CHAPTER V

TRANSFER METHODS

SIMPLE TRANSFER.—Bromoil prints, which have been inked up but not defatted, can be effectively used as print-plates, from which pulls on any desired plain paper can be taken. The process of making such transfers is simple and certain and opens a whole series of new possibilities to the amateur. Briefly the method is as follows:

The greasy ink on a finished bromoil print lies on a gelatine film. If the inked print is brought into contact with any uncoated paper and passed between two rolls under pressure, the ink transfers from the bromoil print to the paper. Obviously the picture thus produced is laterally reversed, which must be kept in view in preparing bromoil prints for transfer. Bromide enlargements to be used for transfer should, therefore, be made reversed.

The bromoil print can again be inked up after this process and again used for transfer; with bromide papers with resistant gelatine films this process may be repeated many times.

The advantages which bromoil transfer offers are as follows: in the first place we attain the end so often sought of being able to use any suitable paper for making photographic prints, which opens a new field for artistic endeavor. Obviously, also, any desirable oil-printing ink can be used, so that the whole gamut of colors is at the command of the operator.

The personal control of the tone values of the print, which attains its maximum development in bromoil printing, is equally possible in bromoil transfer.

The picture is obtained on an uncoated paper and, therefore, the prints are of a character which hitherto could scarcely be obtained.

The finished prints, if the paper is properly chosen, can be retouched as much as desired.

From a single bromoil print a whole series of impressions can be obtained, which may either be all alike or quite different. They can be made heavy or light, in one or more colors, or even in polychrome, according to how the re-inking is done.

The transfer process is also very cheap, as the papers used are naturally much cheaper than photographic printing papers. Moreover, one can make the pulls from small bromoil prints on larger sheets, so that the picture may be suitably surrounded with white margins.

The following details should be observed in the preparation of bromoil transfers:

The bromoil print designed to be used as a print-plate can be made on papers of the characters described in Chapter I, page 13. The bromide paper need not necessarily be free from structure, for with the pressure to which the sheet is subjected in the transfer, the effect of the structure is lost. The structure of the bromide paper may also be reduced by passing the bleached print through the rollers of the transfer machine under heavy pressure before inking. *The bromide print or enlargement must be kept very clean and free from fog,* since the cleanness of the high lights plays a very important part in the transfer. The inking is done in the usual way; only one should use all possible means to obtain

the greatest possible cleanness of the high lights, and good modulation. After inking-up, any brush hairs and especially any little particles of ink that are not broken up must be removed, as the latter are especially troublesome in the transfer.

The process succeeds best when the bromoil print has as high a relief as possible. Such a relief facilitates and requires the use of inks of soft consistency; soft inks adhere to the gelatine film far less firmly than harder ones and, therefore, transfer very much more easily to the transfer paper. A simple experiment makes this fact very clear: if the tip of the finger is placed on a part of the bromoil print worked-up with hard ink, some of the ink sticks to the finger, but at the most there is formed on the print an impression of the tip of the finger, as the place touched still retains the greater part of its ink. If, however, the tip of the finger is placed on a part of the print worked up with soft ink, the latter will be almost entirely removed. This may serve to show why bromoil prints which have been entirely or chiefly worked up with hard ink cannot be entirely transferred to the transfer paper. The shadows especially, when covered with hard ink, are likely to appear much reticulated in consequence of the imperfect transfer of the ink.

To obtain with certainty a faultless bromoil transfer, soft ink should therefore be used; the softening of the ink must naturally not exceed a certain limit, because otherwise the high lights will take the ink and a clean pull cannot be obtained. In order to be able to use a soft ink successfully, the relief of the bromoil print must as a rule be kept rather high; hence usually water baths of suitably high temperature should be

used. It may, however, happen, especially with contrasty prints, that the gelatine in the high lights becomes too soft, and if it is not already damaged when taken from the warm water, it pulls off in inking-up or in the transfer. In order to avoid this, it is best to use the ammonia bath described on page 45.

