

How to print posters:

**a process developed at
the Regional Fundamental
Education Centre for
Latin America and described by**

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PREFACE

This is a translation from the Spanish booklet Como Imprimir Carteles, publication Number 4 of CREFAL (Regional Fundamental Education Centre for Latin America), Patzcuaro, Mexico. The process of printing described, though primarily adapted to the quick and cheap production of posters, can be used for other display and craft purposes. The simplicity and economy of the process and its adaptability to the needs and conditions of fundamental education workers has persuaded Unesco to make it known to as many as possible in printed form.

In doing so, it is the sole wish of Unesco that anyone who finds that the process here described corresponds to his needs may feel completely free to use and adapt it, without seeking permission from anyone. At the same time Unesco would be interested to hear from those who do so in what ways they have found it useful and what refinements, modifications or extensions of the system they have developed.

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FOREWORD

The Fundamental Education Centre for Latin America (CREFAL) was established at Patzcuaro, Mexico, in April 1951. It is a joint effort, in which Unesco and the other Specialized Agencies of the United Nations collaborating with the Expanded Programme of Technical Assistance, the Organization of American States and the Mexican Government are all participating. Its purpose is to train leaders in Fundamental Education, and in the production of fundamental education materials, for work in the Latin American States.

With regard to the production of educational materials, the founder bodies recognized the necessity of producing new materials and, more particularly, of devising new methods for the production of materials capable of satisfying the needs of teachers working in technically backward areas.

How could graphic material be produced at a minimum cost and with very cheap equipment? This was one of the problems confronting the Centre from the very beginning. Nevertheless, an even more important problem was to find a method within the technical capabilities of teachers who are not professional printers. Moreover, it was necessary to devise a method requiring only materials which can be easily found in any region.

In January 1952 the Centre's Production Branch began to carry out a series of experiments for that purpose. In February, we produced our first poster at the Centre, by means of a process which we had been testing since 1940. Since February, when we produced our first poster, we have learnt many new facts that have enabled us to improve our work. There is no doubt that, as we acquire more experience, we shall be able to improve the process still further.

We have already produced nine posters of various sizes in editions containing from 50 to 1,000 copies. We are now in a position to state that our method offers many advantages, particularly from the practical point of view.

The present booklet is intended as a technical guide for teachers interested in this type of graphic production.

J.O.

VIEJITO... PERO APRENDIENDO



Poster made for the Literacy Campaign (80×56 cm., in one or two colours). It represents a local theme: the «viejito» (little old man) is a typical character of a traditional folk-dance of the region.

I. BRIEF DESCRIPTION OF THE PROCESS

The process of printing from a glue plate is a relatively simple one. By following instructions, any teacher can use it successfully.

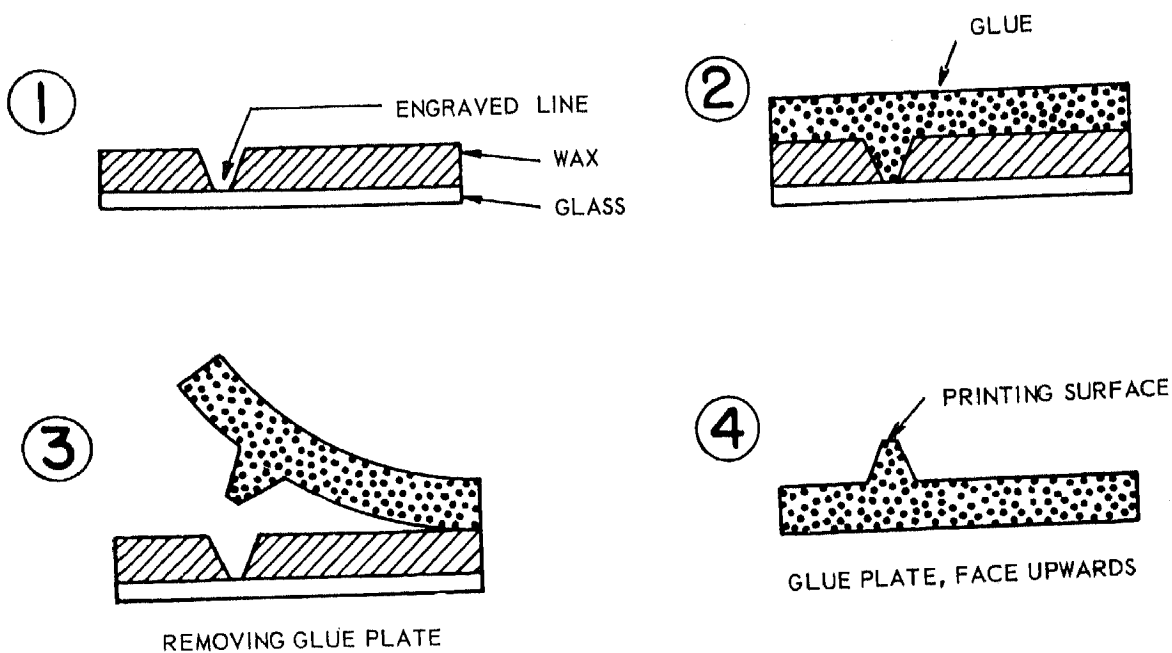
It consists of two fundamental elements: a wax plate on which the picture to be reproduced is engraved, and a glue plate which is cast in the wax matrix. The glue plate, after it has cooled and solidified, serves as the printing-plate.

The wax plate is made by pouring a mixture of paraffin wax and beeswax on to a glass pane so as to form a more or less uniform layer, 3 mm. thick.

The picture to be reproduced on the poster is drawn and engraved on this wax plate, thus giving a wax cast (fig. 1, see below). A mixture of glue and glycerine, melted in a double boiler, is then poured over the wax cast so as to cover it with a layer, 2 cm. thick (fig. 2). After cooling, for approximately eight hours, the glue becomes consistent and flexible like soft rubber.

The glue plate is removed by raising one end of the solidified layer (fig. 3). The latter's lower surface, on which the wax engraving has left an impression, is the printing glue surface or printing-plate (fig. 4).

This short description is intended to give a very general idea of the work involved in making a glue plate. We shall now describe in detail the materials and equipment required for this method of printing, as well as the entire process of producing a poster in this fashion.





This illustration shows the materials which are used for this kind of printing: printer's roller and ink; glue plate and sheet of paper which has just been printed from this plate.

II. MATERIALS, EQUIPMENT AND TOOLS

MATERIALS

For the wax plate, beeswax and paraffin wax are required. For the glue plate, glue, glycerine and plasticine are necessary. These materials must satisfy the following conditions:

1. Beeswax. Must be pure.
2. Paraffin wax. May be of any quality. (In the chapter dealing with the process in detail, it is indicated that the paraffin wax and the beeswax are mixed in the proportions that are necessary for obtaining the desired consistency. If necessary, these materials can be replaced by candles similar to those used in churches. Care must be taken to see that the candles are really made of beeswax and not of animal fat or petroleum.)
3. Glue. Any glue (gelatinous) is suitable. The glue commonly used by carpenters is very good for this purpose.
4. Glycerine. This may be of any quality; but it is preferable not to use pure glycerine, for the latter, purchased from a chemist, is unnecessarily expensive.
5. Plasticine. May be of any quality. If there is no plasticine, clay (made with soil and water) can be successfully used in its place, but the clay must be kept damp.

