

1 562 781

- (21) Application No. 7461/77 (22) Filed 22 Feb. 1977
- (31) Convention Application No. 4 042/76 (32) Filed 1 April 1976 in
- (33) Switzerland (CH)
- (44) Complete Specification published 19 March 1980
- (51) INT. CL.³ G07D 3/12
- (52) Index at acceptance
G4X 3
- (72) Inventor MARCEL BRISEBARRE



(54) COIN SORTING MACHINES

(71) We, SYSTEMS AND TECHNICS S.A., a Swiss body corporate, of Avenue du Mont-Blanc, 1196 - Gland/Switzerland, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to coin sorting machines.

Known coin sorting machines fall into two general categories.

a) A first category comprises machines which only permit the sorting of a single denomination of coins at once. It is then necessary to introduce coins to be sorted successively into the same number of machines as there are coin denominations to be sorted. This is necessarily very time consuming and it is necessary to have 5 to 8 machines, depending on the nationality of the currency to be sorted. Such an arrangement takes up a large amount of space, the machines having to be arranged in cascade.

b) The second category comprises machines which sort several denominations at once, but which have a very limited efficiency because the coins to be sorted must travel by gravity along a predetermined fixed path.

According to the invention, a coin sorting machine comprises a rotary plate, means for rotating the plate, a frame mounting the plate and the means for rotating the plate, a funnel for receiving coins of different denominations in loose form, the funnel being located in the centre of the rotary plate, coin positioning means only permitting discharge from the funnel of coins which are disposed flat on the upper surface of the rotary plate, a peripheral stop preventing coins discharged from the funnel from leaving the rotary plate, means carried by the rotary plate permitting movement of part

of a coin below the upper surface of the plate and at least one sorting station for the selection and extraction of one denomination of coin from among the others, the or each sorting station having a member secured to the frame and positioned to contact a coin to be selected which is laying flat on the rotary plate.

Coin sorting embodying the invention and described hereinbelow permit the sorting of several coin denominations at high speeds.

The invention will now be further described, by way of example, with reference to the accompanying schematic drawings, in which:

Figure 1 is a schematic plan view of a coin sorting machine embodying the invention;

Figure 2 is a plan view of the machine on a larger scale, with certain parts removed;

Figure 3 is a cross-sectional view of the machine;

Figure 4 illustrates a control device for a coin deflector of one of a plurality of coin extracting or receiving stations of the machine;

Figure 5 is a sectional view of the coin deflector;

Figure 6 illustrates in plan view the coin extracting or receiving station;

Figure 7 is a sectional view of one of a plurality of denomination sorting stations of the machine;

Figure 8 is an end view of the sorting station taken in the direction of the arrow A in Figure 7;

Figure 9 illustrates in part sectional form a plate having a circular groove for use in a modification of the machine shown in Figures 1 to 8; and

Figure 10 illustrates in part sectional form a plate provided with a circular groove for each denomination to be sorted and for use in a modification of the machine shown in Figures 1 to 8.

5
10
15
20
25
30
35
40
45

50
55
60
65
70
75
80
85
90

The coin sorting machine shown in Figures 1 to 8 comprises a rotary plate 1 having two concentric, annular driving surface portions 2, 3 with a high coefficient of friction with coins, the portions 2, 3 being separated by a sliding zone 4. The rotary plate 1 is rotatable by means of an electric motor 5 and a belt 6.

A cylindrical funnel 7 centred on the plate 1 receives loose coins of mixed denominations. The coins are carried along by the high friction driving surface portion 2 and the centrifugal force imparted to them by the rotation of the plate tends to displace them radially towards the edge of the plate 1. The coins are held back by the wall of the funnel 7.

Around part of its periphery, the funnel 7 has a slot 8 permitting the passage of the coins towards the outside. A strip 9 located inside the funnel 7 prevents two superimposed coins from passing through the slot 8 at the same time.

A channel formed by guides 10, 11 directs the coins which have passed through the slot 8 to the periphery of the plate 10.

The coins are accelerated along the guide 10, slide on the plate 1 in the zone 4 and are separated from one another to abut against a circular stop 12 provided at the periphery of the plate 1. The coins are then once again on a driving surface portion, namely the portion 3, and are driven at the speed of plate 1. The driving surface portion 3 is made from an elastic material.

The same number of sorting stations T and extracting stations E as there are coin denominations to be sorted are distributed around the axis of the plate 1. The stations T and E are arranged in the direction of rotation of the plate 1, in accordance with the diameters of the coins which they must sort and extract, the stations which sort and extract the coins with the largest diameter being positioned first.

