

Mr. Hicks: (Reproduction of Catalogue Cards by Photographic Methods):

An enormous development of card catalogues is a characteristic of library science in the United States. Their most obvious advantage is that, without interruption of use, they can be kept up to date more easily than is possible with any other kind of catalogue. On the other hand, they are bulky, are costly in time and material, and must be built up with such detailed care that cataloguing is slow. It was a timely aid that the Library of Congress provided when it began to print and sell catalogue cards. This event resulted in standardization of the method of preparing cards for our catalogues by using sets of identical author cards, typing added entries and subject headings on their top margins. It eliminated also, when cards precisely fitting our books are obtainable, the errors and inaccuracies incident to the multiple reproduction of cards on the typewriter. When Library of Congress cards are not available, it left us, however, to prepare, type and retype, revise and revise again, the copies of the author cards which are used in making a set for each book.

To be relieved from this cumbersome method of multiple production of identical cards by typing, various substitutes have been tried. Among them are (a) printing one's own cards (a method impossible for most libraries), (b) printing cards by means of type set on a drum (the multigraph method), (c) reproducing by means of stencils cut with a typewriter (the mimeograph method), and (d) reproducing typed master cards photographically. It is with the last method only that this article deals, recounting therein particularly the experience of the Yale Law Library in the use of the Junior Dexigraph.

Miss Anna M. Monrad has already described (*Library Journal*. 57:218-222, March, 1932) the method by which an official catalogue of 1,009,313 cards was made for the Yale University Library, using Dexigraph machines. This was a special contract job, done on machines built for quantity production. At the end of her article, Miss Monrad refers to the Junior Dexigraph, which was not then perfected, but was being developed for current use in cataloguing departments. Through the initiative of Mr. Charles Perkins, of the Remington Rand New Haven office, the Yale Law Library eventually agreed to serve as a laboratory in which to experiment with the Junior Dexigraph, to discover, first, in what respects the machine could be improved, and, second, what details of operation affect the results obtained. A Dexigraph was placed in the Law Library cataloguing room, a dark-room was fitted up in an adjoining closet, supplies were provided, and experiments were carried on for over a year without other expense to the Law Library than the cost of an assistant's time.

The conditions under which the experiments were made were the following. The Cataloguing department, under the direction of Miss Katherine Warren, Chief Cataloguer, was and still is engaged in cataloguing and classifying not only about 10,000 volumes of annual accessions, but in recataloguing and classifying the entire law library. The recataloguing and classification are being done not by a separate staff as a distinct enterprise, but by the regular staff along with its current work. The task is not to reproduce old cards by quantity production, but to provide either Library of Congress printed cards or new cards made in the Yale Law Library. Our statistics for the last four years show that only about half of the cards needed can be obtained from the Library of Congress.

The remainder we had been making on the typewriter. Could we use the Dexigraph as a substitute for the typewriter in the regular work of the Cataloguing Department? Would it be equally simple and flexible in use, and could we economically produce cards good enough to file in our public catalogue along with printed and typed cards? These were the questions which had to be answered.

The results at first were not reassuring. The color of the cards was bad, there were shadows and streaks, letters at the ends of lines were lost in the photographic process, the finished cards curled, and when headings were typed on them, the ink would not dry. All of these difficulties were, however, largely overcome by the combined efforts of the Remington Rand Company and the Law Library staff. The Dexigraph itself was improved, and we learned how to use it, noting by experience the things that must or must not be done. On December 15, 1933, we signed a contract for a year's rental of the Dexigraph and equipment, revocable at the end of three months. When that time arrived, we purchased the equipment (except the camera itself), and now consider that the Junior Dexigraph is a regular part of our cataloguing facilities. If no unforeseen difficulties develop, we shall continue to use it.

In order to understand what is involved in this photographic method of reproducing cards, it will be necessary to describe, first, the equipment and supplies needed, and second, the process followed in the Yale Law Library.