ENGRAVING TOOLS

1. Gouges. Figure A, see below, represents the cutting edge of the gouge used for engraving linoleum or wood.

Types B and C are also used and can be easily made. It is simply necessary to take a strip of metal such as is used for wooden boxes and to fashion it so as to obtain either of the cutting edges indicated. A wooden handle is affixed to the other end. The three sides of the cutting edge are then sharpened.

Type A is a true V-shaped cutting edge. It produces very fine lines. Types B and C have a small transversal segment which produces much broader lines. A transversal segment of a width of 2 mm. or 4 mm. is very suitable for types B and C.

Nevertheless, the artist may vary the width of the cutting edge if he so desires. Types B and C may also be made with iron, which is fashioned with a file. Steel is not necessary, for the wax is soft and so the edges do not wear away.

2. Cleaners. These are used for cleaning the lines engraved on the wax. A cleaner can be made with a thick nail affixed to a handle. The other end is filed so as to resemble a pencil-point, but it must not be too sharp. Figure D represents a very good type of cleaner, whereas that shown by figure G would not give satisfactory results.

In order to make wider-pointed cleaners of the type indicated by figures E and F, the point is truncated with a file, care being taken to see that the truncated end is cleanly made.

3. A small knife with a thin, sharp-pointed blade.
4. A brush (medium-sized with bristles) to remove wax shavings which form during the process of engraving.

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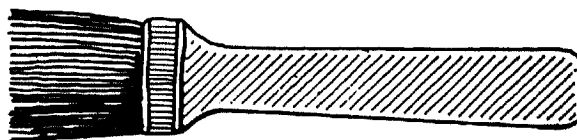
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ACCESSORIES

1. A pot for melting the wax and a stick for stirring it.
2. A double boiler for melting the glue and a stick for stirring it.
3. A stove (gas or electric, or any other form of stove). At CREFAL we use three stones to support the pot, and make a wood-fire under it.
4. Two strainers: one for the wax and the other for the glue. If there are no metal strainers, a piece of gauze can be used.
5. A mason's level, approximately 30 cm. long.

EQUIPMENT FOR GLUE PLATE IMPRESSIONS

The equipment includes: a number of accessories; the table for the engraving of the wax and the casting of the glue plate; the printing-press.

We shall describe each of them, and the manner in which it is used.

The size of the various materials may vary and depends on the type of work for which they are intended. A large printing-press can also be used for printing small posters. The experiments carried out at CREFAL have shown us that it is advisable to construct two presses of different sizes: one of rectangular shape (95 x 70 cm.) and a smaller one, one-fourth of the size of the former (35 x 47 cm.). Sometimes, when posters are urgently needed and the materials are not available, it is possible to obtain good results without them. If only one or two impressions are needed each year, there is really no need to construct any equipment.

ENGRAVING TABLES

The engraving table is used for the engraving of the wax and the casting of the glue plate.

We give the following brief account of the process in order to make the description of the table easier to follow: the surface of the table, which must be perfectly level, is covered with a layer of wax; when the latter has solidified, it is engraved with the gouge. The molten glue is then poured into this matrix. When the glue, which must fill all the interstices in the wax engraving, has also solidified, it is removed from the latter in the form of a plate.

This glue plate is the printing-plate.

The table on which this work is done is illustrated (see below), and is constructed as follows:

It is a four-legged table with a glass top (B) surrounded with a wooden frame (A). The glass must be thick and solid.

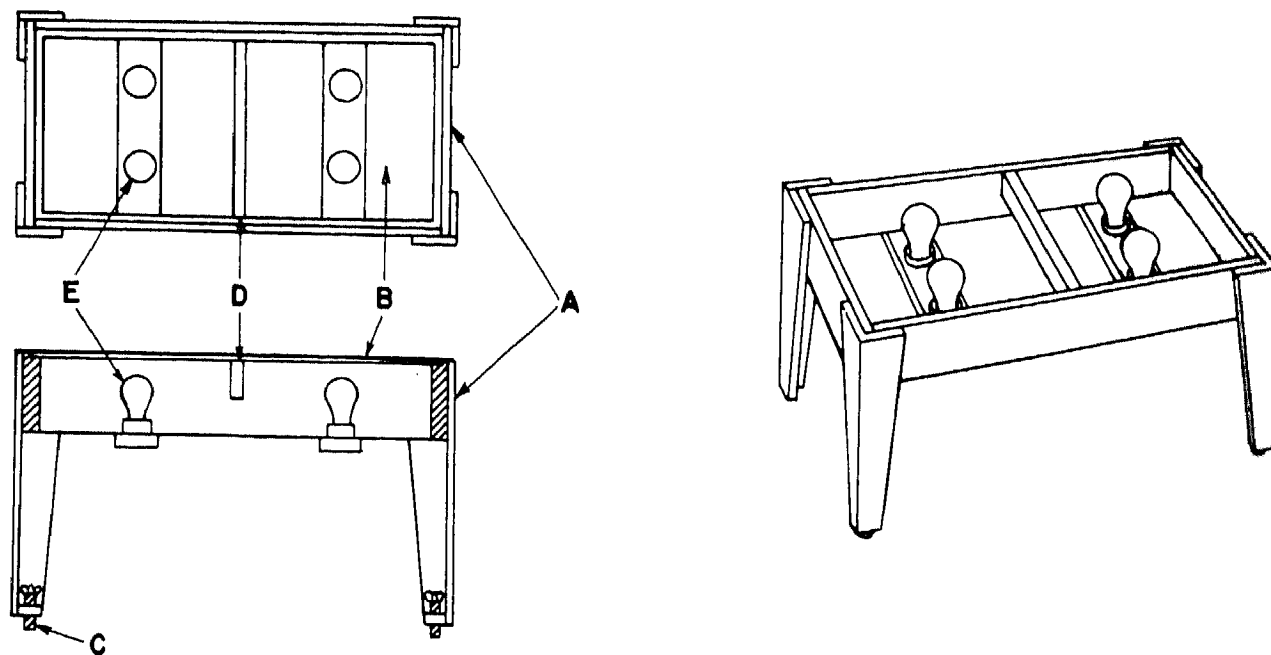
At the bottom of each leg there is an adjustable screw (C) for ensuring the correct level of the table.

In the middle of the glass top there is a transversal support (D) which prevents the top from sagging under the weight of the cast.

Approximately 15 cm. below the glass top there are transversal supports for four electric bulbs (E) which are intended to provide light and heat.

The height of the table is adjusted to suit the engraver.