All the sorting stations T are of similar construction to one another, as are also the extracting stations E, so that only one of each will be described in detail. A sorting station T will first be described with particular reference to Figures 7 and 8.

The sorting station T has an adjustable support 13 fixed to a frame B of the machine and carries, mounted on springs 26, 27, a member 15 mounting a drive wheel 16 which is applied against the surface of the plate 1 and drives a disc 17. A shaft 14 journaled in the member 15 and carrying the wheel 16 and the disc 17 is inclined relative to the plane of the plate 1, and the disc 17 is so disposed that its periphery is spaced from the surface of the plate 1 by a distance which is slightly less than the thickness of the coin of the denomination to be sorted by the station and is spaced

from the circular stop 12 by a distance which is slightly less than the diameter of the denomination of coin to be sorted by the station.

The member 15, in which is journaled the shaft 14, is guided on the support 13 by a pin 24 fixed to support 13 and engaged in a slot 25, having the shape of an arc of a circle, made in the member 15. The radius R and the orientation of the countersunk hole 25 are such that the member 15 can pivot in normal operation against the action of spring 26 relative to the support 13 at any point of contact between the wheel 16 and plate 1. This pivoting movement does not affect the position of the disc 17 relative to the plate 1 and ensures good driving of wheel 16, even if its tyre has been irregularly worn.

The outer part of the member 15 carrying the disc 17 is engaged with the support 13 by the springs 27, which are calibrated safety springs. The position of the disc 17 is adjustable as regards height by means of screws 28 and radially by means of screws 29.

During rotation of the machine, the coins applied against the stop 12 pass beneath the first sorting station T1 corresponding to the denomination having the largest diameter. That portion of a coin of this denomination which is directed towards the centre of the plate 1 passes beneath the disc 17 causing the inclination of the coin (Figure 7) by deformation of the elastic surface portion 3 of the plate. Thus, when the disc 17 is applied to this portion of the coin, it leads to a local elastic deformation of the surface portion 3 of the plate and the coin pivots about a support point or line close to the point of action of the disc 17. Thus, the outer edge of the coin is raised, escapes from stop 12 and the coin is ejected tangentially beyond the plate by centrifugal force. It should be noted that the thus ejected coin does not turn, but instead remains in a substantially horizontal plane. Therefore, not only the trajectory but also the position of the coin is stable during the ejection process, so that the coin can be passed into an extraction channel of relatively small cross-section, thereby facilitating the recovery and in particular the counting of ejected coins.

The coins of other denominations, whose diameters are smaller, are not affected by the first sorting station T1.

Thus, the coins are sorted denomination by denomination starting with the coins having the largest diameter and ending with the coins having the smallest diameter. The number of sorting stations T correspond to the number of denominations in the currency in question.

As the member 15 is mounted on safety

springs 27, the sorting station is not damaged if a foreign body C passes beneath the disc 17 (Figure 8).

A coin which has been raised and has thus 5 escaped from the circular stop 12 enters a corresponding extraction station E which will now be described with particular reference to Figures 4 to 6. The extraction station E has a recovery channel 18 for the 10 coins ejected from plate 1, the channel comprising a coin detector 19 supplying a counter. The channel 18 supplies two stores 20, 21 with the ejected coins, one or the other of the stores being supplied in accordance with the position of a deflecting flap 15 22 operated by an electromagnet 23 controlled by the counter supplied by the detector 19. Thus, as soon as a predetermined number of coins has been supplied to the store 20, the counter 19 causes displacement of flap 22 to bring about filling of the store 21. The store 20, which may, for example, be a bag, can be removed by an operator and replaced by an empty bag.

25 The machine described above has the following main advantages:

1. It is very compact because it comprises a desired number of sorting stations which are concentric with the funnel 7 for the introduction of the loose coins.

30 2. It is of simple construction, only a single rotary plate 1 being necessary. Furthermore, as the position of the ejected coins is stable, it is possible to detect them by means of a conventional simple sensor.

35 3. It operates at high speed because the coins can be accelerated, the acceleration depending on the speed of rotation of the plate 1.

40 4. It permits the filling of a store with a given quantity of coins. Thus, the coins are not only sorted but they are also counted. Sorting is not stopped when a store is full. Instead, a changeover from one store to the other occurs.

45 Obviously, in simpler variants of the machine described, the rotary disc 17 could be freely pivoted on the member 15, making it possible to eliminate the drive wheel 16.

