

## SUGGESTIONS FOR MAKING AND FILING MICROFILM RECORDS

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The nature and the utilization of microfilm copies of scientific articles and their availability from Bibliofilm Service in Washington have been discussed at length in recent papers by Seidell.<sup>1</sup> Since copies of articles from the very complete collections of the various government libraries may be secured at a reasonable cost, there is little doubt but that in the future there will be a steadily increasing demand for microfilms from this source. Occasions arise, however, when the investigator may wish to make rather extensive notes,<sup>2</sup> or copy the summary, conclusions, and bibliography from an article secured on loan from some library or individual owner. Copies of typed manuscripts with tables and diagrams, or a series of library cards with important literature references may also be desired. In any case the problem may be quickly and easily solved by recording the material on microfilm.

In larger libraries which provide microfilm service the work is done with an automatic copying machine. Results equally as good, however, may be secured by the use of any 35 MM camera which, either with or without a supplementary lens, will focus at a distance of thirty inches or less. When focused at a distance of thirty inches the area covered by a double-frame of 35 MM film measures approximately 14 x 20 inches, which will allow the reproduction of two pages of printed matter. Several manufacturers provide copying stands and focusing attachments for use with their cameras, and for the user fortunate enough to possess such an outfit, the making of microfilms is a simple procedure. For use where such special equipment is not available, I venture to describe two simple copying stands which may be constructed from materials usually found in the laboratory or workshop.

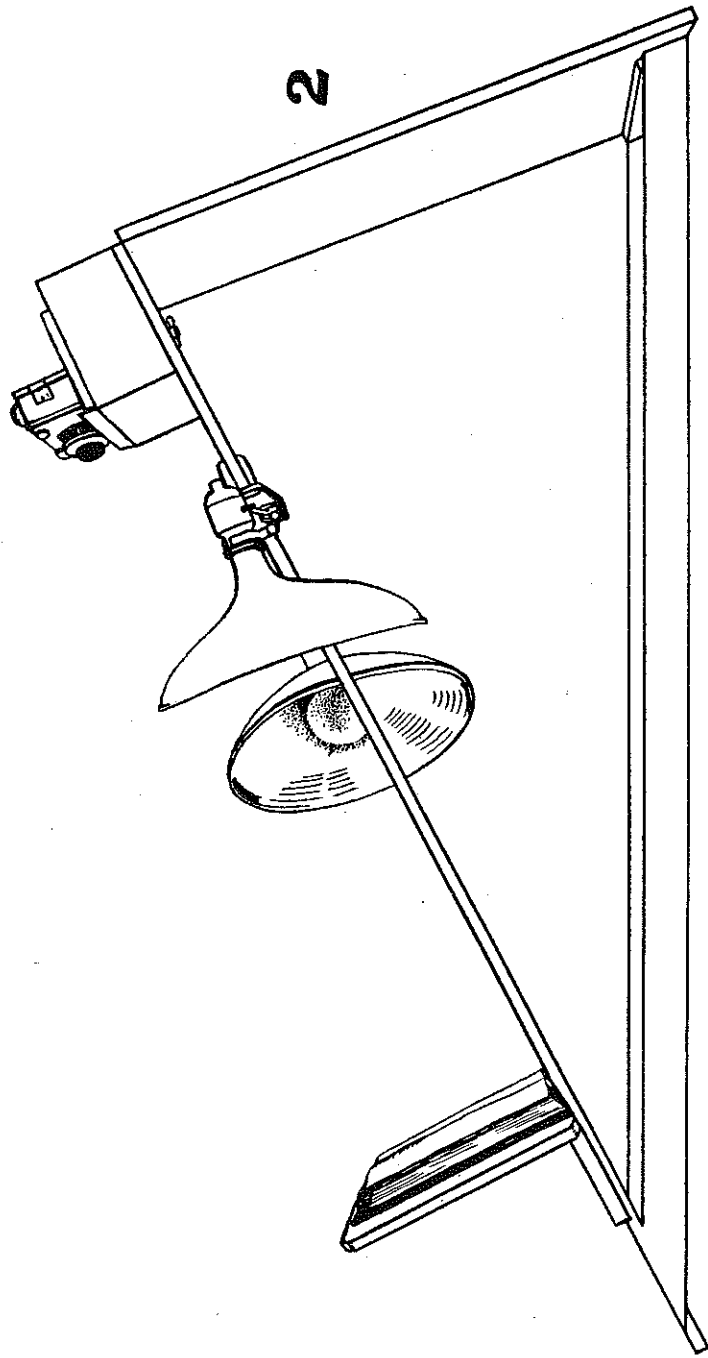
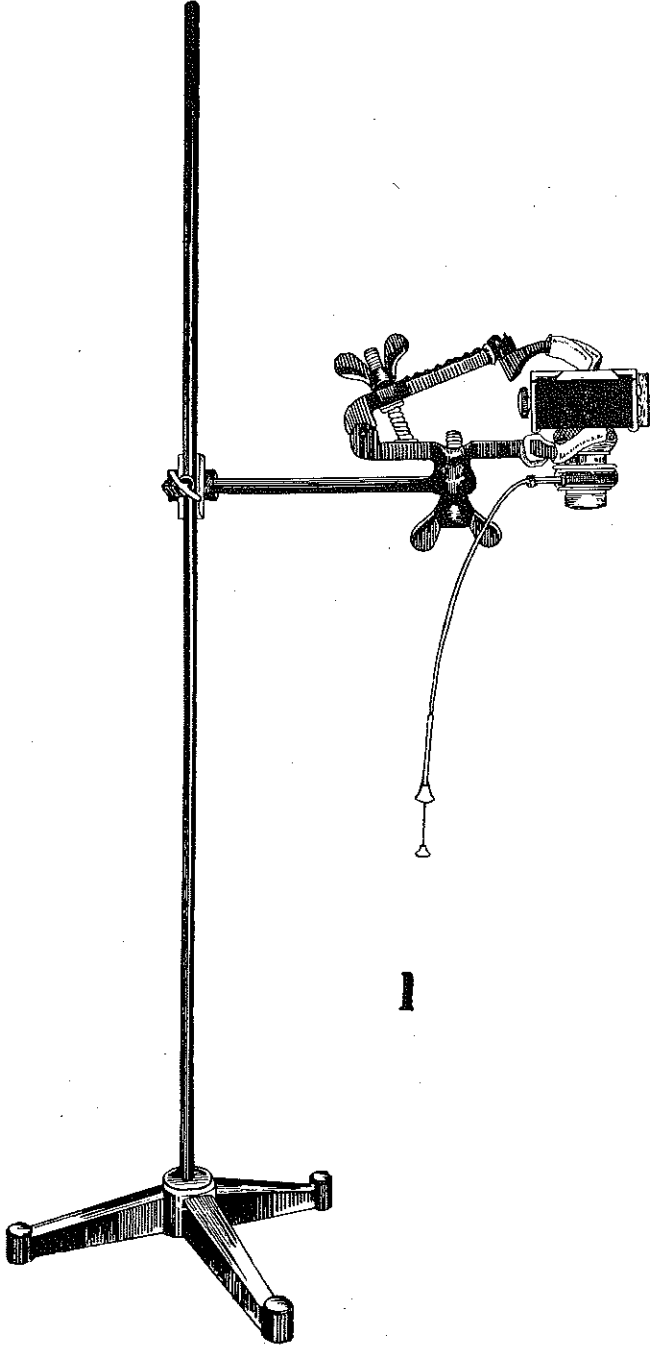
<sup>1</sup>SCIENCE, 89: 32-34, 219-220. 1939.