Bromoil prints which are to be used for transfer must, as already mentioned, always be kept very clean. This is necessary for the following reasons. In the transfer the ink on the high lights transfers completely in every case to the transfer paper, for the high lights are in the highest relief, and the ink adheres to them very lightly. On the other hand the ink is generally not completely removed from the shadows, as they have the lowest relief and, in consequence of their tanning, the ink adheres to them more tenaciously. Thus it happens that the transfer is usually somewhat shorter in gradation than the original bromoil. Allowance must be made for this, and the bromoil print should be made considerably more brilliant than the transfer ought to be, unless low-toned transfers are intentionally sought.

In order to obtain clean, sharp edges the bromide print when dry should be cut to the desired size and a small tab of paper left at one corner, which is useful for hanging it up in the further processes, whereby any damage to the film of the picture itself is avoided. This little tab should be cut off just before inking. If a plate mark is desired, the print should be made with a suitable narrow white margin.

The finished bromoil print can be immediately used for the transfer. If it is not used at once, it remains fit for transfer until the ink begins to harden.

Any desired kind of paper may theoretically be used

for the transfer; but obviously, the success of the transfer greatly depends on the choice of the paper. The finest effects are obtained on matt and absorbent, but strong and well-made papers, the very best being papers intended for copper-plate printing. As the ink penetrates into the fiber of such papers to a certain extent, they give beautiful transfers with an absolutely matt surface. Absorbent papers also make it possible to transfer almost all of the ink from the bromoil. It is different with sized or highly calendered papers. With these, the ink only penetrates a very little way because of the film of size. The ink, therefore, lies chiefly on the surface of the transfer and appears glossy in the shadows; also, as it is not sufficiently absorbed by the transfer paper, the transfer of the ink from the bromoil to the paper is usually not complete.

It is advisable, when using calendered paper, to remove the gloss by preliminary dipping in water. Other kinds of paper also frequently give better transfers, if they are first moistened; this is most easily done by dipping them in water and then drying them between two blotters.

Papers which are inclined to blister because of short fibers easily split in transfer, as parts of the surface of the paper adhere to the high lights of the print and tear away.

Such papers may be made available for transfer, if they are coated with two per cent wheat starch paste and allowed to dry (Process of E. Guttmann). This is prepared by stirring up 2 g (60 gr.) of wheat starch in a little cold water, and adding to the mixture 100 ccm ($3\frac{1}{2}$ oz.) of actually boiling water, stirring well and allowing to cool.

The blistering of weak papers must be differentiated from the sticking to the transfer paper of parts which are too much swollen; in this case the surface of the paper remains undamaged, but the gelatine film of the high lights is torn off and adheres to the transfer paper. As a rule, this only occurs with those parts that are swollen too much, when too great pressure is used in the transfer. The preliminary sizing of the transfer paper with wheat starch prevents this also. Parts of the gelatine film which have high relief may also be protected from sticking to the transfer paper by a slight coat of varnish.

The best machine to use is that described by E. Guttmann on page 153. It has proved satisfactory in every way, especially as it permits accurate and easy regulation of the pressure of the rolls. If such a press is not available, an ordinary burnisher can be used. The simultaneous movement of the rolls in burnishers is produced as a rule by two gear wheels. The inaccurate fitting of the gear teeth, however, causes periodic irregularities in the pressure, which cause trouble in the transfer. In order to prevent this one of the gear wheels should be removed, so that the simultaneous movement of the rolls is produced by the pressure alone. A burnisher is useful for the preparation of transfers only if it is possible to obtain sufficient pressure on the rolls. On the other hand it is difficult to obtain with this machine the necessary regulation of the pressure during the transfer, which is described in the following paragraph.

