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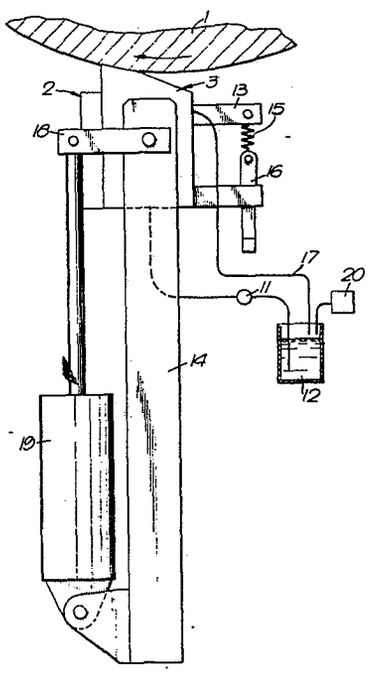
(71) Applicant: **CROSFIELD ELECTRONICS LIMITED, 766 Holloway Road, London N19 3JG (GB)**

(72) Inventor: **Pugsley, Peter Charles, 1 Wood Ridings Avenue, Hatch End Pinner Middlesex (GB)**
Inventor: **Parkins, David Walter, 19 Furzefield, Bedford Bedfordshire (GB)**

(74) Representative: **Rackham, Stephen Neil et al, GILL JENNINGS & EVERY, 53/64 Chancery Lane London WC2A 1HN (GB)**

(54) A rotogravure printing press.

(57) A rotogravure printing press includes a printing member (1) having an at least partly cylindrical ink receiving matrix and at least one inking assembly including an ink channel (3) extending in the axial direction of and open towards the printing member (1). The ink channel is divided into two parts by a blade (4) pivoted around an axis extending parallel to the axis of the printing member (1) with means (10) to supply ink to the one side of the pivoted blade (4) and a drain (21) on the other side. The press also includes means (18, 19) to rotate the blade (4) about its axis, a doctor blade (6) on the one side of the pivoted blade (4) and means (18, 19) to move the doctor blade (6) into and out of contact with the surface of the printing member (1). The press is arranged such that, in use, the means (18, 19) pivots the pivoted blade away from the one side to allow ink from the channel (3) to flood the ink receiving matrix of the printing member (1) with the doctor blade (6) removing ink from the surface of the printing member (1), surplus ink passing over and down the other side of the pivoted blade (4) into the drain (21) and, to stop the supply of ink, the means (18, 19) pivots the pivoted blade (4) towards the one side to shut off the supply of ink and allow any remaining ink to flow into the drain (21) before the doctor blade is moved out of contact with the surface of the printing member (1). Preferably the doctor blade (6) forms the downstream side wall of the ink channel (3) and the pivoted blade (4) seats and forms a seal against the doctor blade (6) to shut off the supply of ink.



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A ROTOGRAVURE PRINTING PRESS

This invention relates to a rotogravure printing press and, in particular, to an inking assembly for inking the printing member of a rotogravure printing press.

Conventionally, in a rotogravure printing press a printing member having a cylindrical surface including an ink receiving matrix dips, at its lowermost point into a bath containing ink to coat the printing member with ink and then a doctor blade downstream of the ink bath engages the surface of the printing member to scrape ink off the surface of the printing member and merely leave ink remaining in the ink receiving matrix. The ink used with a conventional rotogravure press is thin and very fluid, and the ink bath and doctor blade assembly occupy an arc of about 120° around the bottom of the printing member. This arrangement is satisfactory especially when the printing member has a continuous cylindrical surface. When the printing member is in the form of a cylindrical plate, this is fixed to a generally cylindrical substrate by grippers or clamps which fix the plate in position on the substrate. In this case the doctor blade has to be lifted off the surface of the printing member during each revolution of the printing member so that it does not contact the grippers or clamps. Also in this case the grippers or clamps are dipped into the ink bath on each revolution, this covers them with ink which makes their subsequent release difficult and very messy and also, because excess ink is not removed from this region by the doctor blade, the ink from this region tends to be thrown about by the rotary

movement of the printing member. This is also very messy but, more importantly this leads to the evaporation of a large quantity of the ink solvent which represents a potential hazard when the solvent is inflammable and also means that some apparatus is required to add further solvent to the ink in the ink bath to maintain its viscosity at the correct level.

