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The Design and Construction of a Hand Lithography Press, Inexpensive to Make and Easily Transportable

Susan Raab

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Approvals

Advisor; Lawrence M. William

Date 24 Sept 83

Associate Advisor; Philip W. Bornarth

Date 9/24/83

Associate Advisor; David C. Dickenson

Date 9/26/83

Associate to the Dean
for Graduate Affairs;

Date 10/3/83

Dean, College of
Fine and Applied Arts;

Date September 29, 1983

Thesis Proposal for the Master of Fine Arts Degree

College of Fine and Applied Arts
Rochester Institute of Technology

Title: The Design and Construction of a Hand Lithography Press,
Inexpensive to Make and Easily Transportable.

Submitted by: Susan Raab Date:

Thesis Committee:

Chief Advisor: Lawrence William

Associate Advisors: 1. David Dickenson
2. Phil Bornarth

Departmental Approval: 1. Date:

Approval, Graduate Representative of Academic Council:

Final Committee Decision:

Date:

The conception of this idea began in 1975 -- to design and construct my own lithography press, inexpensive to make and easy to transport. At the time I did not have the funds to purchase a new press and felt that making my own would be less expensive. I also did not have a permanent home base and wanted facility in moving such a piece of equipment.

Research

I began my research with history books on lithography but found little written information available. A Complete Course of Lithography*, by Alois Senefelder, the inventor of lithography, proved somewhat helpful. This text gave me a perspective and basic knowledge of the beginning of lithography as well as some technical information about the first presses. While trying to gather written information, I also made contact with as many people as possible who could supply me with practical information concerning press construction. I talked with professors of commercial and fine art printing for more historic insight. I also met with technical engineers to discuss various types of materials which could be used, such as wood or metal, and their inherent characteristics under stress and pressure. The outcome of these interviews was the idea that I could use virtually any material provided it was appropriate for the application needed.

I talked with wood craftsmen and machinists about techniques which could be used when building a press. For instance, if I decided to use wood, what type of joinery would be practical for this application? Or if I used metal, what skills would I need in order to do my own construction? In addition, I made some interesting contacts with people who were in the process of, or had already completed, building their own press. (Appendix A)

*A Complete Course of Lithography, Alois Senefelder; Fuchs and Lang Manufacturing Co., N.Y. 1911

General Description of the Press

Basically the press is divided into two parts; the stable and the mechanical. The stable part consists of:

1. chassis or frame
2. the arch which spans between the uprights
3. the scraper bar housings

The mechanical parts are:

1. pressure lever
2. cam system
3. bed roller
4. gears
5. clutch system

Through my research and correspondence, I decided my press would be mostly wood for the stable parts and metal for the mechanical parts. The basic design would be a cross between two or three existing presses I had used in the past five years. The commercially built presses were either cast iron or tubular steel. I rejected the cast iron because it seemed particularly heavy for easy transportation and the steel because it was an unfamiliar material.

Gathering Material

After selecting wood because of its familiarity, I decided to use 2" Rock Maple for strength and stability. I had a machinist duplicate the cam system (diagram A, figure 1) and drive roller (diagram A, figure 2) of The Griffin Press*. As the first construction element, this determined the overall width of the press. From this measurement I made sketches, scale drawings and full-sized drawings. The sketches gave me an idea of the proportion; the scale drawings established the actual measurements; and the full-sized drawings provided a realistic view and plans from which templates could be made to cut the actual pieces, as well as to keep track of those pieces. When I purchased the wood I added 1/3 more board feet for any correction, mistakes and waste which might occur during construction. The gears of the press were simply off-the-shelf items which could be purchased from any manufacturer. The pressure bar housing (diagram B) was welded to my specifications at a local machine shop. The clutch and handle is a specially designed system which, as I know it, exists on no other hand lithography press. The press bed is a combination of wood and metal, but was not built until much later in the process, as I had still not decided upon the design.

*Griffin Co., 1745 East 14th St., Oakland, CA 94606

Press Description

There are four main sections of the press. (Diagram C). 1. The front which supports the press bed and where the printer stands to work on the stone. 2. The middle section housing the pressure bar, drive roller, drive gears, handle, cam system, and pressure bar housing. 3. The back section, which supports the bed as it passes between the roller and the pressure bar. 4. The bed itself.

The front and back sections of the press are designed to come apart for easy transportation. They are constructed with mortise and tenon joinery. (Diagram D). Their sides are permanently glued. The cross supports (Diagram C, figure 5) are held together by screws so they can be taken apart in small enough pieces for one person to transport easily.

The middle section has very little joinery, the only mortise and tenons used are for the cam system housing. There is no glue or reinforcement as the mortises are cut over-sized and cardboard packed into the void above the tenon. (Diagram E). This system allows for any discrepancy in the pressure to be absorbed by the cardboard.

The gears are a simple sprocket and chain system with a 7:1 ratio. The large sprocket (Diagram F, figure 1) is 11" in diameter, has 70 teeth with a 1/2" pitch, and is mounted on the shaft of the drive roller. The small sprocket (Diagram F, figure 2) is 2" in diameter, has 10 teeth with 1/2" pitch and is mounted on a 1/2" steel rod (Diagram G,

figure 1) which in turn passes through two rubber-mounted flange units (Diagram G, figure 2) attached to either side of the upright. (Diagram G, figure 3).

Attached to the 1/2" steel rod is the clutch (Diagram H, figure 1) and drive handle. (Diagram H, figure 2). The clutch is a spring-loaded jaw system which is engaged by pushing the drive handle toward the press and is disengaged by the spring when the drive handle is released. This allows the drive handle to remain stationary when pulling the bed back into position after making an impression.

The bed of the press (Diagram I) is made of two sheets of 3/4" Baltic Birch Plywood laminated together with Tight Bond Glue, a normal carpenter's glue. The plywood is extremely stable because each lamination in the plywood is the same thickness. These sheets are supported on the bottom by two strips of 1/2" steel which act as a protective reinforcement against wear on the fibers of the plywood, and provide runners for the roller on the frame. They also help keep the bed from warping. An offset blanket is contact-cemented on top of the plywood to take up any discrepancies in pressure from unevenness in the stone or plywood. A sheet of 1/32" galvanized metal is placed on top and folded over the edges. This acts as a protective surface from chemicals during processing of a stone or aluminum litho plate. In addition a 3/16" angle iron is screwed onto the front and back widths

of the bed to act as another stabilizer against warpage and to hold the galvanized metal in place. The sides of the bed also have 3/16" steel runners which act as a continuous surface for the guide wheels of the press. These wheels (Diagram J) are hard rubber, 2" in diameter, set horizontally into a mortise every 19" along the side of the front and back sections of the press. They direct the bed straight through the press in a horizontal position and minimize pivoting from corner to corner of the bed.

The bed supports (Diagram K) are steel rods mounted into and spanning the distance between the front and back sections of the press. Two bearings (Diagram L, figure 1) are mounted on each rod and line up with the 1/2" steel runners on the bottom of the press bed. Shaft collars (Diagram L, figure 2) are mounted on either side of each bearing to hold them in place.

Assembling and Using the Press

At various stages during construction of the press, I assembled and disassembled it. There were joints to fit, bearings to attach and position, and gears to put together. Once the press was fully assembled, there were still a few alterations to be made. For instance, I had to remove one inch of material from the tenon in the cam housing, because the distance between the scraper bar and stone was too great. If I had not altered this situation I would have been able to print only on very thick stones. In addition, I was forced to order extra large scraper bars because altering the tenon did not correct the situation fully. Also, concerning this part of the press, I had to drive pine wedges in the void where the cardboard is packed to replace the compression of the cardboard when pressure was applied.