The following is the procedure in transferring. A blanket must first be interposed between the rolls of the press. The best thing to use for this is two or four thin smooth cards, which may be covered at top and

underneath with two sheets of thin linoleum. The latter are not absolutely necessary. The print may now be introduced into the machine either by entirely removing the blankets, or by rolling them out far enough so that the middle sheets can be easily bent away from one another. The position of the transfer on the transfer paper should be marked with a pencil, and, if a plate mark is desired, a piece of cardboard cut to the proper size should be properly placed on the transfer paper, and the whole passed through the machine. The transfer paper, thus prepared, should be laid on a perfectly flat white blotter, and the bromoil print, which should be held very carefully by the extreme edges, should be lowered to the position on the transfer paper previously marked with the pencil. Any small ink marks thus caused can be easily worked out later. The back of the print should be dried with a white blotter and then a second sheet of the same size as the bottom one placed on it. The transfer paper with the print lying on it is thus placed between the two sheets of blotting paper, so that the water pressed out in the transfer may be readily absorbed.

If attention is not paid to this precaution, it may easily happen that the transfer paper, as a result of partial moistening by means of water pressed out of the bromoil, may become wrinkled or distorted. Then the two blotters, with the transfer and the print between them, are placed between the two middle cards and the transfer begun. The principle of gradually increasing the pressure in this, which was introduced by E. Guttmann, has proved satisfactory in practice. One begins first with a light pressure, so that the transfer passes through the rolls with scarcely noticeable resistance.

Then the pressure should be increased a little by tightening the upper wheel of the machine, and the work continued in this way until a certain, not very high pressure of the rolls is obtained, which one soon learns to estimate with a little experience. One can now, or at any later stage, take the transfer paper with the adhering print out of the press and, holding one part of the print firmly down on the transfer paper, with the hand or a straight edge, lift the free end carefully, in order to ascertain whether any and how much of the ink has been transferred from the print to the transfer paper.

According to the result of this observation, the print is either entirely lifted off or the transfer continued with increasing pressure. In this way, with careful management of the work, one is absolutely certain of obtaining the best possible results in transferring. Still, my opinion differs from that of the inventor as to the reason for the satisfactory action of the gradual increase of the pressure. What happens is that in the initial passage under low pressure the print is immediately firmly attached to the transfer paper, so that its shifting on the transfer paper, which previously very frequently occurred, is avoided. When this adherence is once attained, we can proceed at once to that pressure of the rolls which is the most favorable for the transfer of the ink, if we are sure of it. This frequently happens when one has already made transfers from a print. With still unknown conditions, naturally the gradual increase of pressure is advisable.

The print, removed after the completion of the transfer, can be again inked up immediately or later, and again transferred. Naturally it must first be immersed in water, so that it can again take up that which it has

lost in the transfer. In the new inking-up one can use as desired the same ink or another color, and also alter the print as seems best. If the bromoil print, which has been once used for transfer, is to be again used for the same purpose, it is well to completely remove any adherent traces of ink by going over it with a swab of cotton soaked in a solvent. It may then be dried and can be used again at any desired time.

When transfers have been repeatedly made from a bromoil print, it may happen that the film blisters. This phenomenon is usually only noticeable when the print is again immersed in water after the transfer; as long as the blisters are not too numerous, they do not cause much trouble in the transfer. The answer to the question as to how often a bromoil print can be transferred depends on the resistance of the gelatine film. In practice it has been observed that the number of possible transfers varies between five and twenty-five.

The transfer process can also be used in bromoil printing as a method to free a print that has been too heavily inked from the excess of ink; such a print is passed through the machine together with any completely smooth paper which is free from folds, until it has given up its excess of ink to the paper, and it can then be soaked and inked up anew.

The process of application of ink to the dry print, outlined in Chapter IV, can also be used to advantage in the transfer process. Any bare spots on the finished transfer can be inked up at will, by dabbing on ink of any tone value with the oil-printing brush; thus the sky, which may not be satisfactory, may before transfer be wiped quite clean on the print, the outlines of the landscape cleared up with a brush dipped in ammonia

water if necessary, and the values of the sky put in on the finished transfer. This procedure is particularly advisable in polychrome transfers, with which a blue sky flecked with clouds can be easily obtained in this way.