When small posters are being made, it is not necessary to construct the entire table.



There is another type of engraving table, which is illustrated (see below).

It is convenient for small engravings and its advantages are that it is easy to transport and can be more readily adapted to the needs of the engraver.

It consists of:

A thick glass pane (A) within a wooden frame (B) (fig. 1).

A box (fig. 2) with four electric bulbs (C) arranged in the manner indicated. The bulbs are intended to illuminate the glass from below and to provide heat.

The framed glass pane and the box for the lamps are separable from one another.

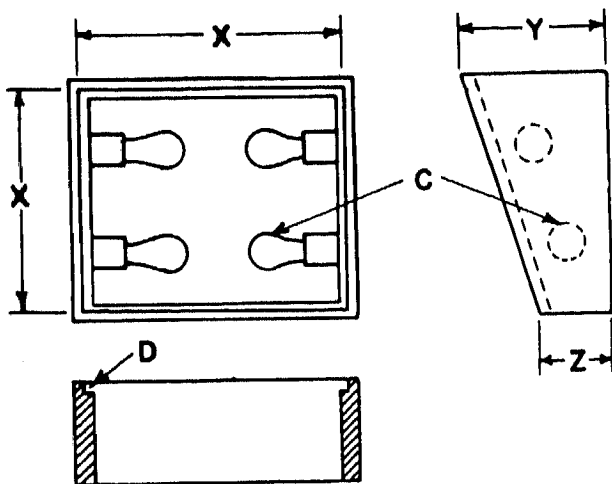
The angle at which the framework is placed depends on the difference in height between Y and Z. This difference can be varied in order to suit the convenience of the engraver.

Figure 3 shows the framed glass pane placed, in a suitable position for work, on the box containing the lamps.

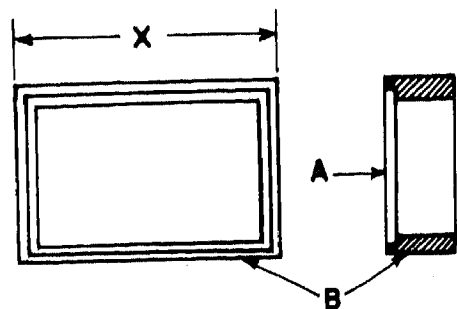
The dimensions (indicated by X) of the frame and of the box must be identical, as this permits the engraver to place the frame on the box in any position.

The groove (D) which runs around the box enables the frame to be firmly affixed to the box.

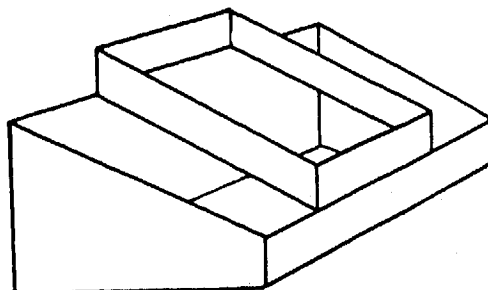
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III. THE PROCESS FOR PREPARING THE PRINTING PLATE

First stage - PREPARATION OF THE WAX PLATE

The glass top of the table is first carefully cleaned.

Before the molten wax is poured over it, it is heated by means of the electric bulbs placed underneath.

If there is no electric current, the bulbs may be replaced by any other source of heat; but the latter must be uniform and not very intense.

The glass pane must be perfectly level, so as to ensure that the molten wax will spread evenly over it.

The size of the wax plate is fixed by surrounding the surface which it is desired to use with "walls", one cm. high. The latter can be made with plasticine, clay or pieces of wood. These "walls" are intended to prevent the liquid wax from spreading beyond the desired limits.

The wax for the plate is prepared by melting beeswax and paraffin wax together. It is difficult to determine the exact proportion of each. Experience has shown that satisfactory results are obtained if they are used in equal quantities. If it is desired to vary these proportions, the following should be taken into account: when a greater proportion of beeswax is used, the mixture is more elastic and glutinous; whereas, if a greater proportion of paraffin wax is used, the mixture is harder and more brittle.

Through experimentation, it is possible to obtain a mixture which, when it solidifies, can be easily engraved with a gouge.

The engraver should therefore experiment with different proportions until he finds the mixture most suitable for his work.

When the mixture of beeswax and paraffin wax has been melted, it must be allowed to cool slowly until there is no risk of its breaking the glass pane owing to its temperature.

While it is still liquid it is rapidly poured over the glass pane so as to cover the latter with a uniform layer. The thickness of this layer can be varied according to the nature of the work and the type of drawings to be reproduced: it is sufficient.

Although it is convenient to make a wax plate of uniform thickness, this is not absolutely necessary; any variations that might occur in this respect will not affect the printing surface which is in contact with the glass pane.

When the wax has been poured over the glass pane, it is allowed to cool until it solidifies: twenty or thirty minutes are sufficient for that purpose.

Second stage - DRAWING OF THE WAX

The drawing which is to appear on the poster is delineated on the wax plate. It may be drawn directly on the wax or traced from a paper drawing.

No special paper is needed for tracing. The paper drawing is placed on the wax and it is lightly traced with a pencil or some other pointed instrument. In this way the drawing will be softly reproduced on the wax surface.

This method of tracing is most convenient when the engraver is unable to draw, as it permits any drawing whatsoever to be reproduced.

As already indicated, it is also possible to draw directly on the wax. In this case, it is necessary to use a soft pencil or Indian ink. One of these must also be used in order to give greater relief to drawings that have been traced.

The drawing - whatever the process used - will appear on the wax plate in the form of black lines and surfaces. In general, the technique to be used is the same as that employed for engravings on linoleum or wood, the only difference being that, in the case of wax, it is necessary to carve out everything that will appear on the poster, whereas, in the case of linoleum, those parts are cut out which will not appear on the poster.

As everything that is to be reproduced is cut out, it is easy to reproduce drawings consisting mainly of lines.

It is not necessary to "engrave in reverse". The letters are engraved on the wax from left to right, in the same way as we read them.

Third stage - THE ENGRAVING ON THE WAX

The lines drawn on the wax are carved out with a gouge, particular care being taken to see that the latter cuts right down to the glass. Each time this occurs, the engraver forms a printing line or surface. Although the lines appearing on the glass pane are very fine, they should be cut out in the form of a V, in order to facilitate the casting of the glue plate. This is illustrated on page 5 : figure 1 represents a line engraved on the wax by a gouge; figure 2 shows how the filling of this engraved line with the glue is facilitated by the V-shape of the former.



Engraving the wax. Owing to the lights underneath, all the engraved lines are clearly visible. It will be noted that the letters are engraved from left to right. The gouge carves out the lines right down to the glass. The letters appear in their correct form.

When several fine lines are cut very close together - in order to obtain grey tones, for instance - there is a risk of the wax detaching itself entirely from the glass pane. This can be avoided by lighting the electric bulbs and slightly warming the wax before engraving the fine lines. The warm wax is less brittle and adheres more firmly to the glass pane.