<sup>2</sup>Lanning, J. T. 3600 pages in six weeks. Leica Photography 8: Number 2, page 13. 1939.

A vertical copying stand is the easier type to construct and to use. All that is needed is a large ring stand with a heavy base, preferably of the tripod type, and a universal clamp such as is used to hold chemical apparatus. The accompanying diagram (Figure 1) illustrates how readily the camera may be fastened in the clamp. The book or journal from which copies are to be made is centered under the camera, either by focusing on a ground glass, or by a series of careful measurements. Two desk lamps of the goose-neck type, arranged on opposite sides of the material to be copied so that the lights strike the surface at an angle of 45 degrees, will provide a satisfactory source of illumination.

The second type of stand is constructed of wood along the lines indicated in Figure 2. By inclining the board which supports the camera and easel at an angle of 30 degrees, it is much easier to arrange the material for copying than would be possible with a horizontal stand. The camera support, which is box-like in construction, may be moved backward and forward to aid in focusing. The support is also provided with a tripod screw for holding the camera in place. Lights may be attached to the stand as shown in the diagram, or desk lamps arranged as suggested for the vertical stand may be used. A stand of this type works very well for copying large material, such as record cards or outline maps; it has also proved useful in photographing mounted herbarium specimens.

For occasional copying the orthochromatic or panchromatic film which is ordinarily used in the camera will be found fairly satisfactory. However, if considerable work is to be done, it is suggested that use be made of the special copying films, of which several brands are available on the market. Positive film, which is used in the printing and projection of motion pictures, is also suitable for use in making microfilms. This film, however, is sensitive to black and white only, and should not be used where colored plates or diagrams are to be reproduced. If film is purchased in bulk lots (25 feet or more) prices will range from two cents per foot for the positive film to six cents per foot for the special copying films. Where copy work is done at irregular intervals it is advisable



to keep on hand a supply of bulk film in a daylight film winder. This makes it possible to load a cartridge with the exact length of film which will be needed for any particular copying job.

Exact exposure times for various films are best worked out by making a series of trial exposures. With two 40-watt frosted bulbs in small reflectors at a distance of twelve inches from the material being copied, the following exposure times are recommended:

FILM	LENS OPENING	EXPOSURE
Microfile	f. 11	10 seconds
Positive	f. 16	2 seconds
Panatomic	f. 16	2 seconds
Micropan	f. 11	4 seconds
Superpan Supreme	f. 11	1/25 second

Use of the small lens opening increases the depth of focus and helps compensate for the irregular copying surface presented by an opened book or journal.

Any of the more contrasty film developers will be found satisfactory for developing the exposed film. When developed for four minutes at 18 degrees C. in Eastman's D 72 or in Agfa's 47, a properly exposed microfilm will show very light gray letters against a very dark gray background. Following development a chrome alum hardening bath should be used. This will help prevent scratches in the emulsion due to handling or use in the reader.

Various methods for filing and storing microfilms are in use today. The small 35 MM film cans are often used and Dice<sup>3</sup> recommends large envelopes with paper partitions. In either case the container must be labeled and with large numbers of films an index becomes necessary. With copies of shorter papers (25 pages or less) it has been found feasible to keep the film in short strips in envelopes the same size as the index cards commonly used for literature references. Coin envelopes are available for use in 3 x 5 inch filing boxes or

<sup>3</sup>SCIENCE, 89: 39-40. 1939.

drawers. The complete reference to the article is entered on the front of the envelope and it is then filed in its proper place along with index cards and other such film envelopes. If a system of cross indexing is used the envelope takes the place of one card, the other card or cards carrying a notation concerning the location of the microfilm copy in the file.