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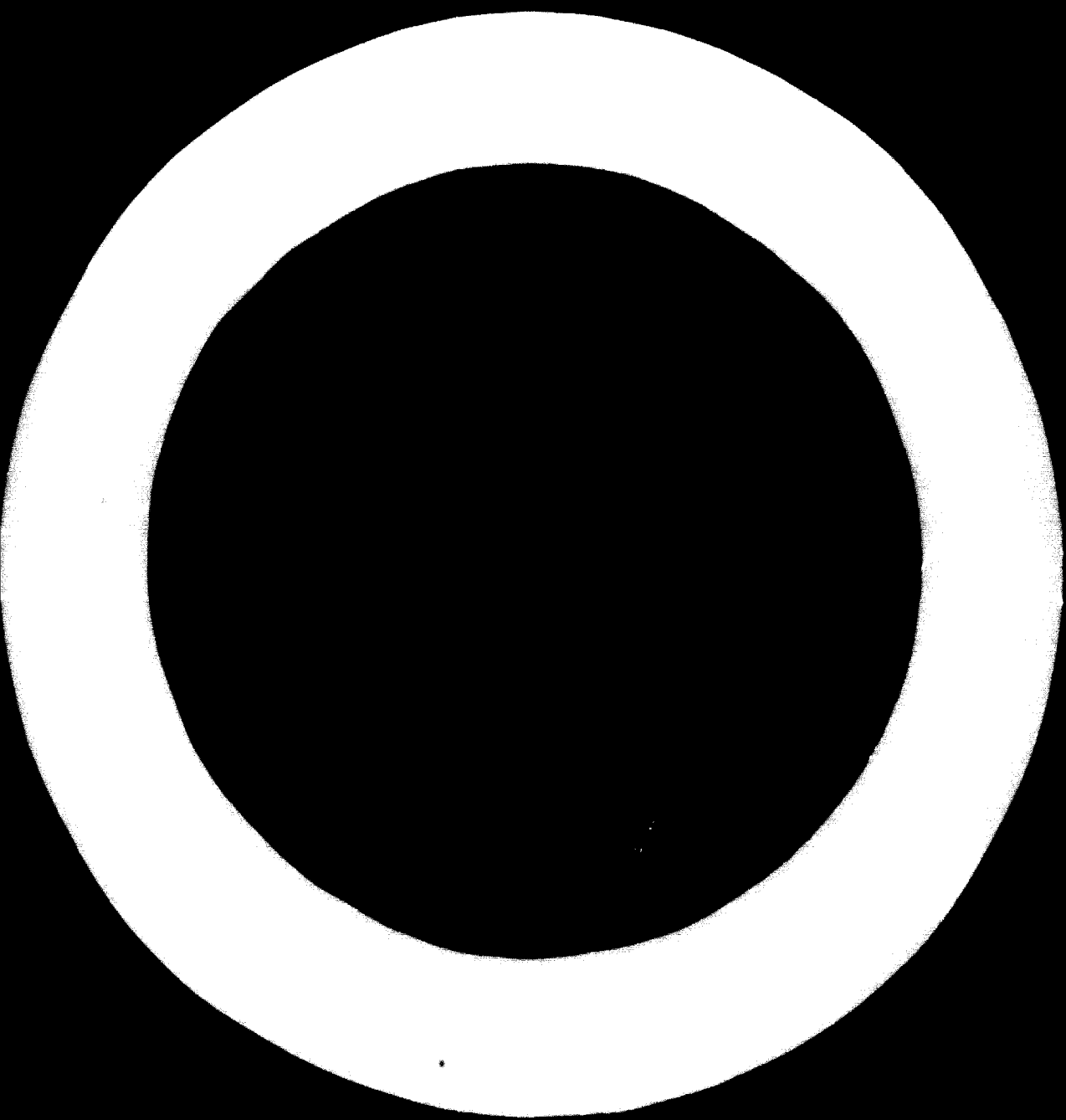
SUMMARY ^{1/}