50 In a further variant, disc 17 and optionally the member 15 could be replaced by some other coin contacting means or member such as a push button or rod fixed in a rigid but adjustable manner to the frame B of the machine.

55 In other variants, the elastic peripheral surface portion 3 of the plate can be replaced by a circular groove or grooves. In a first variant illustrated in Figure 9, the plate 1 has a single groove 30. The external diameter r_2 of the groove 30 is always larger than a value equal to the diameter r of the stop 12 less the diameter of the smaller or smallest coin to be sorted, but smaller than 60 the diameter r of the stop 12 less half the

diameter of the larger or largest coin to be sorted. The internal diameter r_1 of the groove 30 is smaller than the diameter r of the stop 12 less the diameter of the larger or largest coin to be sorted. This ensures that all the 70 coins to be sorted pass above the groove 30 when they are supported against stop 12, but in this position they all have their centre of gravity above a flat peripheral area Z of the plate 1. 75

In a second variant illustrated in Figure 10, the plate 1 has the same number of circular grooves 31 as there are denominations to be sorted. The external diameter of each groove 31 is larger than the diameter r of 80 the stop 12 less the diameter of the corresponding coin denomination, whilst the internal diameter of each groove 31 is smaller than this value, but still larger than the external diameter of the adjacent groove to- 85 wards the centre of the plate 1.

With plates 1 as illustrated in Figures 9 and 10, the coins are extracted as described hereinbefore, whereby the portion of a coin which comes into contact with the coin con- 90 tacting means or member such as a push button or rod or disc 17 is introduced into the groove 30, 31 and the coin is inclined in such a way that its outer edge escapes from the stop 12. 95

WHAT WE CLAIM IS:—

1. A coin sorting machine comprising a rotary plate, means for rotating the plate, a frame mounting the plate and the means for rotating the plate, a funnel for receiving 100 coins of different denominations in loose form, the funnel being located in the centre of the rotary plate, coin positioning means only permitting discharge from the funnel of coins which are disposed flat on the upper 105 surface of the rotary plate, a peripheral stop preventing coins discharged from the funnel from leaving the rotary plate, means carried by the rotary plate permitting movement of part of a coin below the upper surface of 110 the plate and at least one sorting station for the selection and extraction of one denomination of coin from among the others, the or each sorting station having a member secured to the frame and positioned to con- 115 tact a coin to be selected which is laying flat on the rotary plate.

2. A machine according to claim 1, wherein the means carried by the rotary plate comprises at least one circular groove 120 whose depth increases in the direction of the centre of the plate.

3. A machine according to claim 2, wherein the plate has the same number of circular grooves as there are denominations 125 to be sorted.

4. A machine according to claim 2, wherein the internal diameter of the groove is smaller than the diameter of the periph- 130 eral stop less the diameter of the larger

or largest coin to be sorted.

5. A machine according to claim 4, wherein the external diameter of the groove is larger than the diameter of the peripheral stop less the diameter of the smaller or smallest coin to be sorted.
6. A machine according to claim 3, wherein each groove is radially aligned with that portion of the periphery, directed towards the centre of the plate, of the coin whose denomination corresponds to that groove when said coin is laying flat on the plate and abutting against the peripheral stop.
7. A machine according to claim 1, wherein the means carried by the rotary plate comprises a peripheral annular area of the upper surface of the plate made from an elastic material.
8. A machine according to any one of the preceding claims, wherein for the or each sorting station the member secured to the frame is positioned slightly radially inwardly of the radially innermost portion of the edge of the coin of corresponding denomination abutting against the peripheral stop, and at a distance above the plate which is less than the thickness of the coin of corresponding denomination.
9. A machine according to claim 8, wherein for the or each sorting station the member secured to the frame is fixedly secured to the frame.
10. A machine according to claim 8, wherein for the or each sorting station the member secured to the frame is a rotary member.
11. A machine according to any one of claims 2 to 8, wherein the plate is provided between the funnel and its periphery with a sliding zone, whereby in use the coins traverse the sliding zone under the action of centrifugal force and are accelerated and separated from one another.
12. A machine according to any one of claims 2 to 7 wherein for the or each sorting station the member secured to the frame is a disc rotatably mounted on the frame and arranged to be rotated by a wheel in contact with the rotary plate.
13. A machine according to claim 12, wherein the periphery of the disc nearest the plate is located at a distance above the rotary plate which is less than the thickness of the corresponding coin denomination.
14. A machine according to claim 13, wherein the periphery of the disc nearest the plate is spaced from the peripheral stop by a distance less than the diameter of the coin denomination to be sorted by the station, but greater than the diameter of any other coins of smaller diameters than the denomination to be sorted by the station.
15. A machine according to claim 14, wherein the disc and the wheel are journaled in a member mounted on a support and displaceable relative to the support against the action of springs.
16. A machine according to any one of the preceding claims, wherein the or each sorting station is followed by an extraction station having a channel for receiving the coins ejected from the sorting station, a detector for the ejected coins and two stores.
17. A machine according to claim 16, wherein the or each extraction station has a flap controlled by a counter supplied by the detector and arranged to direct the coins to one or other of the stores.
18. A coin sorting machine substantially as herein described with reference to Figures 1 to 8 of the accompanying drawings.
19. A coin sorting machine substantially as herein described with reference to Figures 1 to 8, as modified by Figure 9, of the accompanying drawings.
20. A coin sorting machine substantially as herein described with reference to Figures 1 to 8, as modified by Figure 10, of the accompanying drawings.