We have recently developed a rotogravure press which is particularly useful as a proof press or for printing limited print runs and in this press the ink receiving matrix on the printing member contains at least two different colour separations of the same image and normally contains the four different colour separations required for four colour printing. Thus, it is required that inks of different colour are applied to the different parts of the same printing member forming the different colour separations with no contamination of the other parts of the matrix and with no contamination of the supply of printing ink of one colour with that of any other colour. Clearly, with such a press it is not possible to dip the printing member into various baths of the different ink and it is desirable for the circumferential extent of each of the inking assemblies to be relatively small so that, together they still only occupy a limited proportion of the circumference of the printing member.

According to this invention, a rotogravure printing press includes a printing member having an at least partly cylindrical ink receiving matrix and at least one inking assembly including an ink channel extending in the axial direction of and open towards the printing member, the ink channel being divided into two parts by a blade pivoted about an axis extending parallel to the axis of the printing member with means to supply ink to the one side of the pivoted blade and a drain on the other side, means

to rotate the blade about its axis, a doctor blade on the one side of the pivoted blade, and means to move the doctor blade into and out of contact with the surface of the printing member, the arrangement being such that, in use, the means pivots the pivoted blade away from the one side to allow ink from the channel to flood the ink receiving matrix of the printing member with the doctor blade removing ink from the surface of the printing member, surplus ink passing over and down the other side of the pivoted blade into the drain, and, to stop the supply of ink, the means pivots the pivoted blade towards the one side to shut off the supply of ink and allow any remaining ink to flow into the drain before the doctor blade is moved out of contact with the surface of the printing member.

The pivoted blade may form a seal against one side of the ink channel with the doctor blade arranged downstream from the ink channel but preferably the doctor blade forms the downstream side wall of the ink channel and the pivoted blade seats and forms a seal against the doctor blade to shut off the supply of ink. It is preferred that the inking assembly moves towards and away from the printing member during each revolution of the printing member, and it is preferred that the ink channel is also pivoted about an axis parallel to the axis of the printing member. In this case the inking assembly preferably includes resilient means to provide the appropriate contact pressure between the doctor blade and the surface of the printing member so that after the pivoted blade engages against the doctor blade to shut off the ink, further movement of the pivoted blade causes the entire ink channel to pivot about its axis to move the inking assembly away from the surface of the printing member. Thus the means to move the pivoted blade and the means to move the doctor blade are largely common.

Preferably the ink channel includes a containing blade upstream of the pivoted blade, the containing blade bearing against, or being arranged close to the surface of the printing member. Ink may flow into the drain under gravity but preferably the press includes a vacuum source coupled to the drain to draw any excess ink that flows over the top of the pivoted blade down into the drain. The ink from the drain is preferably returned to an ink reservoir forming part of an ink supply system. The vacuum that is applied to the drain in use causes a flow of air to take place past the top edge of the containing blade and this keeps the top edge of the containing blade clean whilst the containing blade also prevents any spray or spatter of ink from leaving the ink channel and contaminating any other parts of the apparatus. Preferably the containing blade is located in front of the pivot axis of the ink assembly so that, when the ink assembly pivots to remove the doctor blade from the surface of the printing member the containing blade is also moved away from the printing member.