The subsequent application of ink to the finished transfer finally offers the possibility, by tinting the whole transfer with a very delicate coating of a suitably chosen ink, of imparting a different mood to the picture. Thus, for instance, one may give a transfer made on white paper a faint yellowish tint; it may be effective to surround the picture with a border of this tint, using a suitable mask to obtain sharp outlines; this yellowish tint is only visible in the high lights, as it does not show in the deep shadows. In similar fashion a darker tint surrounding the print may be put on with ink and brush.

It is obvious that the transfer, especially when fresh from the press, can be easily and thoroughly retouched with rubber, water-color or charcoal; first of all those places should be treated from which the ink has been removed in consequence of the unavoidable touching of the print with the fingers, or to which the ink has not transferred for any reason. With transfers fresh from the press, any places that are too dark can be easily lightened with the rubber.

The transfer very soon dries. Obviously it does not require defatting. The inks act better on the absorbent transfer paper than on the bromoil print itself, as they sink into the paper instead of remaining on the surface of a gelatine film. The final result no longer resembles a bromoil print, but has its own individual character and is a product which it is difficult to compare with the bromoil print as regards esthetic effect. The bromoil

print has a certain charm which is lacking in the transfer and vice versa. In any case the transfer process is worth attention, since on the one hand it can be of practical value because of the possibility of the duplication of bromoil prints, and on the other hand it enables one to use varieties of paper which were not hitherto available to the amateur.

COMBINATION TRANSFER. — In order to render possible the reproduction of every possible tonal value of the negative, I have worked out the *combination transfer process* outlined in the following paragraphs. The essence of this process lies in the fact that two or more transfers can be made on one transfer sheet, which differ so much in their quality that *each of them reproduces a different series of tone values,* which then supplement one another on the transfer.

This is attained either by executing the two superposable transfers with *inks of different consistency,* or by *the use of two prints of different gradation* to make one transfer.

COMBINATION TRANSFER WITH ONE PRINT-PLATE. — The bromoil print used as the print-plate must be made on a sheet of bromide paper, which reproduces the tone values of the negative as closely as possible, without showing any hardness. The lights must be clean and all the half-tones present; it is, however, neither necessary nor desirable that the shadows should be too dense. In making the bromide print from a moderately difficult negative one should use the process, outlined on page 23, or developing slightly and then completing the development in a dish of water. Bromide prints of this kind are necessary because they satisfy the most rigorous requirements in the high lights and half-tones,

while the depth lacking in the shadows is produced by the repeated transfer.

On the print thus prepared two bromoil prints, differing entirely from each other in character, are made, one of which we will call the *shadow print* (Kraftdruck) and the other the *high light print* (Lasurdruck). This phraseology does not coincide, however, with the similarly named terms which are familiar in gum printing; the middle-tone print usual in gum-printing is wanting here and is also unnecessary, since each of the two partial prints contains a part of the middle tones, and, therefore, when added together, they give a picture perfectly correct in tone.

The *shadow print* is executed by inking up with a stiff ink, so adjusted to the relief that only the deep shadows and a part of the half-tones take the ink, while the delicate half-tones are lost and the highest lights remain absolutely uninked. Having suitably adjusted the ink to the relief, one should also use the corresponding brush technique, which was described as hard ink technique on page 87. The use of a hog's hair brush is advisable. Perfect cleanness of the high lights, which is very important, should be assured by the use of art gum. The shadows must show the full drawing, but ought not to be overinked. This shadow print should now be transferred to the transfer paper; when it leaves the press, the *registration marks* must be immediately applied, so that the subsequent transfer may come exactly in the same place. It may be remarked, that the matching of the print to the transfer does not offer the slightest difficulty in practice, and that the registration marks can often be omitted entirely, especially with prints which are inked right up to their edges, because bro-

moils, in making which rather thick paper is used, leave a fairly strong impression on the transfer paper, into which one can fit the print in the subsequent transfer.

