by the pressure screw **199** which is held in a block housing **161** screwed to the end structure of the cylinder. The pressure screw **199** presses on pressure plates **192** of angle bars **186**. The two clamping mechanisms are in this case coupled by making the pressure plate **192** fixed to member **144** enter into a slot **195** in the other member **142**. Likewise the pressure plate on member **142** may enter a slot in member **144** (not shown).

No special spring counteracting the pressure screw **199** is necessary as the two springs **124**, **126** can in this case also perform this function.

The arrangement is somewhat simplified but is in all principal aspects the same as that shown in Figures 1–6.

The arrangement by virtue of the retraction and the closing up of the mechanism in its retracted position permits to maintain a gap of the smallest dimension in the cylinder, the gap being not larger than ¼" in most cases and in some cases smaller. The size of the gap is of greatest importance, for not only does it produce a discontinuity which leads to vibration of the inking roller which slides on it, but it also represents lost printing space which may be of great importance especially where printing is to be done on plastic or metal. Further, the combined retracted clamping members present a surface which deviates only very little from the cylindrical contour so that its influence on the rollers sliding on the printing cylinder is negligible.

Where metal or plastic is printed the printing plate must be elastic and yielding (for instance it must be made of rubber) and it is a characteristic of the invention that the arrangement such as it is, is suitable for all types of printing plates or sheets and in all cases will be capable of drawing the plate tightly around the cylinder. This advantage is not obtainable with the printing presses now in use.

The regraining of the metal plates can take place without fractures, as the ends of the printing plates are not bent and may therefore be repeated many times. A further advantage consists in the fact that the plates may be stored easily, which is not the case with plates with bent ends.

It will thus be seen that the arrangement provides a material improvement of the printing plate holding means which is accompanied by a number of disadvantages.

It will be clear that many unessential modifications may be made without in any way departing from the essence of the invention as defined in the annexed claims.

What is claimed as new is as follows:

1. In combination with a printing press cylinder, a plate clamping mechanism, said printing press cylinder having an axially extending cavity radially through the periphery of said printing press cylinder, a clamping unit disposed in said cavity and extending substantially the full length thereof, said clamping unit comprising a pair of spaced trunnions, a pair of clamping members carried by each of said trunnions, one of said clamping members being

mounted on its respective trunnion, the other of said clamping members being slidably mounted on said one clamping member, one of said clamping members having an end jaw, the other of said clamping members having an offset jaw overlying said end jaw, cover plates carried by said printing press cylinder forming a continuation of the periphery of said printing press cylinder and disposed in overlying relation to said cavity, said cover plates having spaced opposed ends presenting an axially extending, radial opening through the periphery of said printing press cylinder, said cover plates having ends terminating short of the ends of said cavity, said clamping members extending axially beyond opposite ends of said cover plates, fastening means disposed in said cavity beyond the ends of said cover plates connecting together said clamping members of each trunnion and urging said offset jaws towards said end jaws for clamping edges of a printing plate therebetween, said offset jaws initially projecting through said opening radially of the periphery of said printing press cylinder for facilitating the positioning of edges of a printing plate, and means disposed within said cavity beyond the ends of said cover plates for rotating said clamping members about the axes of said trunnions and drawing said jaws into said cavity to a printing plate tensioning position.

2. The combination of claim 1 including mounting blocks for said trunnions mounted in opposite ends of said cavity, said means for rotating said clamping members including pressure plate members connected to said one clamping member, said pressure plate members extending away from said trunnions into the space between said trunnions, and adjustable pressure applying fasteners carried by said mounting blocks and engaged with said pressure plate members.

3. A clamping means as claimed in claim 1, wherein the clamping member carrying the offset clamping jaw projecting above the peripheral surface in the open or initial gripping position is provided with a body member pivoted to one of the trunnions, while the other clamping member consists of two portions located on different sides of the first named clamping member, which is provided with an elongated slot, the two portions of the second clamping member being joined by means of a member passing through said slot.

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