EQUIPMENT AND SUPPLIES

The Junior Dexigraph which we are using is a fixed focus camera, with adjustable shutter. In size, it is $33\frac{1}{2}$ inches long, $19\frac{1}{2}$ inches high, and $18\frac{1}{4}$ inches wide, being therefore small enough to stand on an ordinary desk. In construction, it is as simple as the old Kodak box camera. In front of the camera box is a reversible copy-plate, black on one side, and white on the other, to be used when photographing dark or light cards respectively. Cards are held in position by a hinged glass cover. Light is furnished by an attached mercury vapor tube. In the door of the camera box is a sleeve through which the hand is thrust so that sensitized cards may be fed to the lens without exposing them to light. The camera is operated as follows:- While the left hand is placing the card to be photographed on the illuminated copy table under the lens, the operator's right hand, working through the rubber sleeve, removes a sensitized card from the magazine inside the camera and places it in the aperture window, directly in line with the lens, where a hinged cover holds the card flat. The left hand then presses the shutter lever to make the exposure.

The camera is rented at a cost of \$12.00 a month. We are satisfied with the Company's plan of renting rather than selling, because the lessor agrees to "keep the equipment in working order and make all necessary repairs," except those caused "by accident, fire, water, misuse, theft or neglect." It is understood also that improved parts, or even a complete new improved camera will be substituted without expense to the library, if they are produced by experiments carried on in the Company's laboratories.

If preferred, the exposed sensitized cards may be developed in a Dexigraph Developing Box. With this Box, the Yale Law Library has had no experience.

Instead, we have equipped as a dark room, a janitor's supply closet which already had a large basin and running water. This basin was transformed into a tank in which prints could be washed with running water, by inserting a stand-pipe to serve as an overflow through the stopper at the bottom, and by attaching a length of hose pipe to the faucet to carry running water to the bottom of the basin. Shelves were placed in the closet, and the following items of equipment, at the prices indicated, were provided for the dark room.

1. Ruby light (\$.50)
2. Four developing tanks (\$15.00)
3. Three developing racks, each holding 36 prints (\$15.00)
4. An Eastman Timer, or photographer's clock (\$5.00)
(This Timer has only a minute hand and a long second hand)
5. Photographer's thermometer (\$.75)
6. Glass measuring jar (\$.41)
7. Glass funnel (\$1.00)
8. Glass mixing rod (\$.08)
9. Glass dish for bleaching solution (\$.45)
10. Four (gallon) glass jars for storing chemical solutions (\$1.00)

Other equipment used outside the dark room includes:-

11. A print roller (squeegee, \$.65)
12. A plate of glass on which to use the roller (\$1.00)
13. A card punch (\$5.50)
14. Drying outfit (blotter) (\$2.50)

This makes a total of \$48.84 for equipment exclusive of the monthly rental of the camera. Better results will be gotten, however, if an electrically heated Dexigraph Print Dryer (\$100.00), is substituted for the blotter drying outfit. With this change, the total cost is \$146.34, exclusive of the monthly rental of the camera. The electrical Print Dryer occupies more space than the camera itself (69½ in. long, 27½ in. wide, and 27½ inches high), but its use saves time and produces better results. It will, in ten minutes, perfectly dry thirty-six prints.

The supplies needed in the routine use of the Dexigraph are:-

1. Sensitized, pre-cut, cards (\$10.25 per thousand)
2. Chemicals
 - (a) Developer (\$.40 a can)
 - (b) Fixing powder (\$.20 a box)
 - (c) Commercial acetic acid, for cleaning utensils (\$.40 a quart)
 - (d) Potassium ferricyanide, for bleaching prints (\$.07 an oz.)
3. Drying blotters (\$.55 a package)
4. Special typewriter ribbons (\$2.50 for three)

REPRODUCTION PROCESS

The following are the successive steps involved in each day's use of the Junior Dexigraph, from the preparation of the master card to the filming of the completed cards.

