ABSTRACT: This is a handling device for placing and removing individual printing plates on letterpress rotaries in exact position on the printing or plate cylinder. There is an arcuate transparent shell of the size of the individual plate or a little greater. This shell has spaced apart passageways in the inner concave face that have connecting outlets in the face. The passageways are connected to pipe fittings that are in turn connectable to a vacuum source. At each side of the arcuate shell at points midway the ends of the shell, there is fixedly mounted a retractable spring biased punch which when released forces the punch outward from the inner face of the shell. Also mounted along one side and along one end of the shell are two spaced apart abutments that are slidably mounted in T-shaped grooves in the inner face of the shell. Each abutment is threadedly connected to a knurled end adjusting screw that is threadedly received in a nut fixed to the shell. The threads are slightly different in pitch in the nut and the abutment and therefore a differential screw is provided that affords micro adjustment of the abutments that position a printing plate. The vacuum shell has positioned on its inner face a transparent proof and holes are bored in the proof in alignment with the vacuum holes in this concave inner face of the shell. The shell with proof secured thereto as with double face tape is placed to the transparent proof aligns with its individual printing plate to be removed. The vacuum holes in the proof and shell abut the face of the printing plate. The vacuum is lightly applied at first so that the shell and proof while clinging to the printing plate may be moved into exact registry with the printing plate to be removed. The vacuum is fully applied and the spring pressed punchers are released so that a keyhole is formed extending into the printing plate carrier shim mounted on the printing cylinder. This provides for exact remounting and registry of the same or other plates.
Fig. 3

Fig. 4
APPARATUS FOR POSITIONING INDIVIDUAL PLATES IN EXACT REGISTER ON ROTARY LETTER PRESS PRINTING MACHINES

BACKGROUND OF THE INVENTION

The invention relates to a method and the apparatus involved for positioning individual plates in exact register on letterpress rotaries whereby the single pieces making up the printing plate are secured on a carrier shim by means of double-sided adhesive foil.


It becomes necessary now and then that a single plate or a set of plates has to be exchanged, such as for editorial reasons or for the reason that a plate was damaged during printing.

In such cases, printing plates have to be installed in exact register relative to each other as well as to the plates that remained on the carrier shim.

Up to now, the position of the new plate with respect to the other pieces of the wraparound plate was either found by trial and error whereby another plate had to be installed and removed several times, or the composite plate had to be removed from the printing press and be mounted on a registering machine by means of which the new plates could be conventionally mounted in exact register.

SUMMARY

It is an object of the invention to avoid these disadvantages which arise from time and money consuming and to provide a device which allows the exchanging of plates within the press and also with the shortest possible delay. A suction shell serves to solve this problem. It is portable, made of transparent material, provided with vacuum connections and is curved, the curve corresponding to the radius of the plate cylinder. It can be placed directly on the plate cylinder of the printing press and is fixed in the midpoint on both front or outer face sides accurately guided and retractable punches suited to make keyholes into the carrier shims of the composite plates and to align the suction shell by means of the punched holes when it is placed on the plate cylinder for a second time.

Instead of punches register pins can also be used by means of which the suction shell is adjusted on the carrier shim of the composite plate according to the existing keyholes in the carrier shim. These holes can be punched into the carrier shim prior to or during the mounting of the composite wraparound plate.

There are several methods by which use is made of the suction shell according to the invention.

With the first method it is assumed that the plates for instance for four colors are accurately installed on the carrier shims and that these composite plates are mounted on the plate cylinders of the printing press. If a certain set of four colors is to be exchanged then the transparent proof characteristic for this set of plates is secured in the transparent suction shell with adhesive tape. Holes are made in the proof corresponding with the vacuum holes of the suction shell. Within the press the suction shell and the attached proof are then accurately adjusted over the plate to be exchanged by means of the suction shell and the suction shell is adjusted on the carrier shim of the composite plate with the result that after completion there are two keyholes in the carrier shim right and left of each separated color plate representing the position of the corresponding plate.

The four plates can now carefully be removed from the carrier shim. Their place is now taken by other plates. Therefore, a characteristic transparent proof of the new series instead of the first one is lightly secured in the suction shell by means of suction, then the shell is placed on the plate cylinder where the old plate had been mounted and the position of the new proof plate in the suction shell is aligned according to the position of the old plate and is finally secured by means of adhesive tape, and holes are cut into the proof in alignment with the vacuum holes of the suction shell. The first separated color plate of the new series is then lightly held by vacuum in the suction shell according to the transparent proof and is accurately positioned and secured with vacuum. A double-sided adhesive foil is stuck on the back of the plate or the corresponding place thereon of the carrier shim in the printing press. Both the hole punches of the suction shell are advanced and the shell is adjusted in the keyholes of the carrier shim by means of the points of these punches. Afterwards, the suction shell is vertically applied to the plate cylinder against spring pressure of the hole punches such that the plate first touches the carrier shim on the plate cylinder at the topmost point, that is the connecting line of both punches. After the vacuum has been switched off, the suction shell can be removed and the plate is finally pressed by hand against the carrier shim.