For the Applicants:
D. YOUNG & CO.,
Chartered Patent Agents,
9 & 10 Staple Inn,
London, WC1V 7RD.

FIG.1

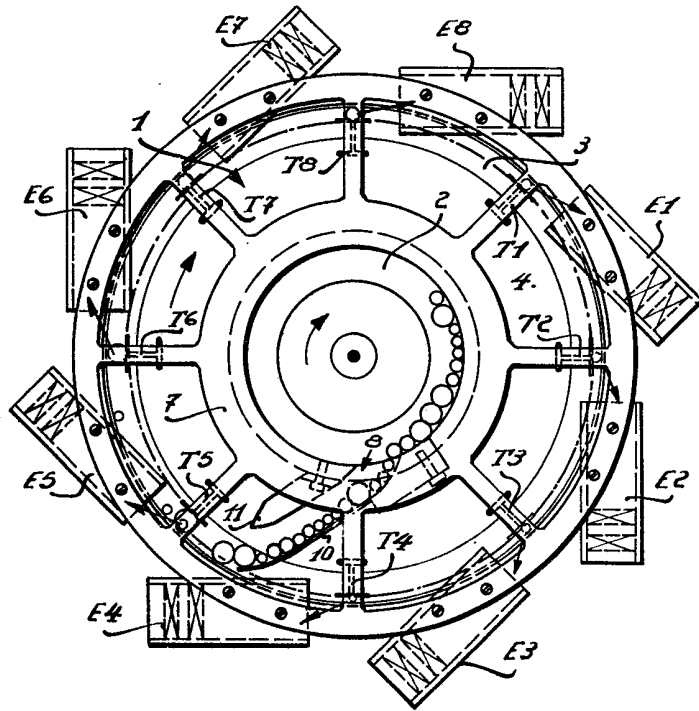
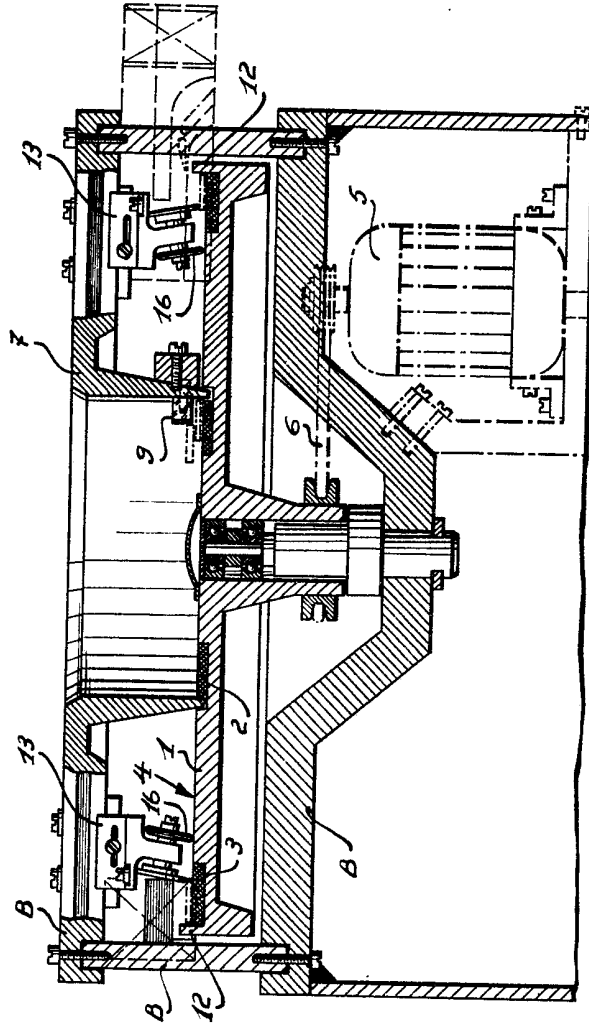