On the other hand, if it is desired to remove a piece of the wax plate in order to leave a printing surface, this can be done without any difficulty. It is simply necessary to cut around the surface in question with a small knife and the piece of wax can then be prized from the glass pane. This will produce a dark surface on the poster. If the wax is cold, it is more brittle and so the piece to be removed can be easily detached from the glass pane.

This is the best process for the engraving of letters, particularly if they are large block letters.

If the engraver wishes the wax engraving to stand out clearly, he should place a black paper underneath the glass pane. The lines of the engraving will then appear in black, and the rest will remain invisible owing to the opacity of the wax.

If an error is made during the engraving, it can be "erased" as easily as errors in a paper drawing. For that purpose, it is sufficient to melt a little wax with a match and to let it drip into the engraved line which it is desired to correct. When this wax solidifies the correction can be made.

As the printing surface is in contact with the glass pane, the clarity of the lines on the poster will depend on the cleanness of the glass. Consequently, the latter must be cleaned with considerable care.

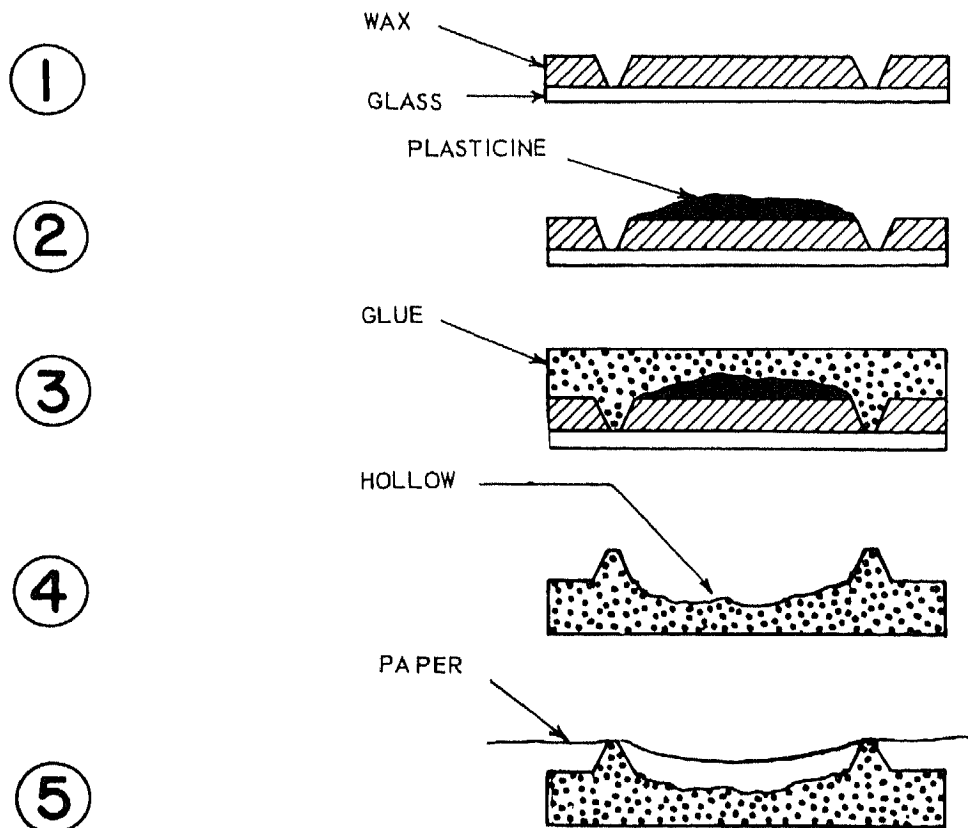
If the glass pane has a large surface, it must be kept clean by vigorously rubbing it with a damp piece of cotton fabric. If it is only desired to clean engraved lines, the cleaners already described must be used.

The cleaner must be passed several times over the lines so as to leave the glass perfectly clean. It must be used vertically in order to produce satisfactory results.

When the lines have been cleaned in this manner, the rest of the wax plate must be brushed in order to remove all the wax shavings remaining on it.

When large parts of the wax plate are not engraved (they will appear as white surfaces on the poster), the thickness of the wax must be increased. Figure 1 (see below) shows two engraved lines separated by a large space; in order to increase the thickness of the wax (represented by stripes), plasticine (represented in figure 2 in black) is added. When the glue is poured over the wax (figure 3) the space occupied by the plasticine makes a deeper hollow between the engraved lines; this is clearly seen when the glue plate is removed from the wax engraving (figure 4).

Figure 5 shows that, even if the paper sags owing to pressure or its own flexibility, it will not be stained by the glue plate, provided that the hollow has been made sufficiently deep.





The engraver is reproducing a drawing on the wax plate with Indian ink. All the lines drawn will be carved out with a gouge.

Fourth stage - PREPARATION OF THE TABLE

When the wax engraving is ready to receive the glue, the surface to be covered by the latter must be limited, as this surface will determine the size of the printing plate.

A wooden frame, 2 cm. high, or a "wall" (made with plasticine or clay) of the same height can be used in order to prevent the liquid glue from spreading beyond the said limits.

The height of the frame or of the "wall" will depend on the thickness which it is desired to give to the glue plate. A thickness of 2 cm. is suitable for plates which do not exceed one square metre. The larger the plate, the thicker it must be, so that it will have the necessary resistance.

If a wooden frame is used to prevent the liquid glue from spreading, care must be taken to see that no spaces are left between the wood and the wax into which the glue might work its way. It is advisable to strengthen the framework by filling all the cracks and chinks in it with plasticine. In order to prevent the glue from adhering to the framework, the latter should be smeared with oil or grease.

Fifth stage - PREPARATION OF THE GLUE MIXTURE

The solidified glue plate is the printing-plate. This plate is made with a mixture of glue and glycerine. Any sort of hard gelatinous glue can be used. The glue commonly used by carpenters - and which is supplied in sheets of 8 x 20 x 1/2 cm. (thickness) - is suitable and can be procured anywhere.

Where a choice is possible, the finest and purest glue should be used.

In order to determine whether a sheet of glue contains dust, it is sufficient to look at it against the light.

The sheets of glue must be broken into small pieces; before being broken with a hammer they should be placed in a sack in order to prevent the pieces from scattering.

After it has been pounded, the glue is placed in a pot, covered with water and allowed to soak for four hours. The glue absorbs part of the water and the rest of the latter evaporates during the four hours.

The glycerine is added to the glue which has absorbed the water: one litre of glycerine to every five litres of glue.

The mixture is placed in a double boiler until the glue and the glycerine are transformed into a thick, glutinous liquid.

The quantities given of glue and glycerine must not be regarded as invariable.

The correct proportions depend on many factors, and it is advisable to experiment with small quantities in order to determine what proportions correspond to the particular needs of the climate, temperature, etc.