The second, third and fourth separated color plates are in similar manner carefully positioned against the same proof, the suction shell each time being adjusted by means of the respective keyholes in the carrier shim of each plate cylinder. It is thus possible with the portable suction shell to even exchange four-color sets within the press provided that the previous plates had been accurately positioned.

The portable suction shell, however, may also be used in a second manner. In general, the pressman knows beforehand which plates are printed for the whole run and which ones are exchanged during the run. It is consequently not necessary to wait and punch the keyholes into the carrier shims for shell adjustment within the press, which, as described, calls for positioning of the suction shell against the existing plates. Rather, it is useful to make holes for the pages to be exchanged when the first printing plate is mounted on the registering machine, the holes having to be in clear relation to the separated color plates that are installed. This substantially reduces exchanging time within the press since there are keyholes available for each separated color permitting accurate-positioning of the suction shell on each carrier shim within the press. If keyholes are provided right from the beginning, the plates to be exchanged can be immediately removed; it is obvious, however, that for color work all separated color plates must be accurately positioned in the suction shell against a one and only proof to obtain exact color register.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings but it is clearly understood that the invention is by no means limited to the details of this embodiment.

FIG. 1 shows a top plan view of the suction shell;
FIG. 2 is a side view of the suction shell;
FIG. 3 is a vertical cross section through the hole punch and the guide pin in cocked position;
FIG. 4 is a further vertical cross section through the flexible hole punch;
FIG. 5 is a fragmentary cross section through the suction shell at the point of abutment; and
FIG. 6 is a top plan view at the suction shell with differential screw and abutment.

Throughout the description like reference numbers refer to similar parts.

The suction shell 1 is made of transparent material and is curved according to the plate cylinder 9. The vacuum holes 3 on the inner side 2 of the suction shell communicate with passages 4 which are connected by means of tubular connecting fittings 5 having connecting pipes leading to an air pump, not shown, producing an adjustable vacuum.

A proof 6 can be glued into the suction shell 1 according to the first method. The proof 6 is provided with holes 16 at the place where the proof 6 conceals the vacuum holes 3. The other holes in the suction shell not covered by the proof 6 have to be closed off.
The proof 6 corresponds with its characteristics to printing plate 7 which has to be exchanged for editorial or other reasons and which is located on the carrier shim 8 mounted on plate cylinder 9. For this purpose, the suction shell 1 including proof 6 is placed on the plate 7 to be exchanged, is accurately adjusted by means of proof 6 provided therein and tightly held by vacuum on plate 7.

Afterwards, both the punches 10 are advanced, punching keyholes 14 into the carrier shim 8. This takes place by means of the guide pin 11, in which the punch 10 is firmly held, being revolved by 180° from its retracted position in Fig. 3 to the position shown in Fig. 4 where it is released. In Fig. 3, the guide pin 11 is tensioned by the amount 12 by means of spring 13. When the punches 10 have taken this retracted position, the suction shell 1 can be moved and adjusted in whatever direction on the combination plate 7, 8 without running danger of damage to the carrier shim 8 or a plate 7. Due to the exactly predetermined stress of spring 13 the punches 10 will always have the same impact on each hole that is punched with the result that the same hole depth is always obtained in the carrier shim. The hole can be made by hand.

The constant position of points 17 of punches 10 during the punching procedure is obtained such that the guide pins 11 slide along the faces 18 of the guide 19 making rotation around their axis impossible and permitting that the points 17 of the punches do not unnecessarily have to be in the center of the guide pins 11.

In the position as shown in Fig. 4, the punches can enter the previously made holes in the course of proceeding in the above-mentioned method giving the suction shell an accurately registered position.