FIG. 3



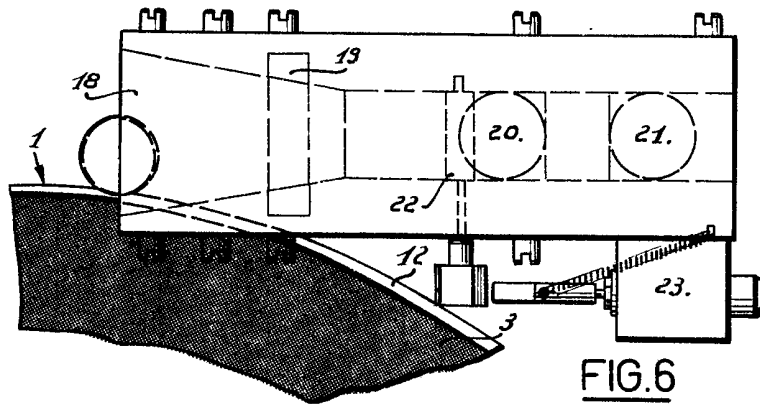
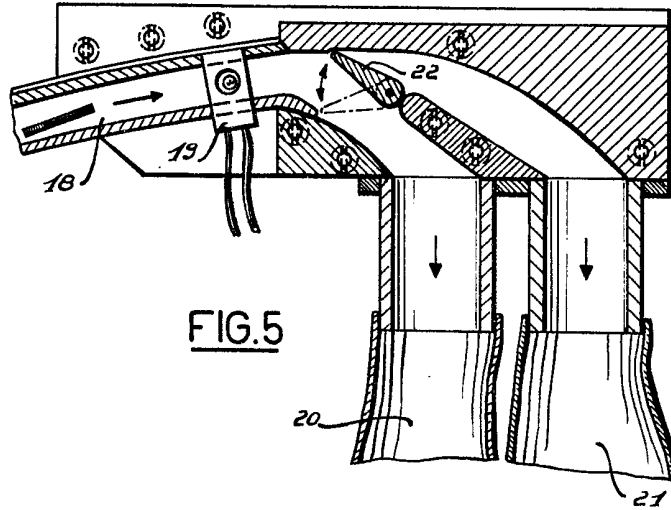
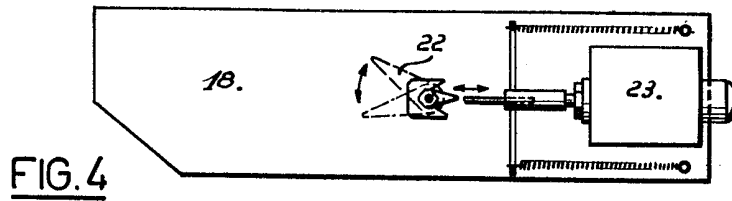