After greasing the moving mechanical parts, I was ready to pull a few proofs. I prepared the stone and checked for unevenness in the surface which might show up in the print. The imagery I chose was a simple color tint which enabled me to get a good idea of how the press was printing. Much to my delight I was able to obtain an even continuous tone with minimum pressure.

Cost of Materials and Time Involved

The following is a roughly itemized list of materials. I do not include the cost of labor as I constructed the press myself. It is difficult to say exactly, hour for hour, how much time I spent on the actual construction. Much of the time was spent gathering material, waiting for pieces to be made and discussing the construction of the press. However, including all aspects of this project it took me about two years to complete the press.

Hardwood	\$200.00
Leaf springs	\$ 50.00
Roller and cam system	\$400.00
Sprocket, chain & flange bearings	\$ 90.00
Shaft collars	\$ 30.00
Scraper bar housing	\$ 75.00
Rubber wheels	\$ 16.00
Roller bearings	\$ 30.00
Steel shafts	\$ 45.00
Nuts and bolts	\$ 5.00
Pillow Block bearings	<u>\$ 90.00</u>
Total	\$1,031.00

Thesis Prints

The last part of this project was to produce a body of prints (Appendix B) using the press. The imagery I used combined drawing with ordinary everyday objects in a still-life situation. I explored the language of drawing with two and three dimensions made permanent only through photography. I used stones as well as litho plates for this work. My main effort in this project was, first, to prove the printability of the press and, second, to produce a strong body of work.

Bibliography

A Complete Guide to Printmaking, Stephen Russ Ed.;
A Studio Book, Viking Press, 1975, N.Y.

New Media In Printmaking, John Bickford;
Watson-Guptill, 1976, N.Y.

Printmaking; A Beginning Handbook, William C. Maxwell;
Prentice-Hall, 1977, Englewood Cliffs, N.J.

Printmaking Today, Jules Heller;
Henry Holt & Co., Inc., 1958

Handbook of Printmaking and Printmakers, John Taylor Arms;
Macmillan, 1934, N.Y.

A Handbook of Graphic Reproduction Processes, 3rd edition, Felix Brunner;
Arthur Niggli Ltd., 1968, Teufen (AR)

A Complete Course of Lithography, Alois Senefelder;
Fuchs and Lang Manufacturing Company, 1911, N.Y.

The Tamarind Book of Lithography: Art and Techniques, Garo Antreasian
and Clinton Adams; Harry N. Abrams, 1971, N.Y.

Lithography, Henry Cliffe;
Watson-Guptill, N.Y.

Lithography, Emil Weddige;
International Textbook, 1966, Scranton, PA

Autolithography; the Technique, Henry H. Trivick;
Faber and Faber, 1960, London

Handbook of Lithography, David Cumming;
A & C Black, 1961, London

Lithography 1800 - 1850, Michael Twyman;
Oxford University Press, 1970, N.Y.