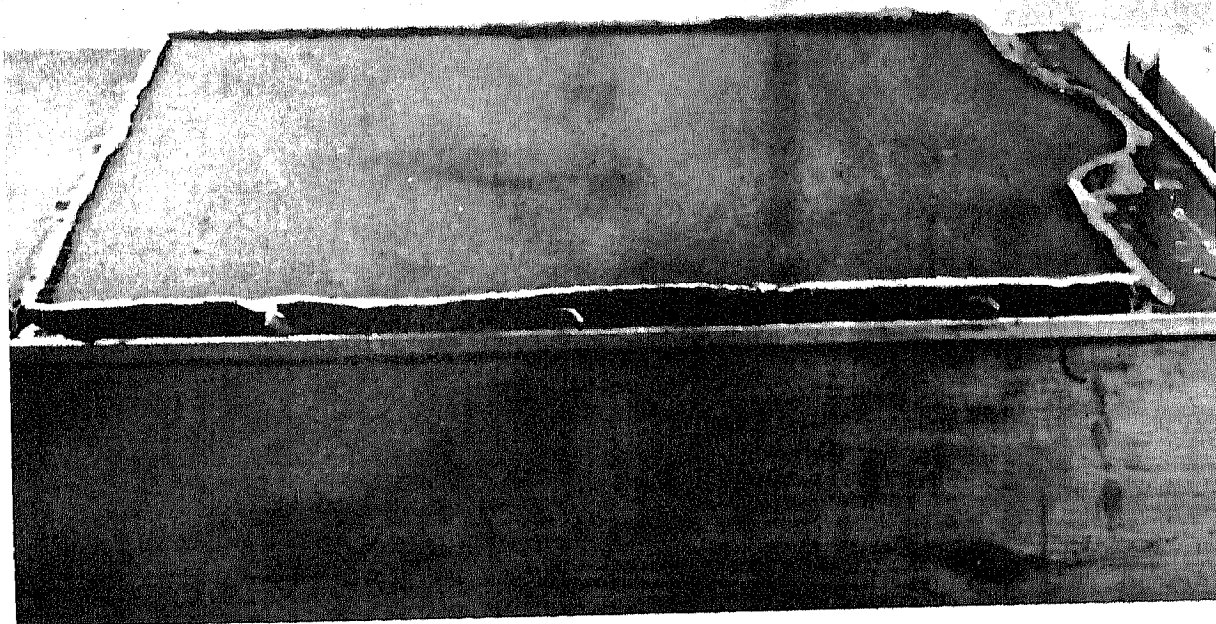
The two main factors are the quality of the glue used and the temperature of the region in which the work is done. Heat tends to soften the glue plate, and cold to harden it.

The glue plate must maintain the consistency of soft rubber.

If, after the first experiment, the glue plate is still very hard, glycerine should be added. If it is too soft, more glue should be added.

The mixture of glue and glycerine must be heated in a double boiler until all the pieces of glue have melted and formed a uniform liquid. The mixture must have the same consistency as thick cream. If, in its liquid state, it is too thick, more glycerine should be added.

Before being emptied, the pot of glue must be removed from the double boiler and allowed to cool, while the mixture is being constantly stirred. It must be allowed to cool sufficiently to avoid its melting the wax when it is poured over the latter. A good means of ascertaining this is to place one's finger in the liquid glue. The glue must be warm but not hot enough to burn the finger. If it is possible to keep one's finger in the glue for half a minute, the glue is ready to be poured out. Care must be taken that the glue does not cool too much, for it then begins to thicken.



The glue has been poured over the wax engraving. The latter is surrounded by plasticine «walls» which permit the glue to form a layer, 2 cms. thick, without any risk of its overflowing.

This mixture of glycerine and glue is similar to that used for making printers' rollers. The latter are made in all parts of the world and it is easy to obtain advice on them from the local printers. The manufacturers of rollers are familiar with the characteristics of the local glue and know what quantities of glue and glycerine must be used in the mixture if the latter is to correspond to the climate of the region concerned.

Sixth stage - CASTING OF THE GLUE PLATE

This operation must be carried out with considerable care, for the accuracy of the impressions depends upon it.

First of all, the table must be made perfectly level, and for that purpose the mason's level already referred to must be placed directly on the glass pane. The uniformity of thickness of the glue layer will depend on the level of the table. Experience has shown that, in making impressions, the uniformity of thickness of the printing-plate is of fundamental importance.

In order to obtain the correct level, the table is provided with adjustable screws as indicated on page 10.

The liquid glue will then find its own level.

The glue must be stirred before being poured out and care must be taken that it does not contain any hard pieces or foreign matter.

Before pouring out the glue, the edge of the glue pot should be placed very close to the glass pane so that the glue will not cool while it is being poured out. It should be poured out slowly, to ensure that it will fill all the interstices in the engraving. If the glue is poured out rapidly, air-bubbles may form and so prevent the liquid mixture from finding its way right down to the glass pane. That is why the gouge with a V cutting edge has been recommended; as the glue is thick, it might not be able to penetrate to the glass pane if the upper part of the engraved lines were too narrow, and, as it is the glass pane which determines the printing surface, any air-bubbles which might form would create a white area on that surface.

In order to avoid this, it is useful, when pouring out the glue, to give short, rapid taps on the lower surface of the glass pane, and thus facilitate the penetration of the glue.

Another risk is that the glue, on cooling, may solidify near the edges before penetrating throughout the whole of the engraving. This can be avoided by moving the glue pot from one side of the glass pane to the other when pouring out the glue.

After pouring out sufficient glue to cover the engraving, one can pour the rest out rapidly until the layer of glue attains the required thickness.

The glue plate solidifies after it has been allowed to cool for six or eight hours. It is useful to allow it to cool overnight.

It is important to carry out the whole of this printing process in the dark. The materials utilized are very sensitive to heat, and the direct rays of the sun affect them immediately.

Seventh stage - REMOVAL OF THE GLUE PLATE

After the glue has been poured over the wax cast and has solidified, the glue plate obtained must be separated from the cast.

For that purpose, the edge of the glue plate is carefully raised from the surrounding "wall". If the latter has been previously lubricated, the plate can be easily removed. If it adheres to the "wall", it can be separated with the aid of a knife, provided that the latter is used with great caution. When the edge of the glue plate has been raised from the surrounding "wall", the rest of the plate is carefully removed; as it is flexible, this operation, which must be effected by hand without the use of any instrument, is not difficult. When the glue plate has been completely removed, the wax cast should remain intact if the work has been correctly done.

On reversing the glue plate, the engraving which has been reproduced on it will face upwards. The printing surfaces - which were previously in contact with the glass pane - must appear smooth, as though they had been polished. This accuracy in the casting of the glue plate, which is of fundamental importance, depends on the cleanness of the glass pane and on the avoidance of air-bubbles when the glue is being poured over the wax cast.