When the printing press includes only a single inking assembly the quantity of ink exposed to the atmosphere and the time for which it is exposed are both greatly reduced, as compared with previous systems, which leads to a great reduction in the evaporation of the ink solvent and a great reduction in the consequent problems that are caused. It also reduces considerably the quantity of ink thrown about and the quantity that comes into contact with the plate grippers or clamps. In this case the means are arranged to shut off the ink and move the doctor blade out of contact with the printing member once during each revolution of the printing member just before the grippers or clamps reach the inking assembly, and are arranged to return the doctor blade into contact with the printing member and to restore the ink supply once the

grippers or clamps have passed the inking assembly.

When the press includes two or more inking assemblies the ink receiving matrix of the printing member includes two or more different colour separations. In this case the means to move the pivoted blade and the doctor blade of each inking assembly are again arranged to move the blades during each revolution of the printing member but the timing of the movement is such that each inking assembly only applies ink to the ink receiving matrix corresponding to the colour separation for the ink contained in that inking assembly. Since the doctor blade of each inking assembly is removed from the surface of the printing member upon completion of the inking of its colour separation the doctor blade associated with each particular inking assembly does not contact the ink receiving matrix forming any other colour separation and so does not get contaminated nor does it contaminate any other colour separation.

Two examples of rotogravure presses in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

Figure 1 is a partly diagrammatic side elevation of part of the first example showing the single inking assembly;

Figure 2 is a cross-section through an ink channel of the inking assembly with a pivoted blade in a first position; and,

Figure 3 is a cross-section through the ink channel of the inking assembly with the pivoted blade in a second position.

The general arrangement and construction of the printing press is similar to any conventional plate-gravure press. A printing member 1 of the press is formed as a partly cylindrical body with a cylindrical gravure plate

having an ink receiving matrix engraved into its cylindrical surface and fixed to it by clamps (not shown). The principal difference between this example and a conventional plate-gravure press lies in the construction and arrangement of the inking assembly and only this part will be described in detail.

The inking assembly comprises a doctor blade assembly 2, an ink channel 3, a pivoted blade 4 and a containing blade 5. The doctor blade assembly 2 is conventional in construction and comprises a pair of spring steel blades 6 and 7 inclined towards and bearing against one another. The spring steel blades 6 and 7 are clamped onto and define the downstream side wall of the ink channel 3. The pivoted blade 4 has a seating surface 8 along its free edge which, in one position of the pivoted blade 4 bears against and seals against the strip 6 of the doctor blade. The containing blade 5 is made from nylon or other plastics material and is arranged to be a distance of substantially 1 mm away from the surface of the printing member when the doctor blade 6 is in engagement with the printing member 1. The containing blade 5 forms the upstream edge of the ink channel 3. A strip of rubber or other elastomeric material 9 is sandwiched between the upstream side of the pivoted blade 4 and the side of the ink channel 3 to form a seal to prevent ink from the base of the ink channel 3 passing upwards over the upstream side of the pivoted blade 4. Ink is pumped into the ink channel 3 through an inlet 10 via a pump 11 from a reservoir 12. // The ink channel 3 together with a doctor blade assembly 2 rotates about the pivot axis of the blade 4 which is parallel to the axis of the printing member 1. An arm 13 is connected to the ink channel 3 and connected to a frame 14 attached rigidly to and forming part of the main framework of the press by a spring 15 connected to a link 16 with a screw-

threaded adjuster 17 to adjust the loading applied to the spring 15. The spring 15 and the arm 13 urge the ink channel 3 to rotate about its axis in a clockwise direction as seen in Figure 2, to urge the doctor blade 6 against the surface of the printing member 1 with a predetermined pressure. The pivoted blade 4 is connected to a crank arm 18 which is in turn connected to one end of a pneumatic piston and cylinder assembly 19 having its other end connected to the frame 14. Operation of the pneumatic piston and cylinder assembly 19 causes the pivoted blade 4 to pivot. A vacuum generated by a vacuum source 20 is applied to the upstream side of the pivoted blade 4 via a connection 21 and ink sucked out through the connection 21 is returned to the ink reservoir 12. The operation of the pneumatic piston and cylinder assembly 19 is synchronised with the rotation of the printing member 1 by a conventional system for removing the doctor blade from a printing member and this conventional system will not be described in detail.