DIAGRAMS

Diagram A

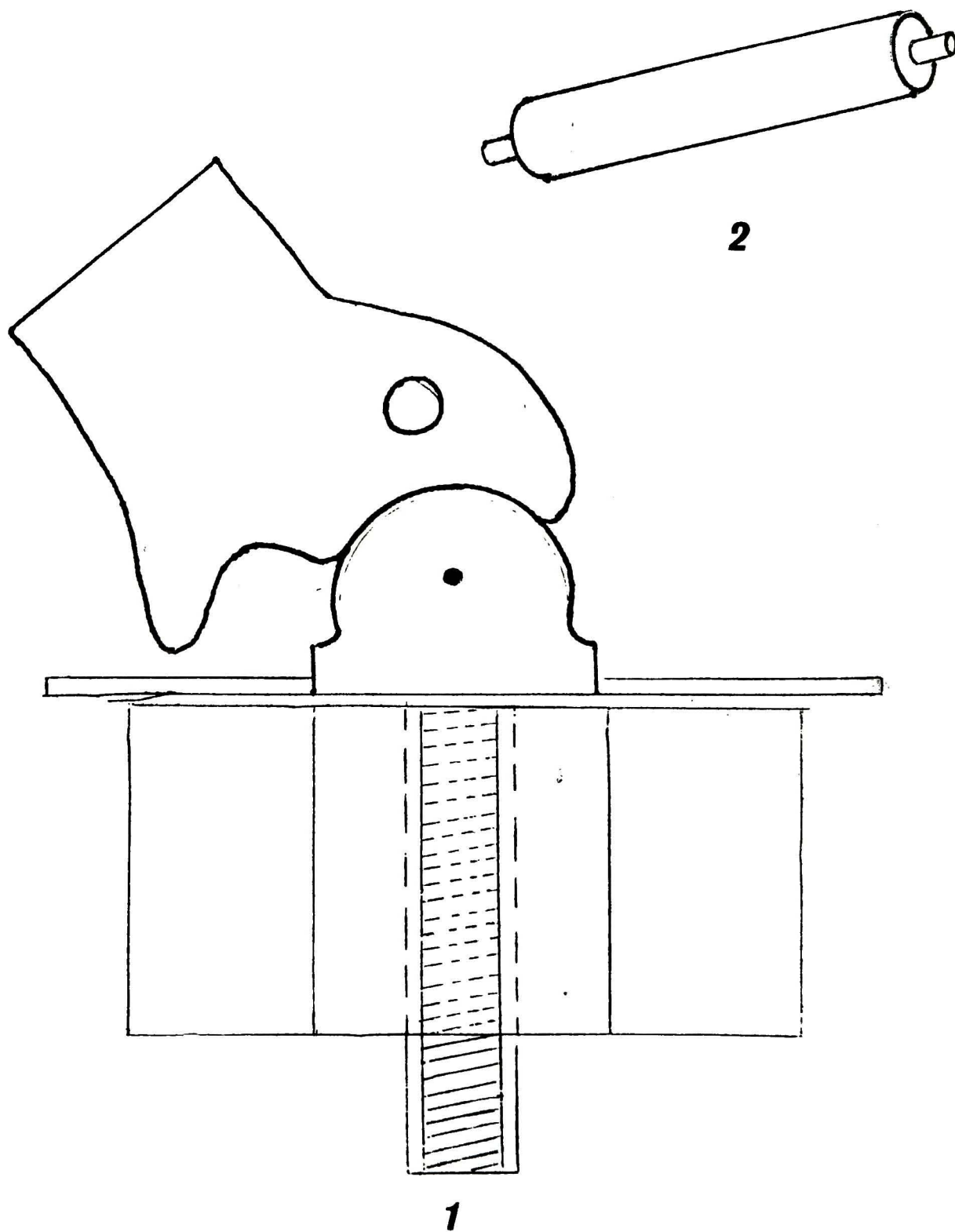


Diagram B

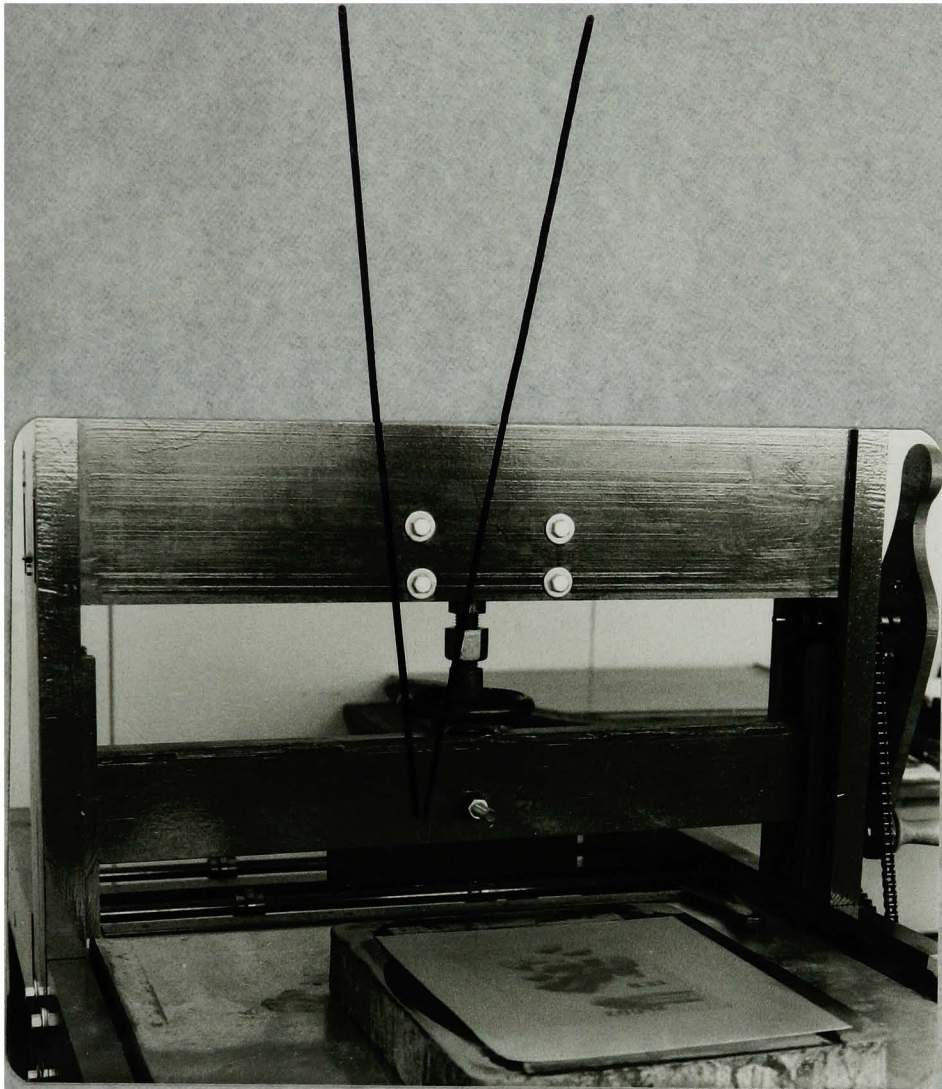


Diagram C

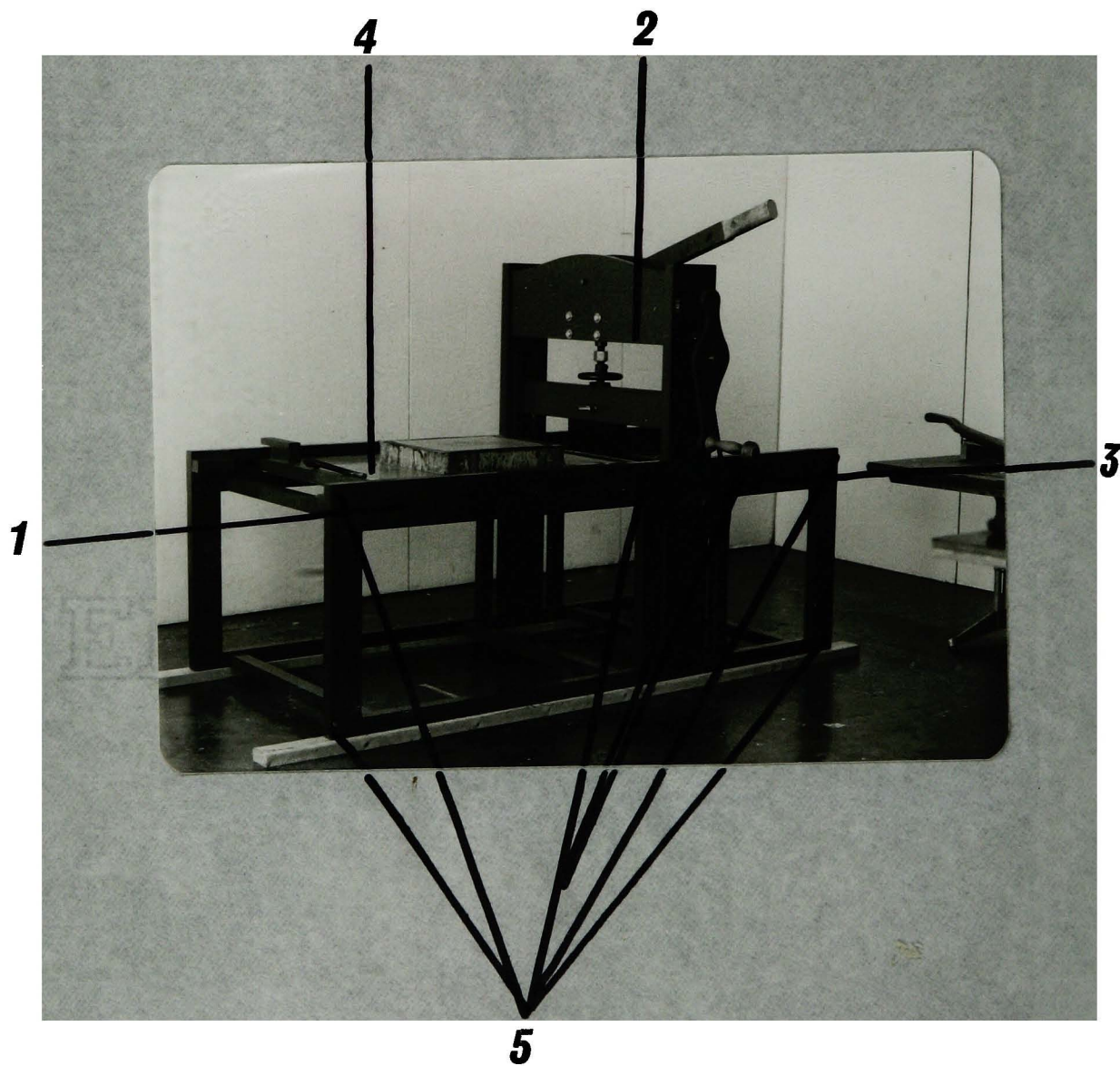