1. The author entry cards to serve as master cards are prepared by the Cataloguing Department in the usual way. These finished cards, however,

must be of superior workmanship, because the camera reproduces what it sees, and it sees nearly everything. Revision of them must be completed, including call number typed in position, before they are passed on for reproduction. The typing must be clear, and on all cards as nearly as possible uniform in density, even though done on several machines by different operators. The typing must not reach closer than one and one-half type-spaces from the edges of the cards. On the backs of these master cards are placed all tracings, and other information needed to determine how many prints of each should be made.

2. Despite the care exercised in the preparation of master cards, there are perceptible differences in the density of the typing on cards made with different ribbons and by different operators. Typed master cards which are to be photographed are therefore sorted into three groups according as the typing is:

- (a) light
- (b) medium
- (c) dark

This is necessary in order that the camera shutter may be adjusted differently for each of the three groups, admitting *less* light for light cards, *more* light for medium cards, and *most* light for dark cards, and thus producing negatives of approximately the same quality for all three.

3. Using the Dexigraph as already described above, sensitized cards are exposed in turn to the light reflected from the typed master cards; and the exposed cards, in a light-proof transfer box, are removed from the camera and taken into the dark room.

4. These exposed cards are developed by placing them

First: In developing solution. (Temperature, 68°-72°F.)
(Time, 55 seconds)

Second: In clear water to rinse.

Third: In fixing solution. (Time, 10 minutes)

Fourth: In developing racks immersed in cold running water. (Time, at least 20 minutes)

The developed cards are negative prints, i.e. with white letters on black backgrounds.

5. These negative prints are removed from the dark room; spread out, face-up, on a glass plate; rolled over with the squeegee to remove moisture; and then, spread out face-down on the belt of the dryer, are mechanically carried by it around an electrically heated drum to be dried.

6. The typed master cards, and the negative prints just made from them, are now arranged in two alphabets; and at the bottom of each negative is pencilled the number of positive prints (e.g. 5 or 7) that are to be made from it. This information is gotten from the reverse sides of the typed master cards.

7. With the shutter of the camera readjusted (to admit more light than was used in making the negative print), the negatives are now in turn photographed, each one as many times as is necessary to make up the set of cards required. These, when developed, will be positive prints, i.e. black typing on a white background.

8. The newly exposed sensitized cards are now, in a light-proof transfer box, taken to the dark room, inserted in thoroughly dried developing racks (36

in each), and developed by the same process used for negatives. The following variations must, however, be noted.

First, Time in developing solution—45 instead of 55 seconds.

Second, Same as for negatives.

Third, Same as for negatives, except that while the prints stand in the racks immersed in the fixing solution, each is removed from the rack, passed through a bleaching agent (solution of potassium ferricyanide), and returned to the rack. This handling, done while the white lights are on, gives an opportunity to examine each print to see whether it is satisfactory. Cards which do not require to be bleached must remain in the fixing solution from fifteen to twenty minutes.

Fourth, Same as for negatives.

9. The positive prints are then "squeegeed," and dried, just as are negatives.

Since the negatives are photographed in alphabetical order, and the positives are kept in that same order while they are being handled, and since the typed master cards are already in alphabetical order, the cards for any title can be referred to throughout the whole process.

10. The negative and positive prints are now provided with rod holes by using a hand punch. At present, pre-punched sensitized cards are not available, but the problem of providing pre-punched cards is being studied and may eventually be solved.

11. The three types of cards (i.e. typed master cards, negatives and positives) are sorted into sets.

12. Headings, as indicated on the reverse of the master cards, are typed at the tops of the positive prints, just as would be done with Library of Congress printed cards. The call number is already on each card because it was on the typed master card when it was photographed.

13. The complete sets of cards, after revision of the typed headings, are now ready to be filed, as follows:-

- (a) The typed master card, in the official catalogue.
- (b) The negative prints, in the shelf-list.
- (c) The positive prints, in the public catalogue.
- (d) When no shelf-list card is required, the negative prints are preserved in a separate file, so that additional copies of them can be made, if they are needed. The negative prints filed in the shelf-list are, of course, available for a like purpose.