As the leading edge of the gravure plate on the printing member 1 approaches the inking assembly the pneumatic piston and cylinder assembly 19 is operated to move the pivoted blade 4 in the clockwise direction as seen in Figures 2 and 3. The initial movement of the pivoted blade 4 merely allows the ink channel 3 to rotate about its axis under the bias of the spring 15 until the doctor blade 6 engages the surface of the printing member 1. Further movement of the pivoted blade 4 by the pneumatic piston and cylinder assembly 19 causes the seating surface 8 of the pivoted blade 4 to unseat from the face of the doctor blade 6 to allow ink to flow from the ink channel 3 to flood the surface of the printing member 1 with ink. This is the position of the pivoted blade 4 shown in Figure 3. A vacuum from the source 20 is continuously applied to the upstream side of the pivoted blade 4 and therefore any ink flowing over the upper edge

of the pivoted blade 4 is sucked by the vacuum down the upstream side of the pivoted blade 4, through the vacuum connection 21 and returned to the reservoir 12. The vacuum applied via the connection 21 draws air over the upper edge of the containing blade 5 to keep this upper edge of the containing blade 5 clean and prevents ink from being released outside the ink channel 3.

As the end of the plate approaches the inking assembly the pneumatic piston and cylinder assembly 19 is again operated to urge the pivoted blade 4 in the anti-clockwise direction as seen in Figures 2 and 3 so that the seating surface 8 on the pivoted blade 4 engages the doctor blade 6 to cut off the supply of ink from the ink channel 3. The vacuum applied via the connection 21 draws the remaining ink down the upstream side of the pivoted blade 4 and, further movement of the pneumatic piston and cylinder assembly 19 and the pivoted blade 4 acting on the doctor blade 6 causes the entire inking channel 3 to rotate about its axis against the bias of the spring 15. This rotation takes the doctor blade 6 out of contact with the surface of the printing member 1 and the vacuum applied to the connection 21 draws air over the top edge of the doctor blade 6 to carry with it any ink adjacent the upper edge of the doctor blade 6 and so keep the top edge of the doctor blade 6 clean and prevent any smearing of the ink on the surface of the printing member 1. The rotation of the ink channel 3 not only removes the doctor blade 6 from the surface of the printing member 1 but also moves the containing blade 5 further away from the surface of the printing member 1.

The ink flow to the ink inlet 10 may be controlled by a valve between the ink inlet 10 and the pump 11 or by controlling the action of the pump 11, in addition to the action of the seating surface 8 of the pivoted blade 4 on the doctor blade 6 if this is required.

The second example of press in accordance with this invention is described more fully in our co-pending European Patent Application No which claims priority from earlier British Patent Application 8028364 and which is being filed on the same day as the present application. In this press, the printing member includes either four separate partly cylindrical gravure printing plates, each of which corresponds to a different colour separation of the same image or, preferably, the cylindrical surface of the printing member 1 has an ink receiving matrix engraved on it which comprises the four separate colour separations of the same image. The press also includes four inking assemblies each of which is substantially identical to the inking assembly of the first example described above.

The synchronisation between the operation of the inking assemblies and the rotation of the printing cylinder is again described in detail in our co-pending application and the inking assemblies are arranged so that each inking assembly only applies ink to its respective colour separation.