THE PLANNING OF MODERN BELMHOUSE AND TANNING DEPARTMENTS

by

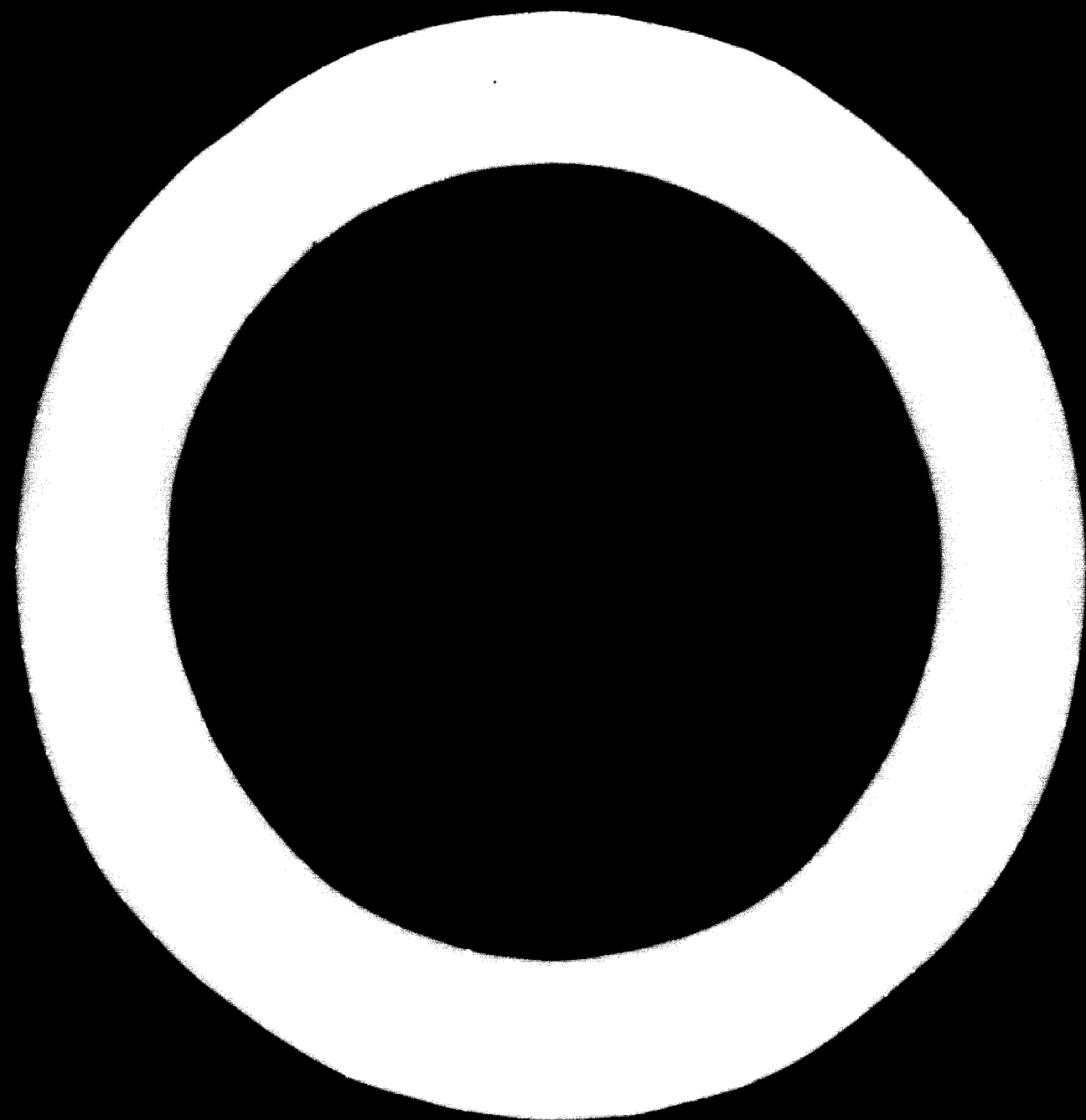
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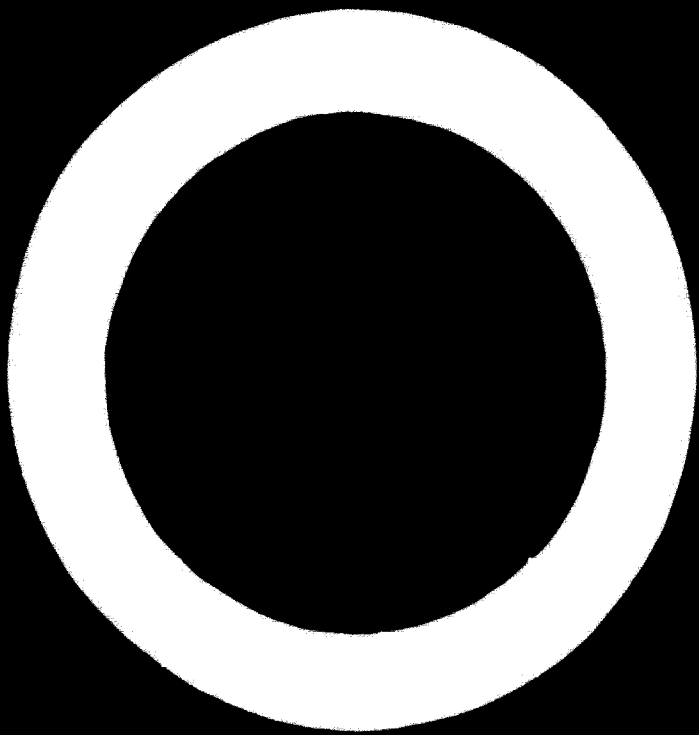
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To ensure that a tannery will operate well and with profit, it is indispensable to plan it carefully. The paper enumerates the main factors to be considered in the pre-planning stage and then goes on to explain in a summary form the main planning stage. Technology, buildings, transport and expansion possibilities are mentioned. In more detail technology, equipment and planning of the following departments or operations are discussed:

