The present invention relates to printing plates and more particularly, to apparatus for delaminating a printing plate and a backing plate.

It is well known in the prior art to separate a printing plate from a saddle or backing plate by heating the plates to soften or destroy the adhesive connecting the plates and then manually driving a sharp tool therebetween to separate them so that the components may be remelted or reused. This process is slow and expensive as it requires relatively large amounts of manual labor and often results in damage to the parts.

It is an object of the present invention to provide a novel and effective power driven apparatus for separating a printing plate from a backing plate.

It is also an object to provide such a delaminating apparatus that separates a printing plate from a backing plate rapidly and without damage to these parts and which is relatively simple and rugged in construction.

Still another object is to provide such apparatus which is adapted to take printing plate assemblies of varying size and edge configuration.

Other objects and advantages will be readily apparent from the following detailed description and attached drawings wherein:

FIGURE 1 is a perspective view of the printing plate delaminating apparatus of this invention with portions broken away to illustrate the operating parts;

FIGURE 2 is a cross-sectional view of the delaminating apparatus of FIGURE 1;

FIGURE 3 is a fragmentary sectional view in elevation of the delaminating apparatus illustrating the operating parts in the starting position;

FIGURE 4 is a view similar to FIGURE 3 with the operating parts illustrated in the final position; and

FIGURE 5 is an exploded view of the printing plate assembly formed by the printing plate, adhesive, and mounting plate or saddle and shows in FIGURES 1-4.

It has now been found that the foregoing objects and other advantages can be readily attained in apparatus for delaminating a printing plate assembly having a housing with a plate support thereon having means for supporting in a position normal thereto one end portion of a printing plate assembly formed by a backing plate and a printing plate firmly adhered thereto generally by means of a separate adhesive. The plate support functions to position the backing plate so that the printing plate may be separated therefrom by a power driven member without the necessity for heating the parts or causing damage thereto. A blade support is movably mounted on the housing for movement along an axis parallel to the printing plate assembly in its support position and generally normal to the plate support. Mounted on the blade support at a minor angle relative to the axis of movement of the blade support and in general alignment with the plate support is a blade which reciprocates relative to the plate support for insertion into the interface of the backing and printing plates. Power means are mounted on the housing and engage with the blade support for moving the blade relative to the plate support to separate the backing plate from the printing plate by shearing the joint made by the adhesive without damage to these parts.

The plate support preferably includes a saddle register disc with an accurate groove of wedge-shaped cross-section therein for firmly gripping and supporting the backing plate in a position extending normally to the disc. Desirably, the disc is rotatably mounted to permit loading in one position and rotation to the operative position, and may be provided with a series of grooves using arcs of different radii to accommodate backing plates of varying radii arranged in a circle. In the latter instance, the blades would be interchanged to provide different radii of curvature, conveniently by a turret mounting arrangement.

To provide the printing plate assembly more rigidly and particularly when the printing plate assembly is relatively long, the plate support also desirably includes an adjustable member to give additional horizontal support to the backing plate intermediate its length. In one embodiment, the adjustable member may be a blade support that is mounted on the housing and adapted to abut against the rear of the backing plate by adjustment of its length by suitable fasteners so that the backing plate is prevented from moving away from the pressure applied by the blade when the parts are being separated.

Although the blade may be mounted on the blade support at an angle deviating about 0.5 to about 30.0 degrees from the axis of movement of the blade support, an angle of deviation about 0.5 to 10.0 degrees has been found to be most efficient. The blade has a body portion with an accurate cross section, and a curved wedge-shaped portion at the free end thereof with a knife edge at its lower periphery. The shape of the blade and the angle of inclination to the axis of movement combine to provide an effective means for separating a backing plate from a printing plate without damaging these parts.

The power means desirably utilizes a hydraulically driven piston mounted in a cylinder on the housing with a connecting rod engaged between the piston and the blade support, and the hydraulic piston and cylinder may be conventional in design and operated in the usual manner by either a gas or liquid. In a manner, the apparatus may be operated with a minimum expenditure of time and labor to rapidly separate the printing part from the backing plate without the time-consuming process of heating the plate to weaken the adhesive and avoiding possible injury to the plate by manual efforts.