Diagram D

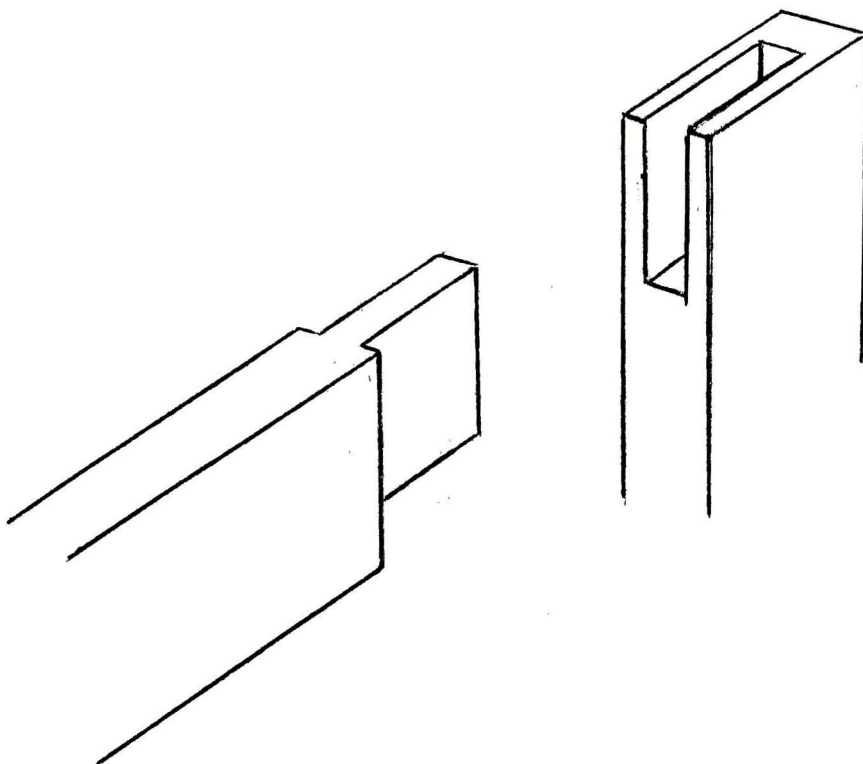


Diagram E

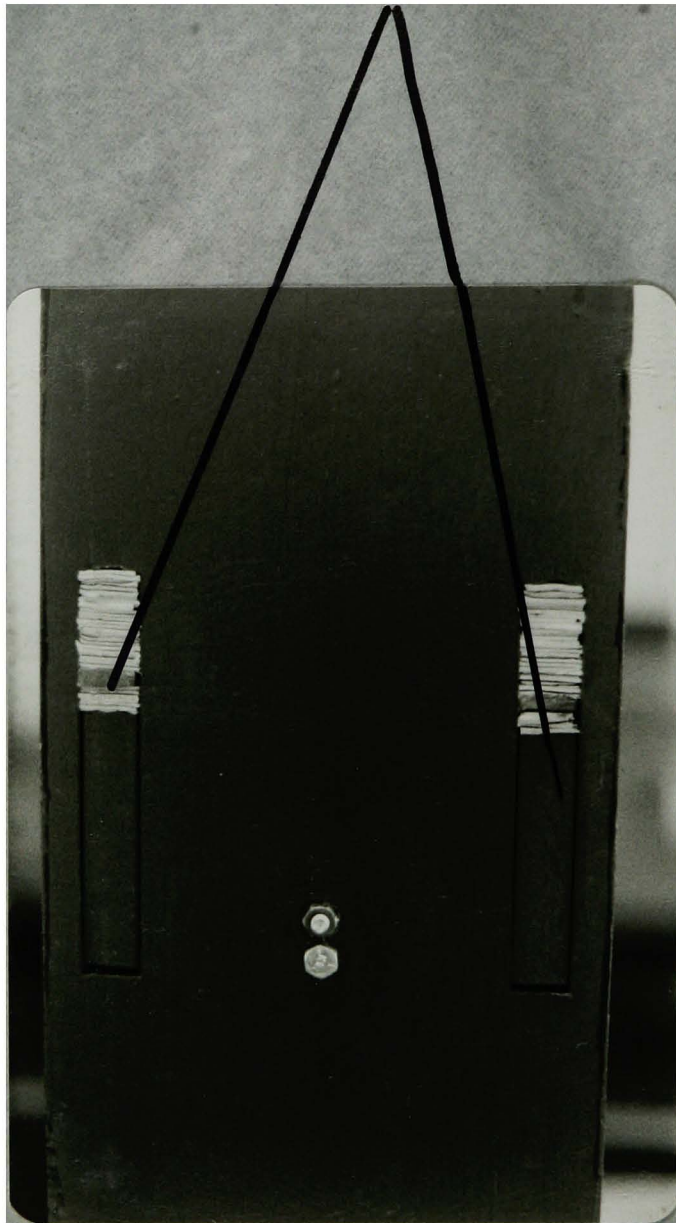


Diagram F

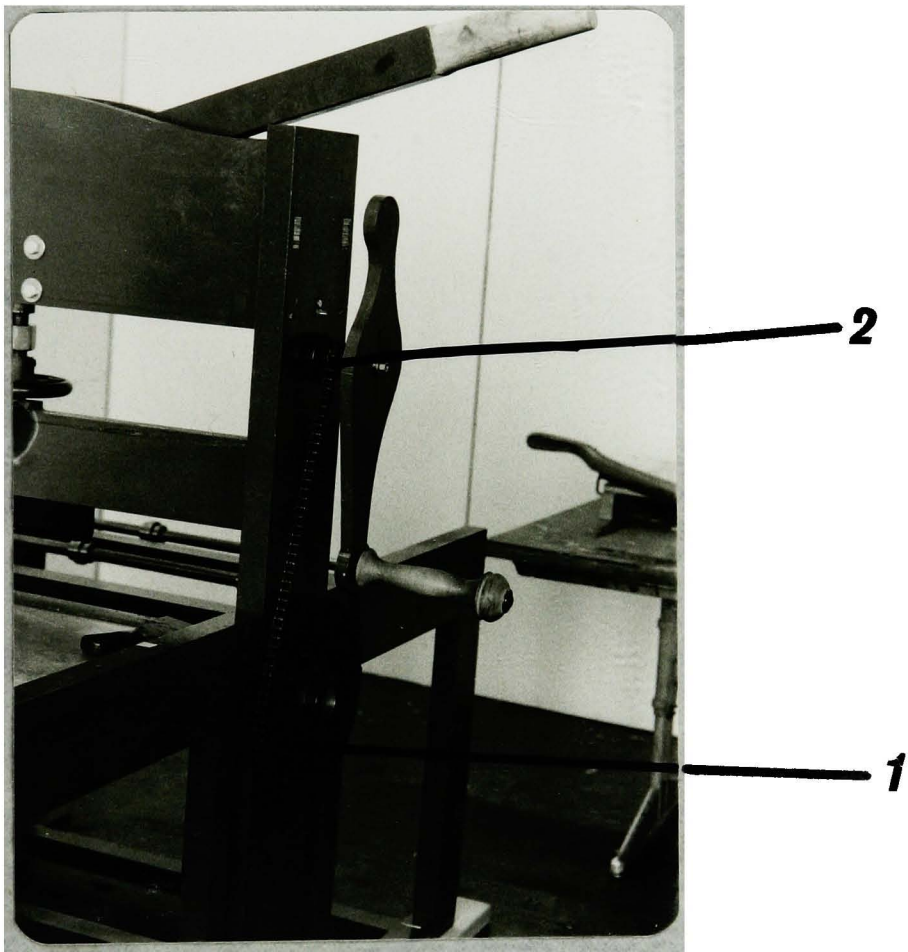