- beamhouse
- fleshing
- splitting
- delimiting
- bating
- pickling
- chrome tanning, and
- vegetable tanning.







The planning of a modern beamhouse and tanning department

Eng. W. Rieger, Leverkusen

Careful planning is essential to ensure smooth and profitable operation of a leather factory.

I) Preliminary planning

The following points should be cleared up:

- 1) Raw materials. Local or imported raw materials?
- 2) Production capacity. Calculated for one day or one month.
- 3) Types of leather. (a) For domestic processing (corrected grain side leathers, full grain leathers, patent leather, etc.).
(b) For exports (wet blue, crust, finished leather)
- 4) Water supply
- 5) Power supply
- 6) Effluent
- 7) Utilization of offal (glue stock, shavings, etc.)
- 8) Laboratory, operations control
- 9) Workshops for repair and new construction
- 10) Social facilities
- 11) Training of technical personnel
- 12) Administration building

II) Main planning

- 1) Technologies. These would have to be selected along general lines as the very first step. Due allowance should be made for flexibility.
- 2) Buildings. These should generally be of the one-floor type. No buildings with several floors as these involve longer hauling distances and waiting times, and also because supervision by the foremen is difficult.

- 3) Transport. Fork lifters have proved to be the most economical way. Principle: the workmen remain at their equipment, transports over longer distances are made by fork lifter. Conveyor belts call for a high degree of precision in the work rhythm, they allow less adaptation to the conditions prevailing at a given time. Expenditure for installation and maintenance is higher.
- 4) Possibilities for expansion. When projecting the floor space due allowance should be made for an expansion of production capacity by 30 % or more. In the event that production has to be expanded by 50 - 100 % the expansion buildings should be erected parallel to the three sides of the U-shaped building at the outer side.

III) Soaking and liming

- 1) Input. Whole skins should be processed up to and including chrome tannage. In sole leather production rounding is often carried out in the beamhouse.
- 2) Drum, paddle or pit. Advantages of the drum: easier adaptability to modern technologies, less consumption of water and chemicals, fast unloading, if necessary also suitable for use in other processes. Dimensions: 3.50 x 3.50 m. Suitable for taking up 5 - 6 tons (salted weight) raw material. Speed 1 - 3 r.p.m. Provision should be made for forward and reverse runs. A system of automatic control of the run and idle times overnight may also be of advantage. The motor power should be 18 - 25 kilowatts to allow for an energy reserve of approx. 33 %. The height of the drums should be such as to allow unloading on to vehicles or conveyor belts below the drum. They are to be loaded by fork lifter or from a raised platform. Generally all chemicals may be added undissolved through the opening of the drum. Crushing and dissolving is only necessary with fused sodium sulphide, although

this form of supply is today rarely encountered. The drums are to be provided with large doors and piping of large diameter.