CLAIMS

1. A rotogravure printing press including a printing member having an at least partly cylindrical ink receiving matrix (1) and at least one inking assembly including an ink applicator, a doctor blade downstream from the ink applicator and means to move the doctor blade (6) into and out of contact with the surface of the printing member (1), characterised in that the ink applicator comprises an ink channel (3) extending in the axial direction of and open towards the printing member (1), the ink channel being divided into two parts by a blade (4) pivoted around an axis extending parallel to the axis of the printing member (1) with means (10) to supply ink to the one side of the pivoted blade (4) and a drain (21) on the other side, and means (18, 19) to rotate the pivoted blade (4) about its axis, the arrangement being such that, in use, the means (18,19) pivots the pivoted blade (4) away from the one side to allow ink from the channel (3) to flood the ink receiving matrix of the printing member (1) with the doctor blade (6) removing ink from the surface of the printing member (1), surplus ink passing over and down the other side of the pivoted blade (4) into the drain (21), and, to stop the supply of ink, the means (18, 19) pivots the pivoted blade (4) towards the one side to shut off the supply of ink and allow any remaining ink to flow into the drain (21) before the doctor blade (6) is moved out of contact with the surface of the printing member (1).

2. A printing press according to claim 1, in which the doctor blade (6) forms the downstream side wall of the ink channel (3) and the pivoted blade (4) seats and forms

a seal against the doctor blade (6) to shut off the supply of ink.

3. A printing press according to claim 1 or 2, in which the inking assembly moves towards and away from the printing member (1) during each revolution of the printing member and in which the ink channel (3) is also pivoted about an axis parallel to the axis of the printing member (1).

4. A printing press according to claim 3, which further includes resilient means (15) to provide the appropriate contact pressure between the doctor blade (6) and the surface of the printing member (1), and in which the pivoted blade engages against the doctor blade (6) to shut off the ink, further movement of the means (18,19) and the pivoted blade (4) causing the entire ink channel (3) to pivot about its axis against the resilient means (15) to move the inking assembly away from the surface of the printing member (1).

5. A printing press according to any one of the preceding claims, in which the ink channel (3) includes a containing blade (5) upstream of the pivoted blade (4) the containing blade (5) bearing against, or being arranged close to the surface of the printing member (1).

6. A printing press according to claim 5 when dependent upon claim 4, in which the containing blade (5) is located in front of the pivot axis of the inking assembly (3) so that, when the inking assembly (3) pivots to remove the doctor blade (6) away from the surface of the printing member the containing blade (5) is also moved away from the printing member (1).

7. A printing press according to any one of the preceding claims, which also includes a vacuum source (20) coupled to the drain (21) to draw any excess ink that flows over the top of the pivoted blade (4) down into the drain (21).

8. A printing press according to any one of the preceding claims, which includes only a single inking assembly, in which the printing member is a gravure plate, and in which the means (18,19) are arranged to move the blade (4) and move the doctor blade (6) out of contact with the gravure plate (1) once during each revolution of the printing member just after the end of the ink receiving matrix has passed and just before the end of the plate reaches the inking assembly and return the doctor blade (6) into contact with the gravure plate and move the blade (4) to restore the ink supply just after the other end of the plate has passed and just before the start of the ink receiving matrix has reached the inking assembly.

9. A printing press according to any one of claims 1 to 7, which includes two or more inking assemblies, in which the ink receiving matrix of the printing member includes two or more different colour separations and in which the means (18,19) to move the pivoted blade (4) and the doctor blade (6) of each inking assembly are arranged to move the blades (4 and 6) once during each revolution of the printing member, with the timing of the movement being such that each inking assembly only applies ink to the ink receiving matrix corresponding to the colour separation for the ink contained in that inking assembly.

Fig. 1.