The printing-plate, which is thus obtained, is placed in its natural position - on a flat surface with the engraved face upwards. The glue is very flexible and uneven surfaces can distort the plate. If it is so desired, it may be maintained in this position for months.

The plate is now ready for printing.



The glue plate which has solidified is being removed. Note its flexibility. The light-coloured parts of the wax plate are those of plasticine.

IV. THE PRINTING PROCESS

The printing process which is described below does not require a printing-press; everything is done by hand. At CREFAL we use cheaply-made presses which are described further on.

INKING

The glue printing-plate is very sensitive to ink; it absorbs and transfers the latter very easily. Any kind of roller (hard or soft) can be successfully used in order to ink the surface of the printing-plate. The roller itself is inked on a glass pane on which the ink has been evenly spread with a spatula.

The only difference between the glue printing-plate and most other printing-plates is the degree of pressure exerted on the roller. The ink-roller must be moved over the glue plate with the minimum of pressure; the mere weight of the roller is sufficient.

Any form of printing-ink may be used.

PRINTING BY HAND

The sheet of paper is placed on the inked plate, care being taken that it does not move after having been placed on the plate. The printer, after gently passing his hand over the paper, carefully removes it by taking hold of one of its edges. The impression thus made will faithfully reproduce the engraving on the plate.

It is possible to obtain an unlimited number of copies by means of this very simple process. At CREFAL we have not produced more than a thousand copies at any one time, but after their production the plate has not been found to have deteriorated in any way.

It may sometimes happen that a part of the printing-plate corresponding to a white surface on the poster is stained with ink during the inking process; this stain will be reproduced on the poster. It can be removed from the plate by cleaning the latter with a piece of cloth soaked in gasoline.

If such stains keep occurring, they may be due not to the inking but to the fact that the hollow corresponding to the white surface is not sufficiently deep. In this case, it is better to deepen the hollow corresponding to the surface which has been stained by cutting the plate with a small knife.

Once the glue plate has been made, it is no longer possible to alter it. Minor features can be removed with a knife, but it is impossible to add anything without making a new printing-plate.

CARE AND CONSERVATION OF MATERIALS

The wax used for the engraving, and the mixture of glue and glycerine, can be used indefinitely.

The wax shavings which form during the engraving process should not be thrown away. Moreover, when the wax cast is no longer needed, the wax should be scraped from the glass pane; it can then be melted in order to make another wax cast, and so on indefinitely.

From time to time the wax should be filtered, so as to remove particles of dust or any other foreign matter.

Likewise with regard to the mixture of glue and glycerine. When the glue printing-plate is no longer needed, it should be cut up into small pieces and melted for further use. The consistency of the mixture remains much the same. If it seems too thick, water should be added to it in order to make up for the water that has evaporated owing to the heat.

A glue plate can last for three months without deteriorating. Nevertheless, it is not advisable to keep it for such a lengthy period. If it is desired to preserve an engraving, it is preferable to keep the wax cast, which never deteriorates. A new glue plate made on that cast will serve as a new printing-plate.



The glue plate has been placed on the printing press, which is of rectangular shape. In the foreground is the thick, flat glass pane used for the inking.

THE PRINTING PRESS

We have already described the process of printing by hand. It is very simple, but it is also slow. In order to speed up the process, we have invented a number of simple wooden presses which can be constructed by any carpenter. Very complicated presses (flat-bed or rotary) can also be made and adapted to printing from a glue plate.

The following is a brief description of a flat-bed press and of the manner in which it works:

a main table (figure A);

an adjustable bed for the inker or ink-table (B);

an adjustable bed for the glue plate or printing-plate (C);

a thick glass pane (D) (on the ink-table) on which the ink is smeared for the purpose of inking the rollers;

a glue plate (E), placed on the above-mentioned adjustable bed for it and on the same level as the glass pane for the inking;

adjustable screws (F) which permit the glue plate and the glass pane to be placed on the same level;

ink-rollers (G) which are placed on the ink-table, and a pressure-roller (H) which is moved backwards and forwards over the printing-plate.

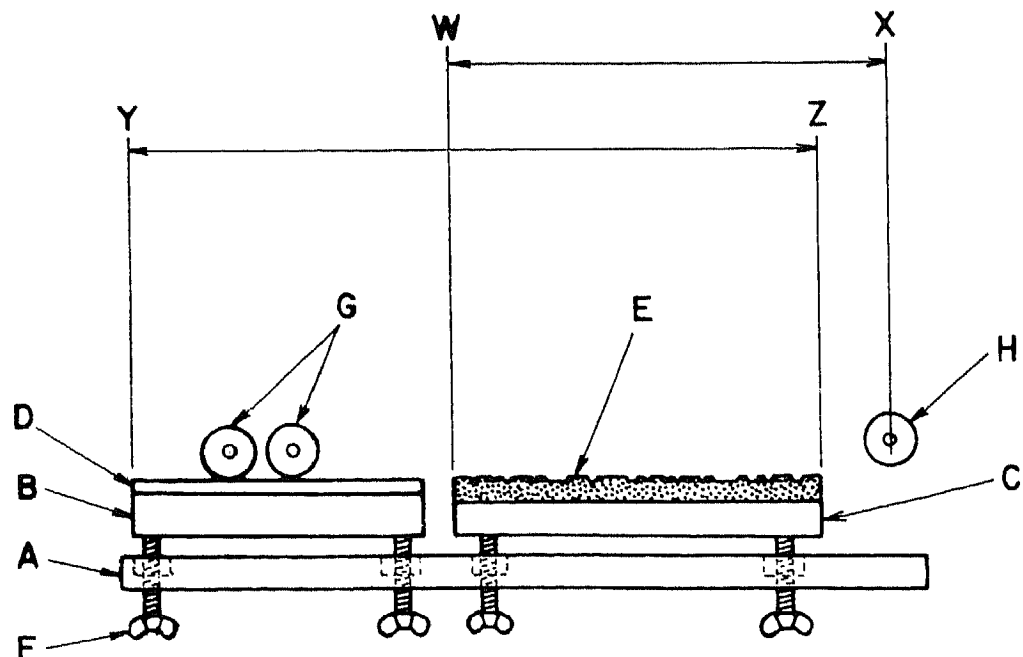
The printing-press is worked in the following manner:

The ink is spread over the glass pane with a spatula. The ink-rollers are moved from point Y to point Z and then back to point Y. When they move over the glass pane (Y to W) they become inked, and when they move backwards and forwards over the glue plate (W to Z and Z to W) they transfer the ink to that plate.

When this has been done, a sheet of paper is spread by hand over the glue plate. The pressure-roller (H) is then moved from point X to point W. This roller exerts a slight pressure on the paper which is spread over the inked printing-plate and thus makes an impression on the paper. The latter is removed by hand, by taking hold of one of its edges, and the poster is then ready for use.

If the impression is faulty, it must be corrected by altering the level of the press by means of the adjustable screws.