ELEMENTS OF SUCCESS

In our two years of experimentation with the Dexigraph, we have learned that success or failure in producing satisfactory cards depends largely on ourselves. In other words the Dexigraph itself is a good machine, and will produce good work if (1) we produce good typed master cards to be reproduced, and (2) if we are skillful and informed as to the details of the processes involved in the exposure, developing and drying of prints. The problem is similar to that involved in the production of cards on a typewriter. Even with the best of

typing machines, we cannot get good results if the operator is unskilled, inattentive and inaccurate, if the type is not kept clean, if a proper card holder is not used, if the cards are not accurately inserted in the holder, if a good ribbon is not used, if the card stock is inferior, if we make mistakes in typing, and are untidy in making corrections. We must be equally skillful and careful in the use of the Dexigraph, and not expect it to produce results contrary to the laws of nature, or automatically to correct errors made in the choice of materials used or in the handling of them.

The following are things learned by experience which we found it necessary to observe with meticulous care, and which reward the effort. Some of them have been referred to above, but they are here repeated more in detail, for the sake of emphasis.

1. The typed master cards must be as nearly perfect as they can be made. In making them,
 - (a) Old typewriter ribbons should not be used, nor ribbons too wet.
 - (b) The type must be kept clean so as to make clear impressions.
 - (c) The key pressure must be uniform, so as to make all type impressions of approximately the same density. The typist must be skillful.
 - (d) The typing should not come nearer than one and one-half type spaces from the four edges, and from the rod hole. If it runs closer than this, a letter or a portion of a letter may be lost in the process of reproduction.
 - (e) Ordinary erasures, skillfully typed over, do not show in reproductions; but smudged and untidy work will show.

These requirements are not difficult to meet, and they might well be adopted for all typed cards, because a better looking and more readable card is produced.

2. The surfaces of sensitized cards, before they are developed, should not be touched.
3. Negative prints should be made with great care because all of the positive prints are made from them. If the negatives are good, the positives are more apt to be good. The sorting of the typed master cards according to the density of their typing, and the special treatment of the three groups in the process of photographing, results in the production of negatives of nearly uniform quality from which positives may be made in a routine manner.
4. It is imperative that the developing and fixing solutions be fresh, which means that they must be poured off into the glass jars and tightly corked, when they are not in use. When new solutions are mixed, they must be tested with a sample card. This precaution usually insures good results, and eliminates the wastage of poorly developed prints which must be discarded. A mixture of chemicals is good for about 1,000 prints.

Since the temperature of the solutions must be correct, the chemical thermometer must be regularly used.

5. All utensils must be kept clean, the developing tanks and the glass jugs, by the use of acetic acid. The same receptacles must always be used

for the same kind of chemical; and the developing racks must be scalded, or immersed in a solution of Oakite to remove any trace of fixing solution, before they are again placed in the developer. All exposed glass surfaces in the camera must be free from dust and finger marks when photo-copies are being made.

6. For typing headings on the positive prints, a special ribbon must be used. The ink of an ordinary ribbon will not dry on a photographic print, the surface of which is covered with an emulsion hardened by the chemicals. If the ribbon used has a glycerine base, the impression will dry quickly and will not smudge. This ribbon, however, requires special care. It will itself dry out, unless it is removed from the machine when not in use, and kept in a humidifier—a tin box in which a moistened blotter is kept. The spool on which the ribbon is wound must have perforated sides, in order that moisture may reach all parts of the ribbon.
7. The camera when in use must not be placed under ceiling lights, nor near a window. It need not be in a dark room; but direct light coming from the sides or from above, will vary the amount of illumination on the cards being photographed, and thus affect the quality of the prints.

QUALITY OF THE RESULTS

Two questions have often been propounded to the writer;—first, are the cards durable and otherwise physically satisfactory; and second, what is the cost?