At the same time it is safe to use the following simple registration arrangement in every case.

When the transfer is taken from the press, draw, by means of a rule, two parallel lines perpendicular to the side edges of the print, running over onto the transfer paper about one centimeter or one-half an inch apart. Also draw with the rule a line perpendicular to the upper surface of the print, also running over onto the transfer paper. In preparing for the next partial print, the side lines are first to be brought into exact coincidence and then the upper line. This insures exact coincidence for the subsequent prints.

After transfer of the shadow print, the bromoil is again immersed in water, in which it must remain for some time, so that it again becomes saturated with water. Only then does it regain the same size as it had at first, for the expansion caused by the absorption of water is quite considerable. If the bromoil is not left long enough in the water before the second printing, it will be slightly smaller than in the first transfer and the combination print will not be sharp.

HIGH LIGHT PRINT. — The inking up of the high light print is effected with soft ink, so as to produce a very thin and smooth film of ink; yet here too the high lights must be kept as clean as possible. Then this high light print is transferred by means of the above described registration arrangement, when as a rule the combination transfer is finished.

It may happen that one has inked up one or other of

the prints too lightly. In this case either the shadow or the high light print may be repeated, but the amount of ink applied for this supplementary impression must be very carefully judged, in order to avoid an overinking of the combination transfer. By the manner of inking the constituent prints and judgment in the quantity of ink applied, the final result may be controlled through a wide range at will; one can, for instance, by emphasizing the shadow print rather than the high light print, get more contrasty effects, or, by emphasizing the high light print, end with very soft effects.

The order in which the two prints are transferred is immaterial. In any case, however, care must be taken that the transfer paper is well dried out after making the first transfer; for it always takes up some moisture in the press and then appears slightly wrinkled and distorted. If the second transfer is made on such a damp transfer paper, the result will obviously be complete or partial want of sharpness in the combination transfer. After the first transfer, therefore, the transfer paper should be hung up to dry spontaneously, not by heat, as otherwise it may alter in size.

The process just outlined for combination transfer from a single print will in most cases perfectly reproduce the tone values of an ordinary negative. If negatives with a very long gradation have to be dealt with, then the following process may be used.

Combination Transfer from Two Prints. — The underlying idea in using two prints is to overcome the impossibility of completely reproducing an extended scale of tones on bromide paper, by the use of two prints, which are so made that they divide the scale of tones in such a way that one end of the scale is repre-

sented by one print and the other end by the other.

Therefore we make from the negative one hard print with well modulated shadows and only the darker half-tones. This is obtained by short exposure and suitable development. The high lights should show no deposit of silver. When master of the process, it is possible to include more or less of the middle half-tones in this partial print which is intended for the shadow print, according to the final result desired, and this can be readily regulated by the length of the exposure. The fewer middle tones the shadow print contains, the more contrasty will be the combination transfer.

The second partial print is the high light print, and must, therefore, be kept as delicate and soft as possible, and include all the delicate middle tones up to the highest lights. The latter may even be very slightly veiled, yet only so far that after swelling absolutely pure whites can be obtained. No further demonstration is needed to prove that a combination of these two partial prints can include the whole scale of tone values of the longest-scaled negative; for the partial print destined for the high light print-plate gives every possible half-tone, while the other, intended for the shadow print, imparts full depth to the shadows without burying the details, and strengthens the half-tones, but does not affect the clearness of the high lights.

The combination transfer is now prepared from these two prints, which are transferred in succession to the transfer paper, the order being immaterial. For this an accurate superposition of the two partial prints is absolutely essential. This must be accomplished by making the two prints of exactly the same size, with the images in exactly the same position on the paper.