Apart from the much lower capital expenditure and the lower power requirement there are few advantages in favour of paddles.

The pit is only to be provided for the preliminary soaking of dried goods. Main soaking and liming are done in the drum.

3) Hide processor. These machines are designed on the principle of the cement mixer used in the building industry. Such machines have been introduced in some factories in the U.S.A. In Europe trials have recently started in a few leather factories. These machines offer numerous advantages over drum and paddle. However, it is unlikely that they will replace drums or paddles throughout within the not too distant future.

4) Rinsing process. This should start early during the day to ensure that the pelts get at least as far as the pickle on the same day. To save water and power it is also possible to give 2 - 3 washing operations. This is done with the door of the drum closed and the washing water being drained between the individual washing operations. The effluent from liming operations should preferably be passed into a separate sewer system which takes it to a separate collecting tank. Mixing with acid effluent should preferably be avoided.

IV) Fleshing/splitting

The fleshing machine should be installed high up on a platform. The fleshed hides or skins drop to a conveyor belt or a chute located underneath. The hides carried in this way are trimmed and, if applicable, given a preliminary sorting by 2 - 4 men. Sorting would be a selection of the hides or skins for corrected grain side leather, full grain

leather, sole leather, etc. as depending on their quality. The glue stock slides through a chute into a collecting tank from where it is removed by pump. Perforated boxes are also suitable. These can be carried by crane or fork lifter, i.e. without tying down labour.

An especially important point is to clear up whether the major portion of the materials is to be split at this stage or only after chrome tannage. We give preference to splitting after chrome tannage because this approach offers considerably greater advantages. This would however involve a slightly higher consumption of chemicals.

V) Delimiting/bating

For these operations, too, we generally prefer the drum over the paddle. Main reasons: the possibility to complete all operations up to and including chrome tannage without the necessity of having to handle the hides between individual operations, the adaptability to modern technologies, the saving of water and power. Drive by motors of 30 - 45 kilowatts, 2-step gearing for six and twelve r.p.m., forward and reverse run, loading with 3 - 6 tons, depending on float volume and pelt thickness. Provision should be made for checking pH and temperature.

VI) Pickle/chrome tannage

Either in the same drum as described under V) or in special drums. Drum dimensions again 3.50 x 3.50 m, speed 12 r.p.m., motor power as under V). The piping should have large diameters to allow fast filling and draining of the drums. Drums with double side walls have proved successful. In addition, it is absolutely essential to ensure that the water/salt proportions are always constant and that quantity and temperature of the water comply accurately with the conditions specified in the formulation. The drums are loaded either by fork lifter or from a platform. A

platform should generally be provided to allow addition of the chemicals from this point and to ensure smooth operation, especially after the unloading of the drums. From this follows that for both beamhouse and chrome tanning operations the general principle applies to load the drums with hides or skins from above, to add water and chemicals from above and to unload downward.

In addition, the chrome tans should generally be added undissolved, i.e. as a powder. A modern tanning system involves products which eliminate the need of basification and which permit a continuing of operations in the following night without special supervision. These drums, too, should preferably be provided with forward and reverse run, and also with an automatic control for run and idle times.

The effluent obtained in the tanning process should be collected in a separate sewer system and passed on to a separate collecting tank.

In addition, adequate floor space should be provided for storing tanned batches. With new buildings mistakes are made again and again regarding the condition of the flooring. Such flooring should be of acid-resistant material and adequate slope of the floor should be provided when projecting. It is better to store the tanned hides and skins on flat platforms than on horses. The advantages are a shorter time required for stacking and easier handling for transport.