Diagram G

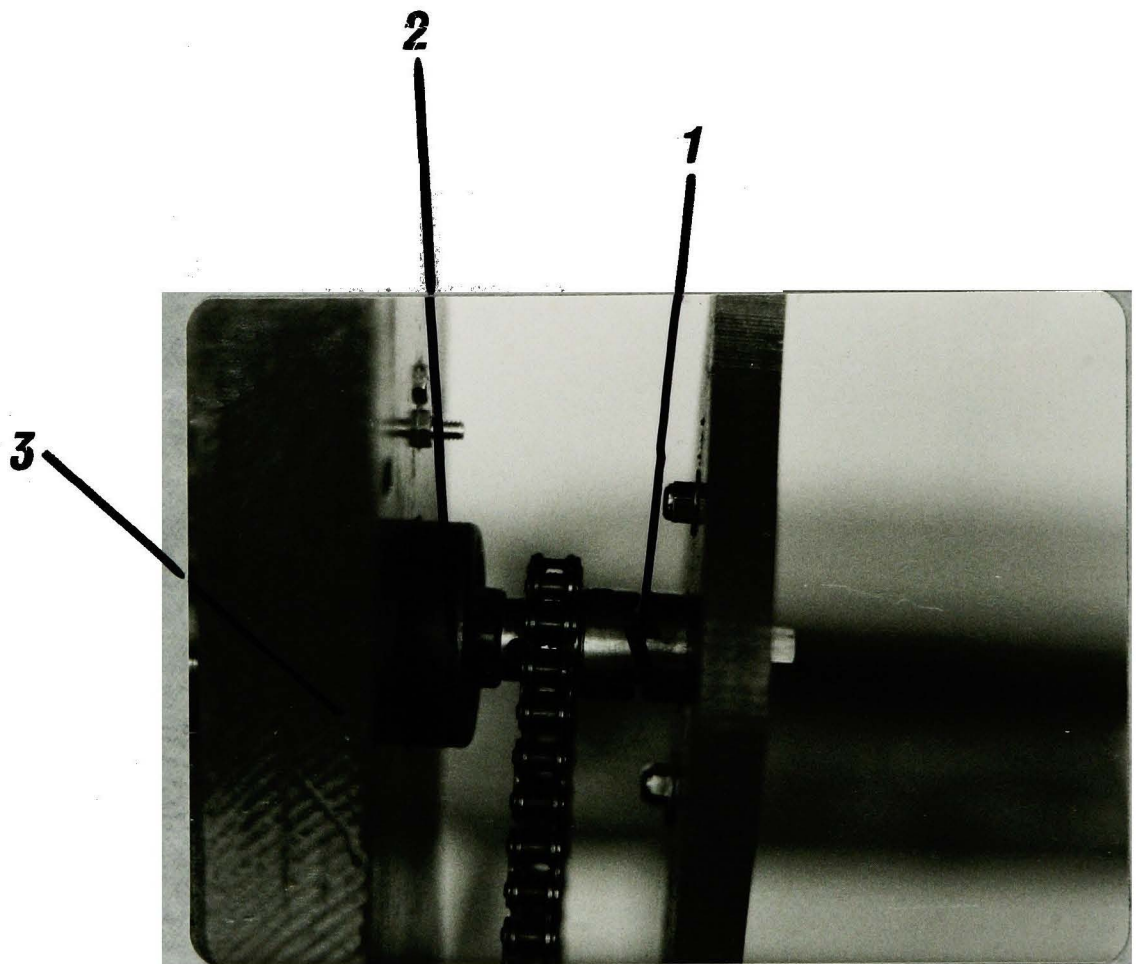


Diagram H

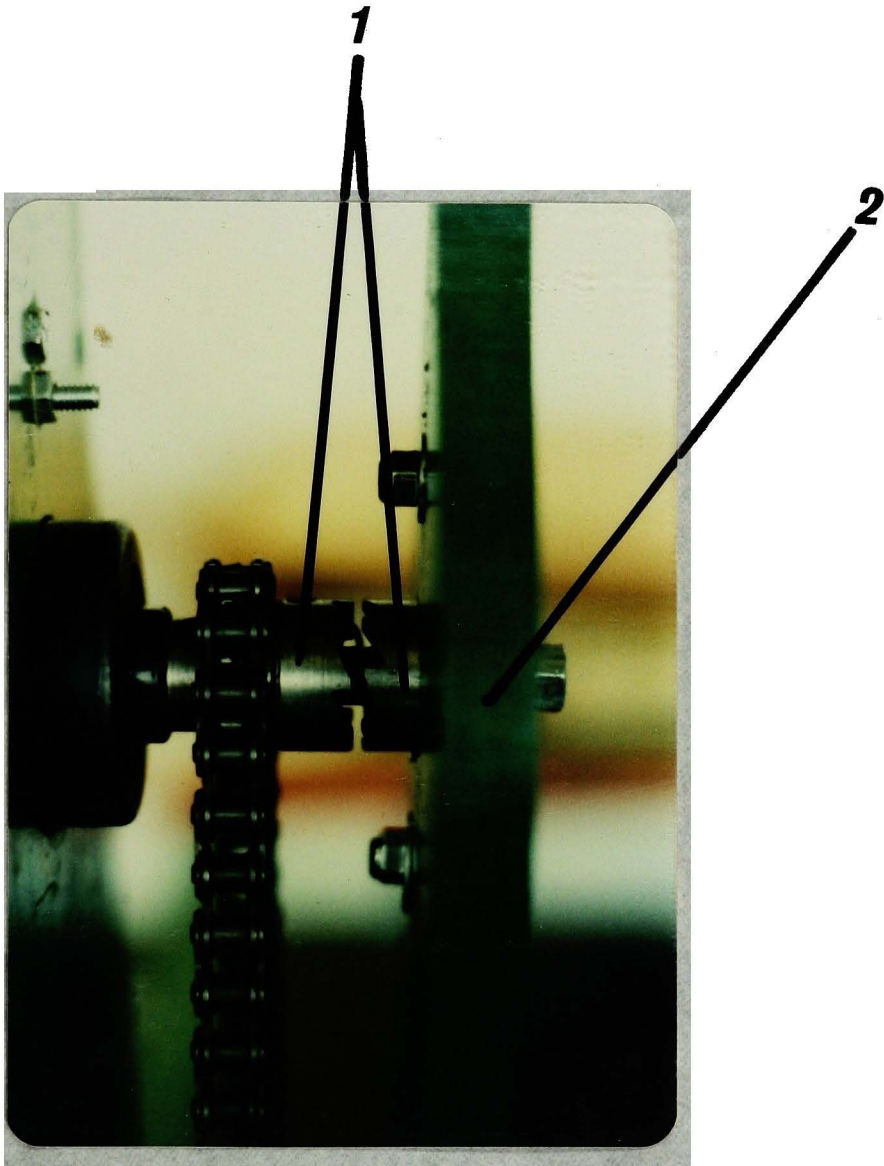


Diagram I

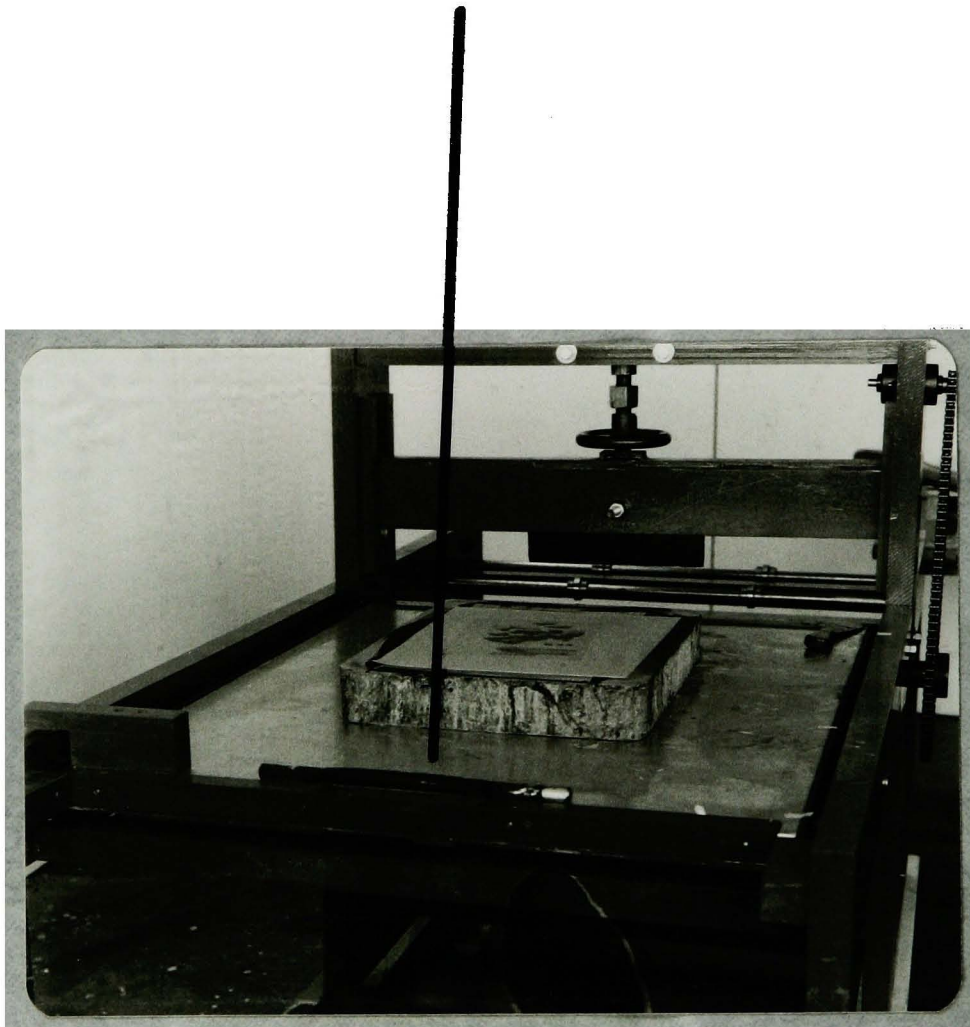