In operation, the lower end of the plate assembly, which is normally only a backing plate since it is of greater length, is inserted into the accurate groove on the saddle disc so that it is held in a position extending normally thereto. The disc is then rotated so that the interface between the backing plate and the printing plate is aligned with the blade and the adjustable member is positioned so that it abuts against the rear of the backing plate and holds these parts in the desired location. The hydraulic piston is then operated in the usual manner so that the knife edge of the blade enters the interface between the plate in order to shear the adhesive therebetween. As the knife edge proceeds further between the interface of the plates, the wedge shape of the blade portion commences to push the printing plate away from the backing plate so that only a minimum of friction producing contact area is maintained between the moving parts. The angle of the blade to the vertical and the wedge-shaped portion of the blade combine to move the printing plate away from the backing plate with a minimum amount of friction by keeping the contact area between the parts to a minimum.

Referring now in detail to the attached drawing, the printing plate delaminating apparatus has a housing generally designated by the numeral 10 with a rectangular base plate 12 supporting a similar rectangular top plate
3,364,556

14 by means of four spaced support columns 16 mounted on blocks 18 rigidly connected to the base plate 12 and top plate 14 adjacent each of the corners thereof. Attached to the upper side of the base plate 12 and the underside of the top plate 79 respectively are upper and lower mounting plates 20 and 22 which rigidly support the upper and lower ends of two spaced vertical guide rods 24.

Slidably mounted for vertical movement on the rods 24 is a cross bar 26 which has cylindrical bore 28 through which the rods 20 extend with a small clearance so that the cross bar 24 is movable from the upper mounting plate 22 to the lower mounting plate 18 with a minimum of horizontal play or movement. Rigidly mounted on the top plate 14 is a conventional hydraulic cylinder 30 which is connected to a pair of supply lines 32 providing a liquid or gas in the usual manner to reciprocate a hydraulic piston (not shown) within the cylinder. The shaft of the piston or a separate connecting rod 34 is disposed in apertures 36 and 38 in the top plate 14 and the upper mounting plate 22 and rigidly joins the hydraulic piston (not shown) with the cross bar 24 to provide vertical movement of the cross bar 24 in the desired direction on the rods 20 as suitable hydraulic pressure is applied to the hydraulic cylinder 30 through either of the supply lines 32.

Attached to the underside of the cross bar 26 is a blade holder 50 which supports a blade, generally designated by the numeral 52, with an upper body portion 54 of arcuate cross section and a wedge-shaped portion 56 of arcuate cross section with a knife edge 58 at its lower periphery. The blade 52 is mounted so that it is at a minor angle $\alpha$ of about 5 degrees to the vertical or axis of movement of the blade support as illustrated, for facile delaminating of the printing plate assembly in a manner to be described hereinafter.

Rotatably supported on the lower mounting plate 20 by the shaft 68 is a turntable or saddle register disc 70 having a circular groove 72 of wedge-shaped cross section therein that receives and firmly supports the wedge-shaped lower end of a curved saddle or backing plate 74 in a vertical position. It can be appreciated that the wedge-shaped configuration of the groove 72 will accommodate backing plates having lower edge portions of varying angles and configuration since the tapering front wall will provide wedging action against the vertical rear wall. The backing plate 74 supports a correspondingly curved face to the printing plate 76 by means of an adhesive film 78 at the interface of the plates 74 and 76 as illustrated in FIGURE 5. To limit horizontal movement of the plates 74 and 76, a bolt 80 is mounted on a bracket 82 attached to the two rear columns 16 and adjusted by the nuts 84 to abut against the rear of the backing plate 74. As will be appreciated, the radius of the arc for the printing plate, the blade and the disc groove should be substantially equal to obtain optimum operation.