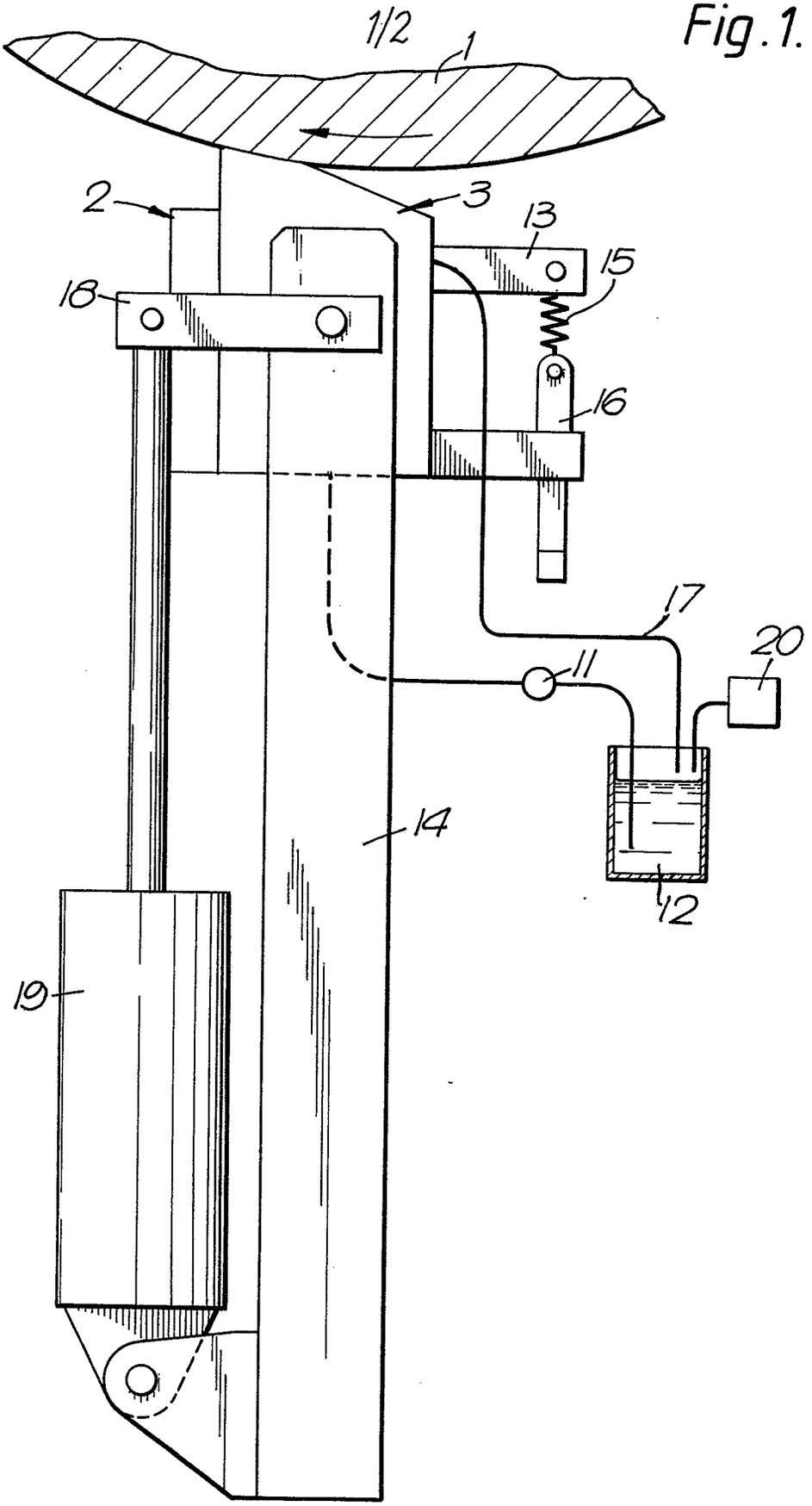


Fig.2.