Diagram J

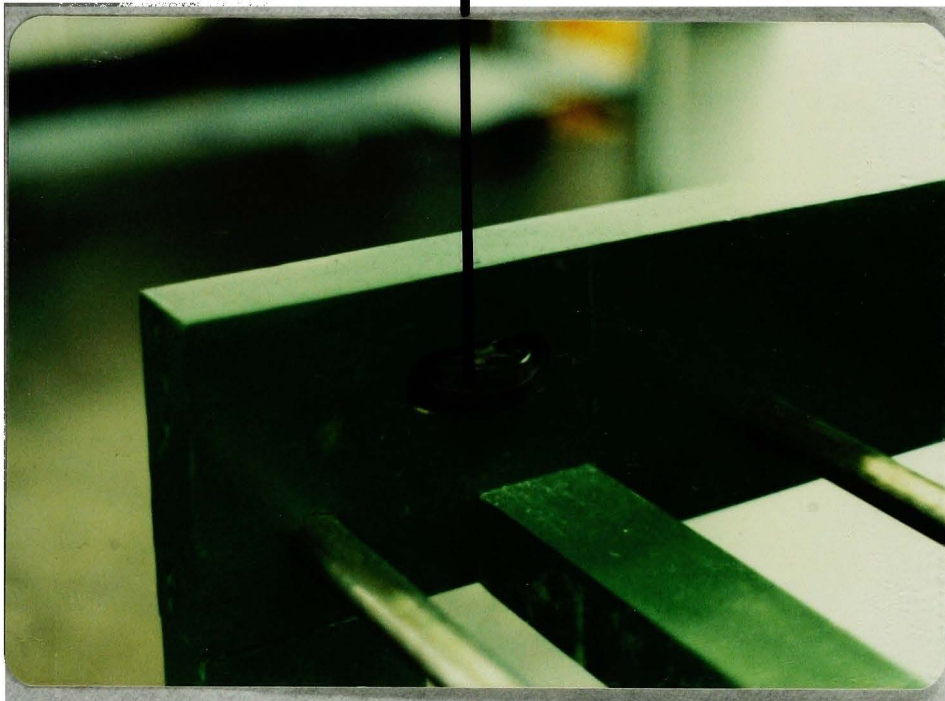


Diagram K

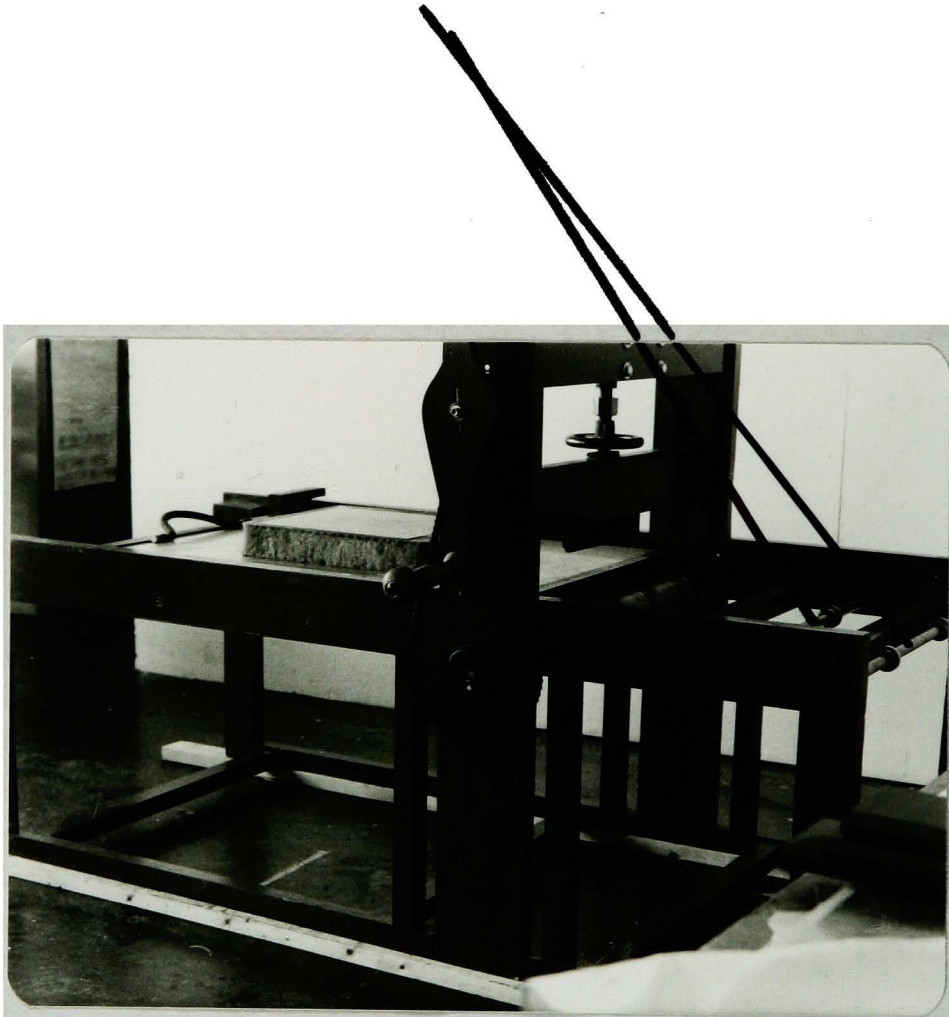
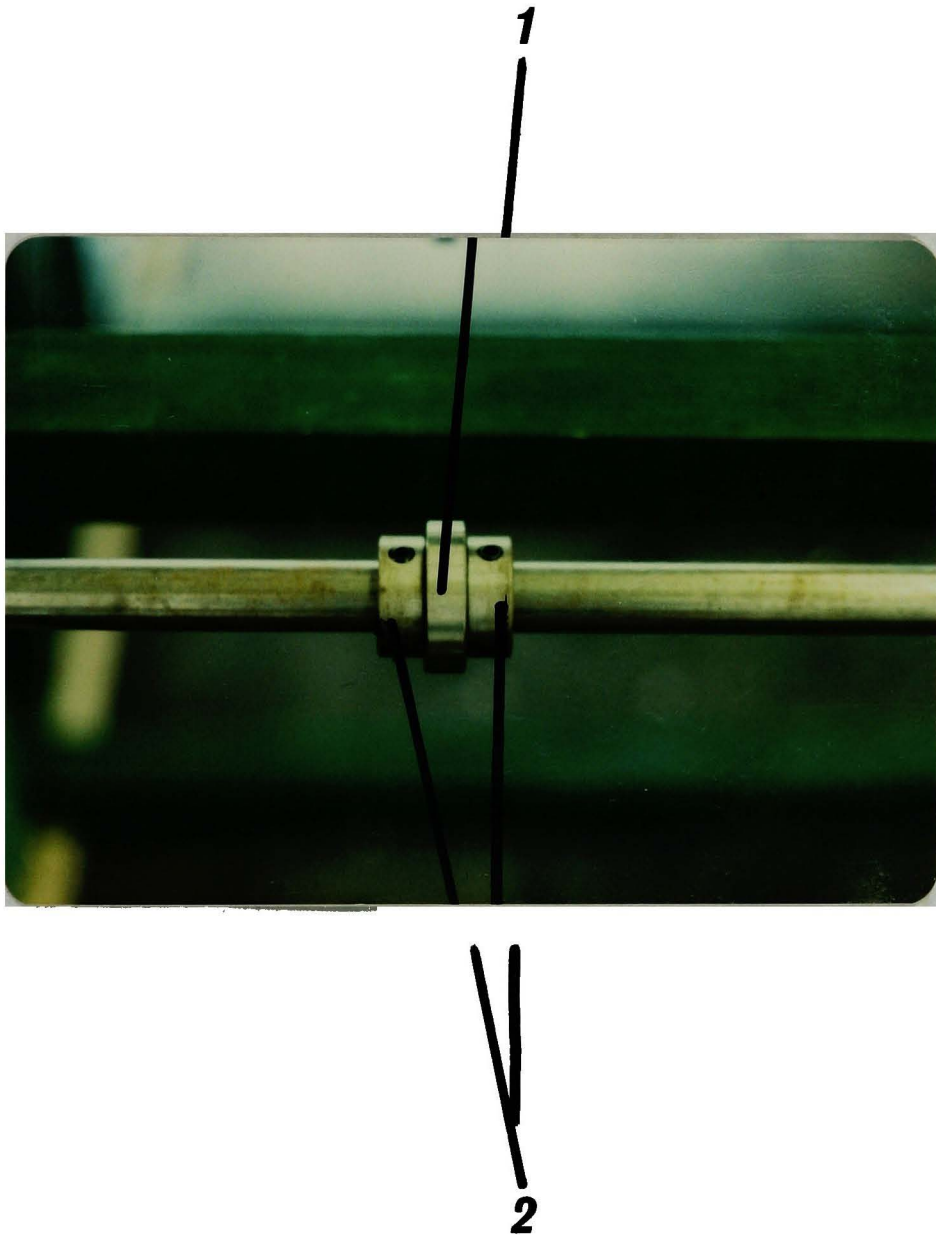