The plate 7 to be exchanged may now be carefully removed from the carrier shim 8. Its place is to be taken by the next plate. For this purpose, a characteristic transparent proof 6' of the new series is secured in the suction shell 1 for the new plate 7' and holes 16 are cut into the proof 6' which communicate with the vacuum bores 3 of the suction shell 1. The new plate 7' is then lightly held by vacuum in the suction shell 1 against the transparent proof 6' and is carefully positioned and afterwards secured with the full vacuum. On the back of plate 7' or the corresponding place thereof on the carrier shim 8 which is mounted in the printing press a double-sided adhesive foil 20 is stuck. Both the punches 10 of the suction shell 1 are advanced, the shell 1 being adjusted in the keyholes 14 of carrier shim 8 by means of these points 17. Then suction shell 1 is vertically lowered toward the plate cylinder 9 against the pressure of spring 13 of punches 10 such that the plate 7' touches first cylinder 9 on plate cylinder 9 at the topmost point i.e. about on the connecting line of both punches 10. Foam rubber strips 21 along the longitudinal edges of suction shell 1 facilitate lowering the suction shell vertically onto the cylinder. It is of advantage if the bending radius of suction shell 1 is somewhat larger than that of the plate cylinder 9 including the plate installed thereon. After the vacuum is switched off, the suction shell 1 can be removed and the plate 7' is finally pressed against the carrier shim 8 by hand. The second, third and fourth separated color plates 7.2, 7.3 and 7.4 are carefully positioned in a similar manner against the same proof 6' in the suction shell 1 whereby each time the suction shell 1 is adjusted according to the respective holes 14.2, 14.3 and 14.4 in the carrier shims 8.2, 8.3 and 8.4 of the respective plate cylinders 9.2, 9.3 and 9.4. Plate 7.2, 7.3 and 7.4, carrier shims 8.2, 8.3 and 8.4 and the plate cylinders 9.2, 9.3 and 9.4, however, are not shown on the drawing.

The portable suction shell 1 thus makes it possible to exchange four-color sets even within the printing press provided that the previous plates had been accurately registered.

The portable suction shell 1, however, may also be used according to a second procedure. In general, it is known beforehand which plates are to be exchanged during the run. For these, keyholes 14 being in clear relation to the separated color plates 7 are punched into the carrier shims 8 prior to or during the mounting procedure. Exchanging time within the press is therefore substantially reduced since for each separated color keyholes 14 are provided which permit exact positioning of the suction shell 1 on each carrier shim 8 within the press.

In a further embodiment of the invention, the portable suction shell 1 is used for subsequent adjustment of for instance wrongly positioned plates. Therefore two abutments 22 each along at least one straight end and two abutments 23 each along a curved side are provided. The abutments 22, 23 are guided in T-shaped grooves, see Fig. 5, having long slide pieces 24 which protrude inwardly from the suction shell 1 somewhat less than plate thickness. The abutments 22, 23 can be moved forward and backward by means of screws 25. The screws 25 are held against the transparent shell 1 as by small fixed nuts 26. The screws 25 act like differential screws, i.e. they thread into the fixed nuts 26 and pull back the abutments 22, 23 by means of having a different thread pitch, the pitch difference between the thread of the fixed nuts 26 and that of the abutments 22, 23 being only slight making microadjustments possible.

If for instance printing results show that a plate 7 has to be moved laterally by .03 inches, then the suction shell, this time without proof, is paced with the abutments 22, 23 against plate 7 within the printing press, securing the shell 1 by vacuum. This position is then marked with holes on the carrier shim 8 by means of the punches 10 as described. The plate 7 is then removed and again placed outside the press against the abutments 22, 23 of suction shell 1 and is lightly secured by vacuum. Afterwards, the plate 7 is shifted to the desired corrected position by means of respective turning of the differential screws 25 and is secured firmly by means of vacuum and is transferred with new adhesive foil and by means of the punches 10 back to the carrier shim 8. The differential screws 25 permit even slight displacements of the plates 7 in a controlled manner.

Aligning index marks may be made on the carrier shim. To cooperate with these aligning marks, there may be a light producing source with magnifiers on the suction shell to project a light spot onto the aligning index markings on the carrier shim.

I claim:

1. A method for remounting an individual printing plate in exact registry on a plate cylinder comprising the steps of attaching a proof plate corresponding to the printing plate mounted on a carrier shim on a plate cylinder to the inner face portion of a suction carrier having suction holes in its arcuate inner face portion, making holes in the proof plate in alignment with the suction holes in the suction carrier, applying the suction carrier and attached proof plate to the printing plate and applying suction to the carrier and the printing plate while aligning the plate cylinder to the suction carrier, marking the carrier shim on the plate cylinder with index marks aligned with indices on the suction carrier, removing the printing plate from the carrier shim relieving the suction on the suction carrier to detach said removed proof plate, removing the proof plate from the suction carrier, installing a new proof plate on the suction carrier and making suction holes therein in alignment with the suction holes in the suction carrier, installing a new corresponding printing plate on the new proof plate by applying suction to same while it is being aligned with its proof plate, inking the suction plate on the corresponding printing plate after exact alignment with its proof plate, applying a two-sided adhesive foil to the back of the newly installed printing plate, applying the new printing plate to the carrier shim on the plate cylinder while aligning the indices on the suction carrier with the index markings previously made on the carrier shim, pressing the new printing plate into aligned position, and relieving the suction on the suction carrier to separate it and the new proof plate from the new printing plate.