If certain lines or surfaces on the poster are not satisfactory, they can be corrected by slightly raising that part of the glue plate which corresponds to the area concerned and inserting a paper wedge underneath it.





The rollers are moved over the glass pane in order to ink them. They are then moved over the glue plate in order to transfer the ink to that plate.



The paper, which has already been printed, is being removed from the glue plate. The impression was made with a very slight pressure.

A SYSTEM USED AT CREFAL

As a result of our experience at CREFAL, we have invented, among others, the printing-press, illustrated below.

The vertical cross-section shows the following parts:

- A Glue plate.
- B Adjustable bed for the glue plate.
- C Screws for adjusting the level.
- D Main table of the printing-press.
- E Supports for the rails.
- F Rails.
- G Blocks supporting the rollers which run along the rails.
- H Roller.
- I Plank connecting the two blocks supporting the rollers.

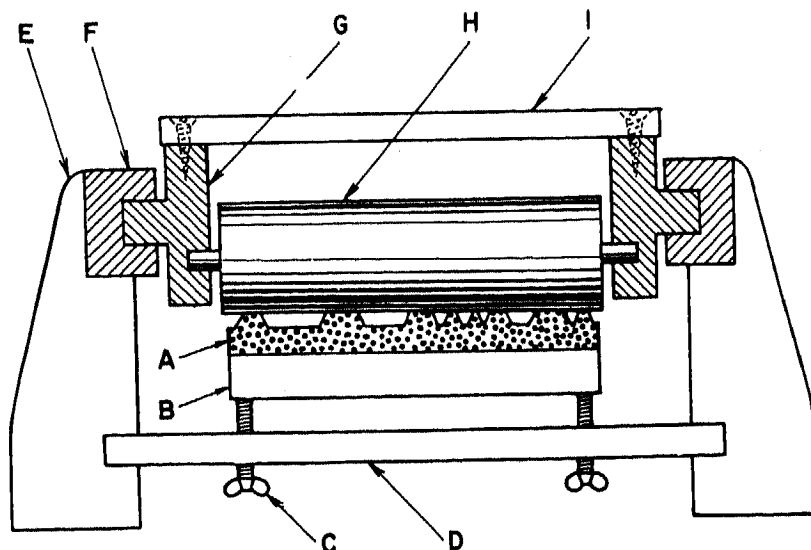
The rails must run right along the printing-press; they should be made preferably of hard wood, so that they will not warp after constant use. The blocks supporting the axles of the rollers must also be of hard wood, and must fit into the rails as accurately as possible so that they can move along without any jerking motion such as would destroy the evenness of the pressure.

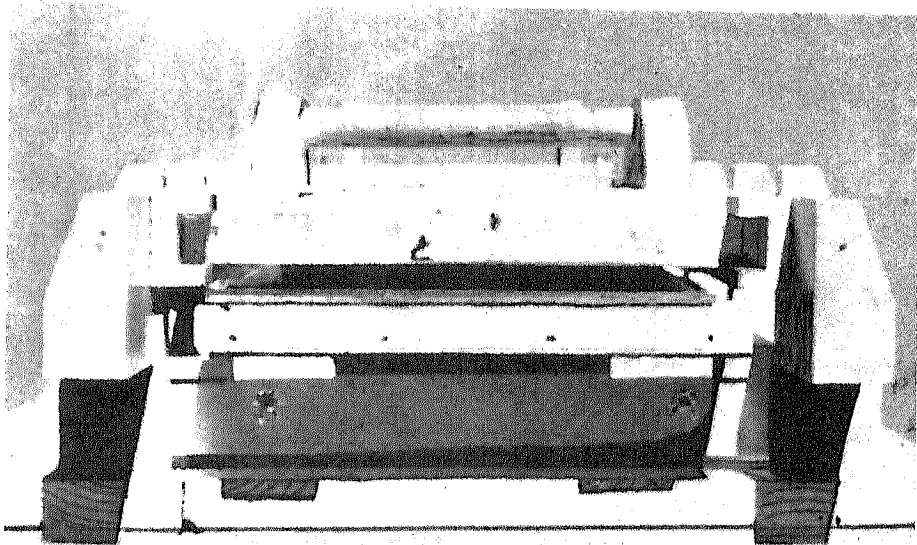
The ink-rollers can be made with the same mixture of glue and glycerine as is used for the printing-plate. For that purpose, a hollow, cylindrical mould with a central support for the axle is necessary. The rollers can also be made of wood turned on a lathe and covered with cloth of closely-woven wool.

The pressure-rollers are made of wood turned on a lathe.

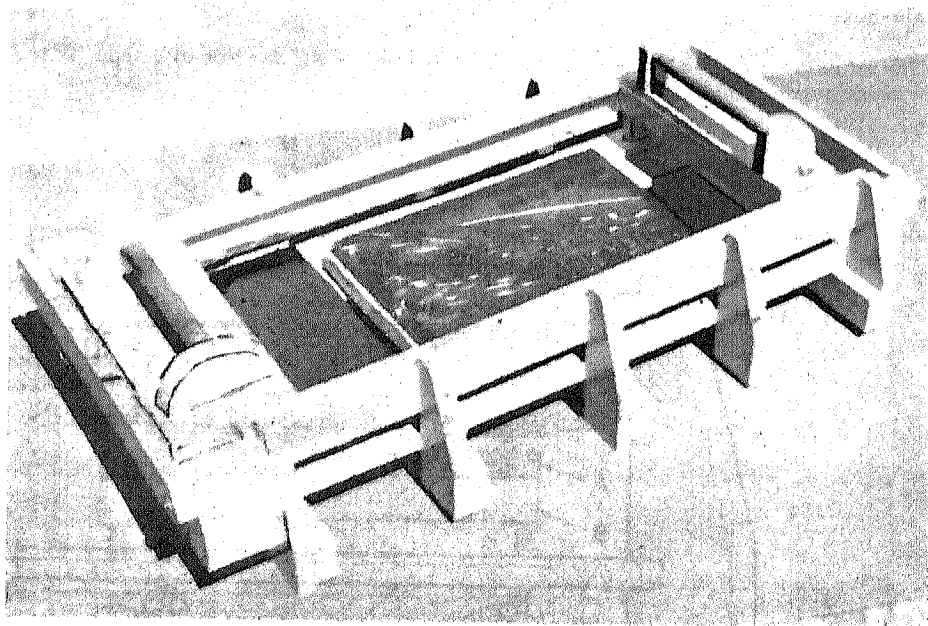
The axle of the roller turns in a hole which is made directly in the supporting block (G) if the latter is made of hard wood. If the press is to be used continuously or very frequently, the axles should be placed on metal axle-boxes.

The adjustable bed (B) must be flat and sufficiently strong not to warp. A framework covered with plywood is recommended for that purpose.





A vertical view of the printing-press described on page 25. At the top of the machine is a handle attached to the box used for moving the rollers over the ink plate and the glue plate



A printing-press for paper of quarto size. The rollers run on rails which extend along the length of the press.