Diagram L



APPENDIX

October 1, 1976

Ms. Susan J. Raabe
P.O. Box 44
Scottsville, New York 14546

Dear Ms. Raabe:

There is indeed a copy of Edward Dickerson's masters thesis in the file of the Art Education area of the Art Department, but by statute they are unable to send it out. The secretary there suggests that you write the University of Wisconsin Memorial Library, where the thesis is also on file. They probably have a system of making such a study available to you.

Sincerely yours,

Warrington Colescott
Professor of Art

WC-bk



School of Art

University of Michigan
2000 Bonisteel Boulevard
Ann Arbor, Michigan 48109
313-764-0397

October 25, 1976

Susan J. Raab
P.O. Box 44
Scottsville, New York 14546

Dear Susan:

Sorry to be so slow about this. I hope that this can be of some use to you in terms of letting you know what we are doing.

We are developing a minimal press for metal plate lithography i.e., a design which assists a print-maker in putting together a workable press at the least possible expense.

Our prototype uses a minimal amount of structural steel. Its operation involves no lateral or diagonal forces so it does not require a metal framework. We have also found that a loose laminated bed of thin steel and masonite holds up reasonably well as a press bed.

The project is not completed however. We anticipate finishing it by the end of this school year and could send you blueprints at that time. In the meantime if you have any specific questions I would be happy to attempt an answer.

Sincerely,

Paul Stewart
Professor of Art

PS/cl

DEAR SUSAN —

I just returned home to find your letter about Press Building. I am glad to hear there are other crazies around who don't want to spend the \$4000 or so on a new press.

I don't know how much specific information you want - so a bit of outline of how I built my press.

It cost about \$500-600 materials plus about \$400. - machine shop work. (lathe work etc.) I did the welding and fitting

— THE DESIGN IS A HYBRID OF THE BEST FEATURES OF SEVERAL PRESSES PLUS A GOOD MANY INNOVATIONS

- THE BED IS PARTICLE BOARD LAMINATED 34" x 22"
- LOWER FRAME IS 2" x 8" WHITE OAK CROSS MEMBERS RECTANGULAR TUBING
- THE DRIVE DRUM IS 14" STEEL TUBE HOLLOW CONSTRUCTION. THIS IS THE MOST IMPORTANT PART OF THE PRESS - WHERE YOU SHOULD START.
- THE PRESSURE SYSTEM IS A CAM-LEVER SIMILAR TO BRAND PRESS
- THE CRANKING AND DRIVE SYSTEM
- IS FAIRLY UNIQUE AND SIMPLE ITS

clutch - gear - chain - 2 speeds spaceclt. system

THE BUILDING TIME WAS INTERRUPTED
~~BY~~ SEVERAL TIMES BY MONEY MAKING
TRIPS TO A RANCH TO DO A LITTLE
COWBOYING. BUT I THINK A PRESS COULD
BE BUILT IN 6 MONTHS.

I'VE USED THE PRESS NOW FOR BETTER
THAN 1000 IMPRESSIONS. IT WORKS FINE.
I'VE MADE A FEW CHANGES. AND HAVE
BECOME ADDICTED TO PRESS BUILDING
AND HAVE STARTED A NEW ONE. IT WILL
BE HYDRAULIC POWERED LITHO - ETCHING PRESS.

BUILDING A PRESS IS FAIRLY EASY IF YOU
HAVE MACHINE SHOP FACILITIES PLUS AN
EYE FOR SCROUNGING PARTS.

GOOD LUCK I WILL BE GLAD TO HELP
IF YOU HAVE SPECIFIC QUESTIONS. IF
YOU ~~HAPPEN~~ HAPPEN TO BE COMING WE
STOP BY. I AM ABOUT 20 MILES NORTH
OF ALBUQUERQUE.

Robert Arber
Box 10121
Alameda, N.M. 87114
1.505-898-7436

P.S.
STONES ARE IN SHORT
SUPPLY OUT HERE. DO
YOU KNOW OF ANY
22X28 OR LARGER?
(AT BARGAIN PRICES)
DO YOU KNOW BRUCE
PORTER - EX-TAMARIND PRINTER
I THINK HE LIVES IN BOULDER

Susan —

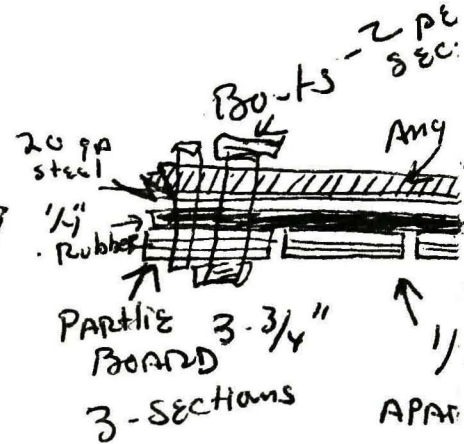
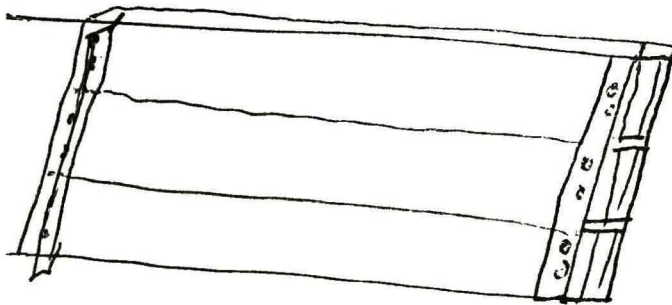
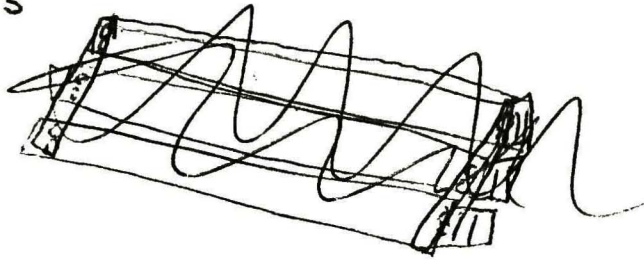
As you well know I am very poor at keeping the letters flow going. But alas - hands. Joints like you found a good man to work on your press - "for cookies" - what kind of cookies do you make?