In order to delaminate the printing plate 76 from the backing plate 74, the hydraulic cylinder 30 is actuated to move the cross bar 26, blade holder 50 and blade 52 vertically downwardly on rods 24 so that the knife edge 58 and wedge portion 54 of the blade 52 come in contact with the interface between the backing plate 74 and the printing plate 76 with sufficient force to shear the joint made by the adhesive film 78. The configuration of the blade 52 ensures that the lowest portion of the knife edge 58 first enters the interface between the plates 74 and 76. On the initial separation, and thereafter, the wedge-shaped portion 56 being driven between the plates effects further separation. As described hereinbefore, the blade 52 is curved to form an arc corresponding to the arcuate interfaces between the plates 74 and 76 so that the force of the knife edge 58 is applied uniformly therebetween. During the descent of the blade as illustrated in FIGURE 4, the action of the wedge-shaped blade portion with its angle of deviation from the axis of movement at the interface between the saddle 74 and the printing plate 76 moves the printing plate 76 outwardly from the saddle 74. In this fashion, friction between the printing plate 76 and the blade 52 is minimized and the parts are readily separated without damage thereto.

Thus, it can be seen that the present invention provides a novel and highly effective apparatus for rapidly separating a printing plate from a backing plate with relatively small expenditures of time and labor. The delaminating apparatus separates the plates without causing damage thereto, is relatively simply in operation, and is relatively inexpensive to manufacture. Moreover, backing plates of varying sizes and angles or contours may be received and supported firmly with a minimum of redesign of parts.

Having thus described the invention, we claim:

1. Apparatus for delaminating a printing plate assembly comprising: a housing; a plate support on said housing having means for supporting, in a position normal thereto, one end portion of a printing plate assembly formed by a backing plate and a printing plate firmly adhered thereto; a blade support movably mounted on said housing for movement along an axis parallel to said supported position and generally normal to said plate support; a blade mounted on said blade support at a minor angle relative to said axis of movement of said plate support and in general alignment with said plate support for reciprocal movement relative to said plate support for insertion into the interface of the printing plates; and power means mounted on said housing and engaged with said blade support for moving said blade relative to said plate support for separating the backing plate from the printing plate.

2. The delaminating apparatus of claim 1 wherein said plate support includes a base support with an arcuate groove of wedge-shaped cross section therein for holding the printing plate assembly normal to said base support.

3. The delaminating apparatus of claim 1 wherein said plate support has an adjustable member for supporting the printing plate assembly intermediate its length to limit horizontal movement thereof.

4. The delaminating apparatus of claim 1 wherein said blade is mounted on said blade support at an angle deviating about 0.5 to about 10.0 degrees from the axis of movement of said blade support.

5. The delaminating apparatus of claim 1 wherein said blade has a body portion of arcuate cross section and a wedge-shaped portion at the free end thereof having a knife edge at its lower periphery.

6. The delaminating apparatus of claim 1 wherein said plate support is rotatably mounted on said housing.

7. Apparatus for delaminating a printing plate assembly comprising: a housing; a plate support on said housing includes a support base with an arcuate groove of wedge-shaped cross section therein for supporting in a position normal thereto one end portion of a printing plate assembly formed by a backing plate and a printing plate firmly adhered thereto; a blade support movably mounted on said housing for movement along an axis parallel to said supported position and generally normal to said plate support; a blade mounted on said blade support at a minor angle relative to said axis of movement of said plate support and in general alignment with said plate support for reciprocal movement relative to said plate support for insertion into the interface of the backing and printing plates, said blade having a body portion of arcuate cross section and a wedge-shaped portion at the free end thereof having a knife edge at its lower periphery; and power means mounted on said housing and engaged with said blade support for moving said blade relative to said plate support for separating the backing plate from the printing plate.

8. The delaminating apparatus of claim 7 wherein said plate support has an adjustable member for supporting
the printing plate assembly intermediate its length to limit horizontal movement thereof.

9. The delaminating apparatus of claim 7 wherein said blade is mounted on said blade support at an angle deviating about 0.5 to about 10.0 degrees from the axis of movement of said blade support.

10. The delaminating apparatus of claim 7 wherein said plate support is rotatably mounted on said housing.

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