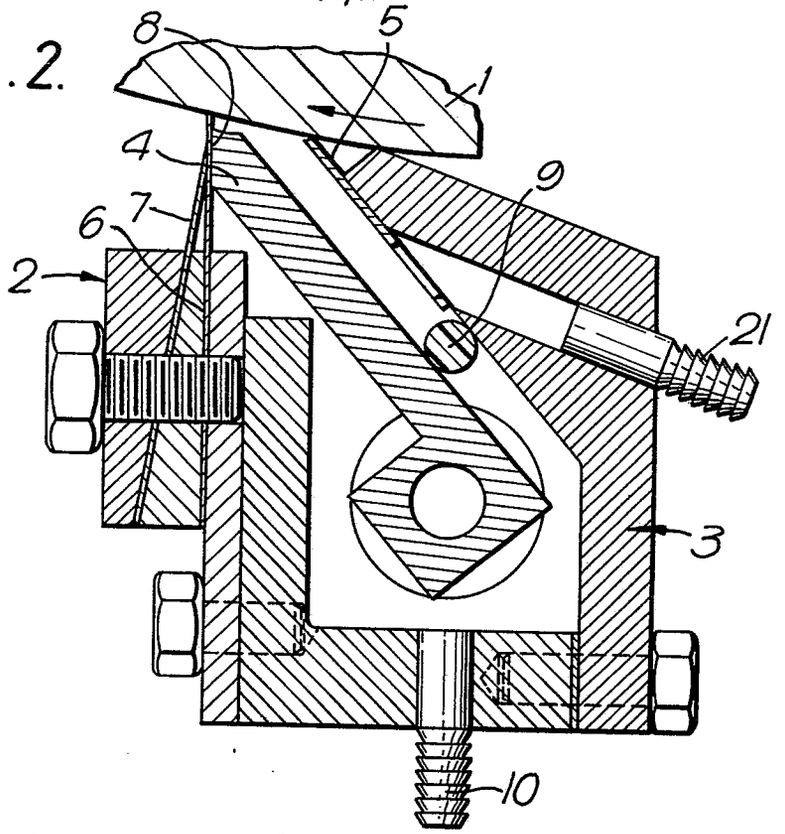
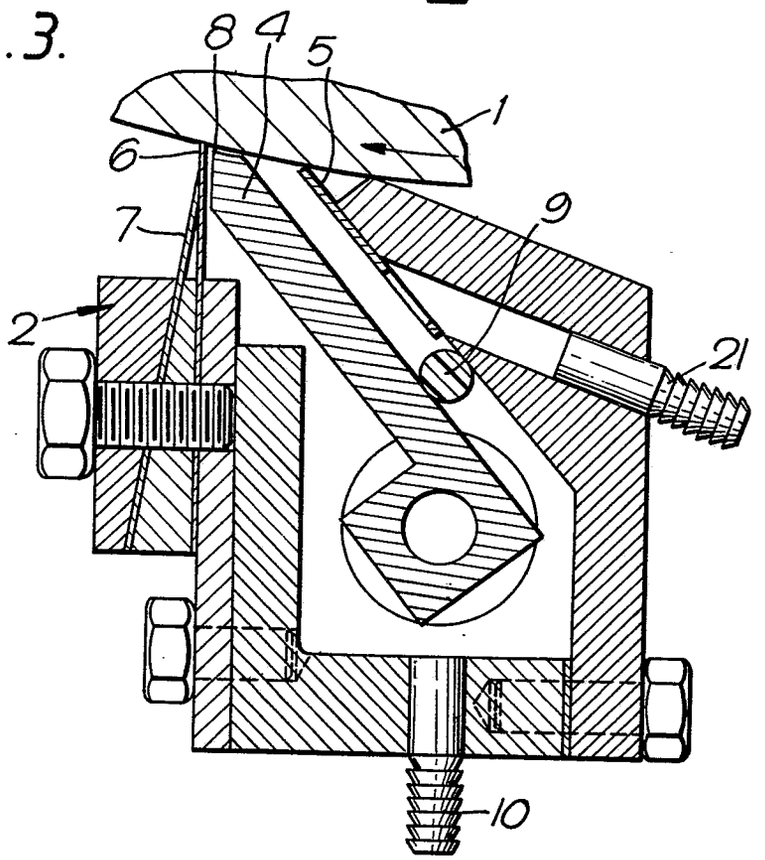


Fig.3.



European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 81303972.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	No relevant documents have been disclosed.	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 41 F 31/08

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 41 F 31/00
B 41 F 9/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	03-12-1981	KIENAST