The first question brings up the matter of the composition of the stock from which the sensitized cards are made. When a Dexigraph is rented, one agrees to use the sensitized cards sold by the Remington Rand Company. At the present time, the cards provided are made from sulphite stock, composed of purified wood fibers as a major ingredient of its cellulose base. It is asserted that sulphite stock withstands treatment by wet chemicals better than a rag stock does, so that the stock used gives a better final result than can be produced using rag cards. Our experience has been only with the sulphite stock, but it has thus far been satisfactory. The prints that have been longest in our public catalogue show only normal wear; and because of their smooth surfaces, are less likely to become soiled than are either typed cards or Library of Congress cards. Moreover, author cards (containing no typed headings) can be washed. It is asserted that indefinite exposure to light will not cause the cards to fade. We have no reason to doubt this statement.

The positive prints can be written upon with either ink or pencil, and pencil erasures can be made.

There is still a slight ripple along the top of the cards; but this is not so pronounced as it was with the cards first made. We still hope to find some detail in the drying process which will eliminate all waviness.

OUTPUT AND COSTS

Thus far, in our use of the Junior Dexigraph, we have been less concerned with costs than with discovering whether satisfactory results could be obtained.

An attempt has, however, been made to compare the cost, during a six week's period, of typing cards and reproducing cards by the Dexigraph. The following is the result:-

Dexigraph

5,417 sensitized cards used, @ \$10.25 per M.	\$65.25
Rental of Dexigraph (6 weeks)	18.00
Chemicals used	8.36
Labor (163 hours @ 42 cents)	68.46
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Total	\$160.07
Usable cards produced	5,211
Cost per card	\$.0306

Typed Cards

5,211 rag cards (@ \$3.20 per M.)	\$16.64
Cost of typing @ .02	104.22
Cost of revision @ .01 (a low estimate)	52.11
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Total	\$172.97
Cost per card	\$.033

In this comparison, the typed master card which must be made whether the duplication is by Dexigraph or by typewriter, is not included. Neither is the typing of subject headings included, for there would be the same cost in both cases.

It will be seen that the labor costs (including revision) of typing cards more than off-set the costs peculiar to photographic reproduction. The comparison would be even more favorable to the Dexigraph method if some charge were made for wear and tear on the typewriters, and for wastage of spoiled cards.

Even though the typing method were cheaper, we still would conclude that the use of the Dexigraph was justified, because of its greater speed and accuracy. We roughly estimate that in a given period of time, the Dexigraph method produces at least two-thirds more cards than can be produced by typing; and that the cards are more accurate, because the hazard of error in typing and revising the same card repeatedly is removed.

The Dexigraph method of reproducing cards is applied under favorable conditions in the Yale Law Library because we require at least five cards for a majority of the books catalogued. Thus far we have made it a rule to type instead of photograph, if we need less than five cards for a title. This arbitrary rule has exceptions, for long titles, titles in foreign languages, titles with peculiar marks which have to be inserted by hand, and titles so long that they require second and third cards, are more accurately produced photographically, even though the cost may be slightly greater.

At the conclusion of his paper Mr. Hicks exhibited cards.

Mr. Hicks:- Now I would be glad to answer any questions. I have answered questions asked by Mr. Baxter. As to how many copies we made,

sometimes we made ten or twelve cards, but we used every one of the cards produced in this process except, occasionally, the negative.

The original master cards, on back of which are all the tracings and subject headings, were placed in our official catalogue. The negative, white on black card, was used in our shelf list. The other cards, the positives, go in our public catalogue. So that every card is used.

Mr. Miles Price, (Columbia University Law Library): How long does it take to qualify the assistant? Is there any specially qualified person necessary?