This may be done by masking the negative with black lantern-slide strips gummed on the film for contact prints and on the glass for enlargements. The strips must be absolutely straight and the slightest curvature avoided in sticking them down. Two prints or enlargements, prepared from such a negative, can easily be registered. The desired end may also be obtained by printing or enlarging the two bromide prints under the same straight-edged mask. Care must be taken here that the image occupies exactly the same place in the mask for both prints. This is easily accomplished with various commercial printing machines. In enlarging, a mask made of stiff card can be hinged to the easel. The prints or enlargements thus made should be very carefully trimmed along the white margins and the difference in size ought not to exceed one-tenth of a millimeter (one two-hundred-fiftieth of an inch). Further, as different papers have different degrees of expansion, it is necessary to use the same kind of paper for the two partial prints, and it is best to take it from the same packet. It is also necessary to make both prints in the same direction of the paper fibers, for the expansion is different with and across the run of the paper.

One of the partial prints is transferred just as in the previous method. The registration marks are also made as was previously described, only the pencil marks must be placed exactly at the same points on the two partial prints, which can be done by exact measurement. With this process, also, the registration is not difficult in practice and the careful worker will find that the impression in the transfer paper caused by the first partial print, supplemented by the two lines on the edges, is sufficient.

The inking up of the two partial prints is effected

in the same way as was outlined for the process with one print-plate.

Both variants of combination transfer offer operators with a little dexterity a wide range of possibilities. By suitable treatment of the partial prints the tone gradations can be controlled at will. The resultant transfer will be softer or harder, as the shadow or the high light print predominates; it is possible to omit certain portions in either of the prints or subsequently print in more deeply any parts which need special strengthening; the two prints may also be executed in different shades of ink, with suitable discretion, and double tones thus obtained. It is also possible to print in clouds from a separate negative. Combination transfer is also well suited for polychrome transfers, since it renders possible the overlaying of a delicate black impression with different color tones. Again, since all the possibilities of control offered by the bromoil process are available, an almost unlimited new field of activity is given by combination transfer.

Finally, there is still another field in which the combination transfer allows remarkable effects. If one has a negative with excessive contrasts, as for instance, a dark arch with a vista of a sunny landscape, a satisfactory print can be made without difficulty by means of combination transfer. One partial print should be so made that it reproduces as correctly as possible the details of the dark part of the negative, in this case the arch, irrespective of the fact that the sunny landscape will be partly underexposed. Another partial print is then exposed for the sunny landscape, when naturally the details of the arch are completely lost. One may even go further still, since the two partial prints may be

prepared from two negatives taken from the same standpoint, the one being exposed for the high lights and the other for the shadows. A combination transfer, correctly executed from two such partial prints, gives a result in which both the darker and the lighter parts of the negative are reproduced in suitable tone values. It may also be mentioned that multiple transfer renders it possible to apply plenty of ink to calendered and, therefore, non-absorbent papers, and thus permits of the attainment of deep shadows, full of detail, on such papers.

In the various kinds of multiple transfer here outlined principles have been introduced into the transfer process which have been used in the gum-bichromate process and many graphic reproduction processes, in order to produce wide ranges of tone values by several printings on one print. Yet the means of attaining this end are novel, namely, either different consistency of inks with one print-plate, or the use of two different print-plates for one transfer.

In my first publications on such combination transfer processes, I mentioned still a third possibility of obtaining the desired end, namely the preparation of two partial transfers from one print by using two different degrees of relief. The process first outlined, using different consistencies of ink with one print, is, however, to be preferred to the process in which two reliefs are used, wherefore the latter was not further proceeded with.

The value of the transfer process has been so increased by the methods just outlined that it is capable of solving the most difficult photographic problem, and by its aid even negatives can be printed, which cannot be satisfactorily rendered even in bromoil. While hitherto the

transfer process was only an offshoot of the bromoil process it is, since the introduction of combination transfer, at least as valuable and in many cases even surpasses it.