I use stones on my press all the time - fortunately have never broken one - knock on your chair - yours make mine OK.

If you know how true (no wobble) and the bed isn't warped you should have no problems.

My Ben uses a "floating Design" (can't warp). I laminated 3 - $\frac{3}{4}$ " sheets Novaply (particle board) - most cabinet shops can laminate for you. Should cost about \$15 material \$15 labor they should spray contact cement then run true a fine roller my bed is 32" x 58" - the bed is then cut into 3 longitudinal sections. Its covered with $\frac{1}{4}$ " rubber

Drum which must be perfect
the tolerance on my drum is
.0015



I hope this helps you with
your problem. My transmission
& clutch set up is unique
& simple and works very well let
me ~~if~~ ~~you~~ know if I
can help
good luck

Box 10121
Alameda, N.M.
87114



THE UNIVERSITY OF NEW MEXICO □ ALBUQUERQUE, NEW MEXICO 87106
TAMARIND INSTITUTE, 108 CORNELL AVENUE, S.E. □ TELEPHONE (505) 277-3901

August 26, 1976

Ms. Susan J. Raab
P. O. Box 44
Scottsville, NY 14546

Dear Ms. Raab:

I have only a few references I can give you. Mr. Arber has made his own press. Professor Stewart has been researching the project. S. D. Takach and D. R. Garfield have recently designed and built the Takach Garfield Press here in Albuquerque. An article in our publication Tamarind Technical Papers, #5, April 1976, page 57, describes the press in full.

One other reference would be the information available in The Tamarind Book of Lithography, Adams and Antreasian, Chapter 13.

The addresses are:

Mr. Robert Arber
Alameda, New Mexico 87114

Professor Paul Stewart
Department of Art--The University of Michigan
2000 Bonisteel Blvd.
Ann Arbor, MI 48105

T. G. Press Company
3207 Morningside Drive NE
Albuquerque, New Mexico 87110

Sincerely yours,

John Sommers
Technical Director

cjs



87110.

SEPTEMBER 7, 1976

SUSAN J. RAAB
P.O. BOX 44
SCOTTSVILLE, N.Y.
14546

DEAR SUSAN,

WE RECEIVED YOUR LETTER A COUPLE OF DAYS AGO CONCERNING YOUR DESIGNING
A LITHOGRAPHY PRINTING PRESS.

I AM NOT SURE HOW MUCH HELP WE CAN BE TO YOU BUT WE ARE WILLING TO RENDER
WHAT ASSISTANCE WE CAN.

YOU MUST HAVE SOME IDEAS ABOUT WHAT YOU ARE ATTEMPTING TO ACHIEVE WITH
YOUR DESIGN AS WELL AS SOME PERTINANT INFORMATION SUCH AS LENGTH OF THE BED
WIDTH AND HEIGHT ETC.

IF YOU WANT YOU CAN SEND US A COPY OF YOUR PRELIMINARY SKETCHES WITH
SUCH DETAILS AS HOW YOU WANT TO SUPPORT THE BED, HOW THE BED IS TO BE DRIVEN,
DETAILS OF THE PRESSURE MECHANISM, AS WELL AS THE CLUTCH SYSTEM. ALSO
WHAT MATERIAL YOU INTEND USING FOR THE BED. ANOTHER QUESTION WORTH CONSIDERING
IS HOW MUCH MONEY YOU ARE PLANNING TO SPEND ON THIS PROJECT.

ANOTHER QUESTION OF INTEREST TO US IS WHETHER YOU ARE DOING THIS PROJECT
AS A STUDENT PROJECT FOR CREDIT OR DO YOU WANT THE PRESS FOR YOUR OWN USE?

I HOPE SUSAN THAT YOU APPRECIATE THE MAGNITUDE OF YOUR PROJECTED UNDERTAKING.
MR. GARFIELD AND I HAVE SPENT THE BETTER PART OF SIX YEARS IN DESIGNING OUR
PRESS. WE WORKED ON PRINTING PRESSES FOR NEARLY FIVE YEARS BEFORE BEGINNING
OUR OWN PRESS.

WE FEEL THAT WE HAVE THE BEST PRINTING PRESS AVAILABLE AT ANY PRICE
AND OF COURSE WOULD LIKE FOR YOU TO CONSIDER ONE OF OUR PRESSES AS AN ALTERNATIVE
TO YOU BUILDING YOUR OWN PRESS.

I AM SINCERLY YOURS,

UNIVERSITY OF WISCONSIN-MADISON

UNIVERSITY LIBRARIES

Memorial Library
728 State Street
Madison, Wisconsin 53706



1-14-77

Susan J. Raab
P.O. Box 44
Scottsville, New York
14546

Dear Ms. Raab:

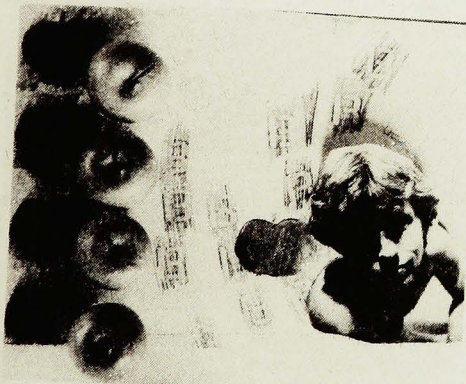
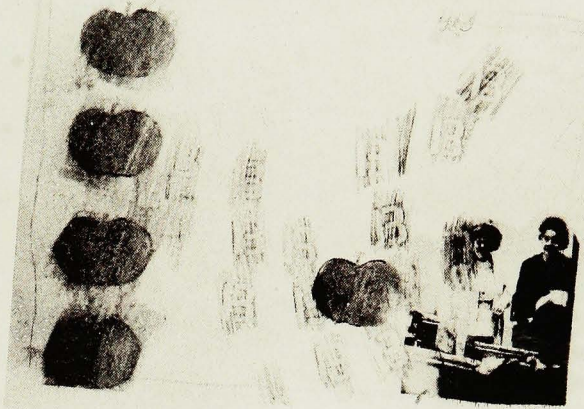
Re: request of Oct., 1976 for thesis done by Edward Dickerson

After much searching we have located the item in question. This is a master's project paper and is on file at the office of the department of Art Education. The paper is unavailable for loan, but the office of Art Education has given us permission to xerox this for you. The cost of a xerox copy would be approx. \$3.65. If you still wish a copy of this paper please let us know and we will send a copy to you. DO NOT prepay - you will be billed later for the xerox.

Yours truly

Paul B. Gandel
Interlibrary Loans

PRINTS



EEB

SPUDS