V. APPLICATION TO FUNDAMENTAL EDUCATION

In considering the process of printing from a glue plate and its application in the field of fundamental education, it is important to define its main objects.

The first problem is: Should graphic materials be produced for merely local purposes or for nation-wide distribution?

In the latter case, the process described in this booklet would offer few advantages. Printing from a glue plate is a manual and quasi-domestic task, and its quantitative output is not very great. In large-scale production, it cannot compete with lithography or photo-engraving. If the Ministry of Education of any country wishes to make posters for nation-wide distribution, the glue plate process is neither economical nor useful.

On the other hand, in the field of fundamental education, the graphic materials used must correspond to local conditions.

Posters are useful if they deal with a specific problem and suggest a satisfactory solution for it. Let us take the following case as an example:

Malaria is a very widespread problem.

Posters produced at central agencies can merely offer the following advice: "Protect Yourself from Mosquitoes". On the other hand, posters produced locally can make either of the following recommendations: "Dry up the Swamps", or "Cover Swamps with Oil", according to their respective degree of feasibility in the region concerned. Frequently, local conditions require different solutions for the same problem. Posters produced locally can take these differences into account and so exert a greater effect.

A typical example of this centralized production is offered by a poster produced and distributed by a National Health Department. The words on the poster are: "Cover your Windows with Wire-Netting". The posters were distributed in a region where it was practically impossible to procure wire-netting; consequently, they had little practical effect. If the poster had been adapted to local conditions, it would have said: "Cover your Windows with Gauze", a material which was easily obtainable in the region concerned.

With locally produced posters it is possible to propose specific solutions, to present visual images with which the inhabitants of the locality concerned can fully identify themselves. The local inhabitants, especially those in backward regions, are particularly attached to local traditions and usually identify themselves with their region or community. In a village on the shore of Lake Patzcuaro, a group of teachers - students at CREFAL - exhibited a poster produced at the Centre. This poster showed the correct way of selecting Indian corn seeds... The following conversation between two of the villagers, overheard by the students of the Centre, contained an interesting piece of criticism.

"This is how seeds are selected in Guadalajara" said one of them, looking at the poster.

"How do you know that it is in Guadalajara that they select seeds in this way?" asked the other villager.

The first villager answered confidently: "It is quite obvious; this is a picture of Guadalajara. Can't you see what kind of hat the man is wearing?"

The CREFAL artist had not paid sufficient attention to the style of hat that is worn in the Patzcuaro region. In fact, he had taken as his model a hat that is characteristic of Jalisco.

The poster "Viejito... Pero Aprendiendo", is an example of the possibilities that are offered by local production. The poster contains a play upon words, as "viejito" (little old man) is also a character of a traditional folk-dance, which is known to all the men, women and children of the Patzcuaro region. Outside of this region it is little known, so that this poster, exhibited anywhere else, would give rise to confusion or lose its point.

The clothes, colour, customs, architecture, landscape and many other details depicted on a poster determine the extent to which the inhabitants can identify themselves with it and its ideas.

Sometimes it is not feasible to produce different posters for the hundreds of different localities in Mexico, as each of them has its own style of hats, dances, etc. Nevertheless, we feel that posters should correspond to local conditions so far as possible.

Another important factor is the independence of local production. The greater the number of persons to whom the means of reproduction are available, the more democratic will be the results.

It is probable that posters and similar graphic materials intended for local exhibition will reflect the true needs and aspirations of the local inhabitants if they are evolved, from first to last, by the local teachers and authorities, rather than by officials living some hundreds of kilometres away.

In the case of local production, the process of printing from a glue plate offers many advantages. It can be employed with a minimum of equipment. When the glue plate (or printing-plate) has been made, all that is necessary is an ink-roller in order to make impressions... The only object of a printing-press is to speed up production. Unlike other printing processes, this process requires only a minimum of pressure for the making of impressions. The glue plate, which is very flexible, makes an ink impression on the paper very easily. Without a printing-press it is possible to print from a glue plate five or ten times as quickly as from a linoleum or a wood plate.

It is also possible to make very large posters. The size of the poster is only limited by the size of the glass pane that is available. A glue plate measuring 2 x 2 metres can be made just as easily as the smallest plates. The glue plate is placed on a large table (or even on the ground), it is inked with a hand-worked roller, and the impressions are made by placing the paper on the glue plate and lightly smoothing it out.

Coloured posters can also be printed; a different plate is made for each colour, exactly as in any other printing process.

As the plate is very flexible, it can also be used on a rotary printing-press; for that purpose it is sufficient to place the plate around a cylinder and to fix the latter in its right position.

As one of the main characteristics of the glue plate is its flexibility, different kinds of printing-presses, made entirely of wood, can be constructed. This is possible owing to the slight pressure needed in making the impressions, and to the fact that the printing-presses do not have to be constructed with very great precision. The flexibility of the glue plate makes up for any defects in the printing-press. If the rollers are defective, the pressure uneven or the table warped, or if there are other imperfections, these do not prevent good results from being obtained. Consequently, any teacher, aided by a carpenter, can construct his own press at very little cost.

Fundamental Education workers frequently have occasion to print words with very large letters. It is difficult to find type more than three inches in size; large type, moreover, is very expensive. Our printing process makes it easy to engrave letters of any size on the wax plate and then to print them from glue plates.

Another advantage of the flexible plate is that it is possible to make impressions from it on any kind of material. At the Centre we have successfully printed on cloth, wood, leather, glass, metal, cement and plaster, as well as on various kinds of paper. The flexibility of the plate permits it to be adapted to almost all surfaces, provided that these are able to absorb the ink.

Dress patterns of normal size can be printed on the material to be cut out. Permanent advertisements can be printed on wood or metal. Flags and banners can be printed on cloth.

As the needs of Fundamental Education workers vary considerably, printing on different materials offers considerable scope.

While the technical features of the process provide the many advantages which we have mentioned, several of the teachers studying at the Centre consider that the chief advantage is its low cost, together with the availability of the materials.

After the initial outlay for the glue, glycerine and wax, it is possible to continue to print different posters for an indefinite period without further expense. If the glue is kept clean, its quality improves with use, instead of deteriorating. Frequently it is necessary to print only a hundred posters or less. The expense of making a printing-plate by most of the other processes is so high that the cost of printing even so small a number of posters would be prohibitive.

Apart from the work done by the teacher, it costs nothing to make a glue plate. This process is therefore a practical one, even though it be used for producing only from ten to fifteen copies of a poster.

Of all the other printing processes, cerotype is the only one which offers much the same advantages as the glue plate procedure. Nevertheless, those familiar with cerotype consider that printing from a glue plate offers greater possibilities.

People working daily in the field of Fundamental Education are continually confronted with new problems which require new solutions. It is to them that we offer this printing process. If they apply it patiently and assiduously, they will soon see their efforts rewarded.

This has been our own experience, and we would like it to be that of many other Fundamental Education teachers.