FIG. 7

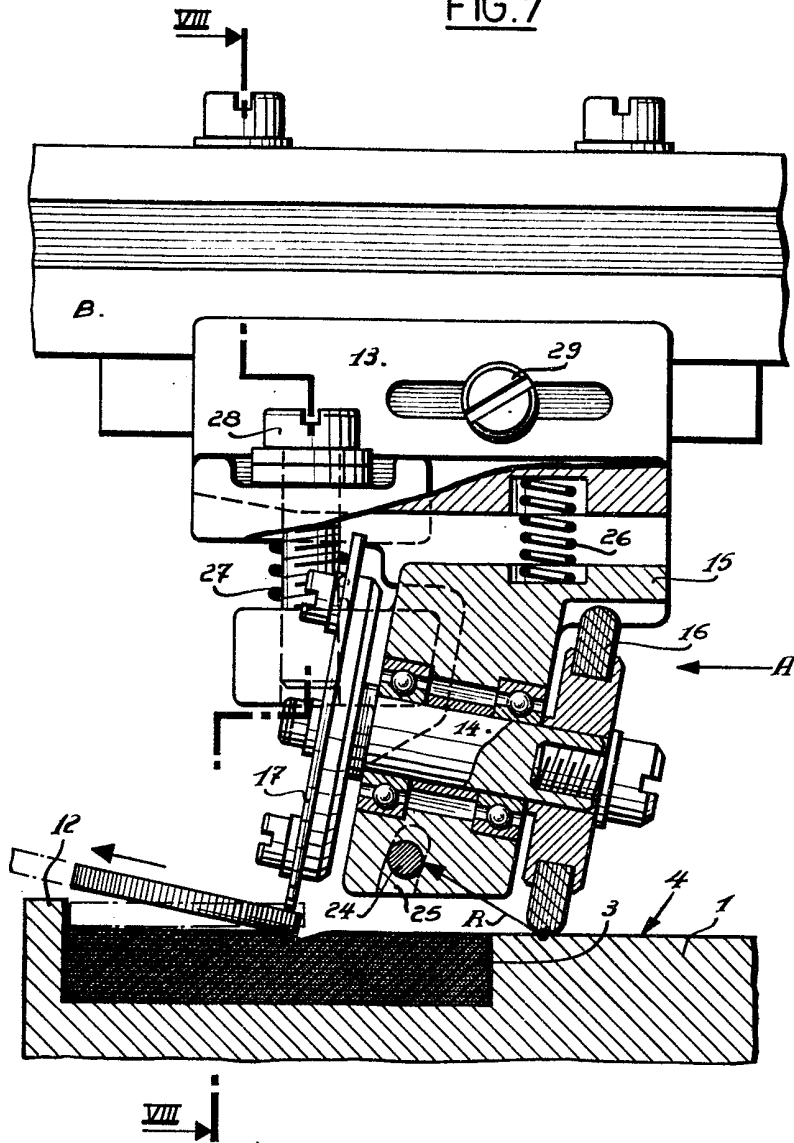


FIG. 8

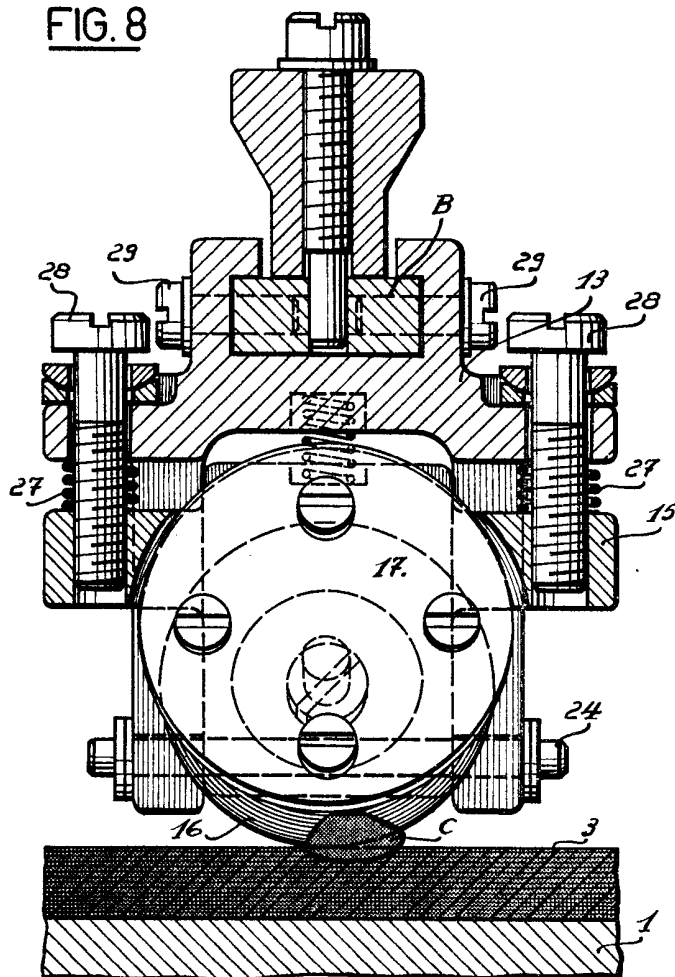


FIG.9

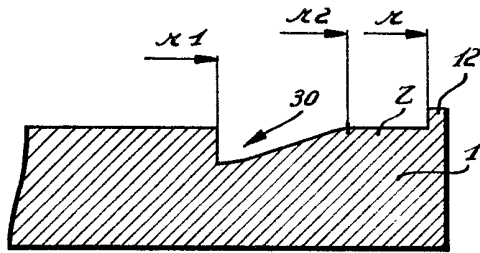


FIG.10