Mr. Hicks: It does not have to be any trained person, but a young woman who was doing our work and came into the Library as a typist, a graduate of a commercial high school and an expert on the typewriter. We simply took one of the typists and had her learn to use the Dexigraph. It does require skillful work, because any slight variation in the process, any carelessness, will immediately show in the quality of the cards reproduced. A whole lot of the middle portion of the paper I wrote deals with questions you might want to ask. I will say this. It is absolutely essential that the card you are going to photograph should be a good card, because the camera sees and reproduces everything. So that you must make a good master card, and it is interesting to find that the use of the Dexigraph has improved our work in the Yale Law Library very much. You have to learn that the typed card must not go to the margin, within 2-1/2 or 1-1/2 spaces, I think it is. You must have just the same rules for making your typed card as the Library of Congress does when it sends copy to the printer. It must not come near the hole on the card. It is photographed twice. You photograph the typed card. In that process there is a slight distortion. It is very slight, but still, if your typing runs to the edge you will lose half a letter; then you photograph the negative again, and the whole letter goes off. You must remember to make a rule that the typing does not go within a certain distance of the edge; then you do not lose any letters.

A Member: Could something be done about the use of a special ribbon—your master card, could it be done in white on black?

Mr. Hicks: We worked on that problem for quite a time but did not solve it. We did not make good cards by that method. We also tried to use various masks, typing the headings on separate sheets and putting the main card underneath this mask on the heading, but we came down to the conclusion that the process of making a negative and then the positive was the more practical one and that we must learn how to type the headings on the positive cards.

Are there any further questions?

Professor Eldon James, (Harvard Law Library): Have you ever thought at New Haven of having a system of common central reproduction, reproducing the cards for all departments. Would not that reduce the expense considerably?

Mr. Hicks: It might. Although I doubt it. In fact, it would be very unsatisfactory to me at the present time. Take the situation at Yale. The University Central Library is already nearly swamped with its own problem of cataloguing. In order to push our cataloguing in the Law Library, we need

to have just the same kind of system as we have with the typewriter in reproducing cards. With this machine we do that; we use it just exactly as you use a typewriter. We are not dependent on any other department of the University, we do not have to wait until the cards are made for the University Library. When they are pushed with work, we can be making our own cards from day to day. So that I think one of the advantages of this little machine is that you have it right there in your cataloguing room and use it from day to day. It is a device for current day to day use.

A Member: To what extent, I wonder, could one use the dryer in the ordinary routine of a library?

Mr. Hicks: There again I wouldn't want to be held up. I want to do it right then and there, and if your little drying theatre and dark room and equipment are always in readiness the work goes on there as a routine day's work.

Mr. Vance: Is this same process used in the union catalogue, do you know?

Mr. Hicks: I think it is used, but they do not make the positives. The real problem we had was not to use this to make a copy of a card, if you just want to read it. Anyone may do it, there is no difficulty about that. If you want to send a card to another library, why, the negative is perfectly good and can be done with fewer processes and less care. But as far as I know, and the Remington Rand people would bear me out in this, our experiment is the first in which we said, "We will not use it unless we can produce a card of which we are not ashamed when put in our public catalogue along with the best typed and Library of Congress printed cards." So that it took us a long time to educate the Remington Rand representatives up to the standard we demanded. They were all thinking of commercial reproduction, the reproduction of life insurance records, for instance, where all they want to do is to be able to read them. We also wanted them to look well. So it took us months to get them to realize what our standard was. I think we have produced something which is good enough to put in the ordinary public catalogue and have them stand up as well as anything else. At least we think they will, and we will continue to use them.

A Member: You use elite type on your cards? Small type?

Mr. Hicks: If this is elite on these cards, yes.

Vice-President Magee: If there are no further questions, we will adjourn. Members who intend to attend the luncheon and who have not registered are requested to stop at the desk and do so, and also to register for the banquet on Friday night.

The meeting adjourned at twelve thirty-five o'clock.

WEDNESDAY AFTERNOON

JUNE 27, 1934

Members of the American Association of Law Libraries and the National Association of State Libraries attended a luncheon at "Chez Paul" at one o'clock on Wednesday, June 27th. Following the luncheon a visit was made to the Advocates' Library and the Courts of Justice.