VII) Machinery/piping/repair

The following planning errors are widely encountered with new factories: machinery which is not sturdy enough and thus involves an increased risk of breakdown, lack of a replacement machine, at least for the major operations, lack of spare parts, water tanks much too small, pressure

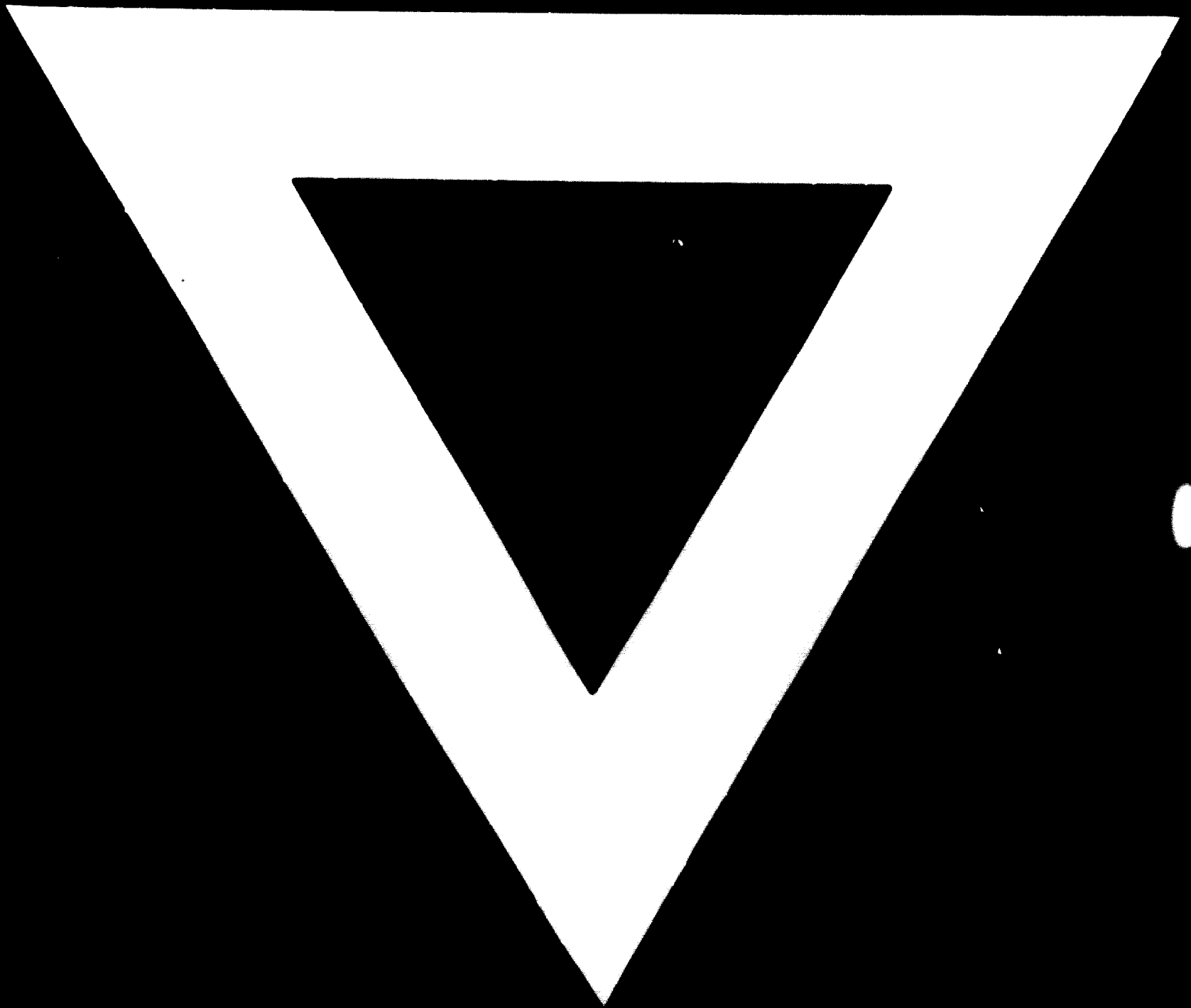
drop in the water supply during peak periods, electric motors which are too weak. The purchase of machinery with modern, yet sensitive components calls for the availability of trained mechanics and electricians. It is therefore urgently advised to purchase only sturdy machinery with a minimum risk of potential breakdowns.

VIII) Vegetable tannage

Here, too, the fundamental question must be settled whether tannage is to be given in pits and in the drum or exclusively in the drum. A modern, widely successful system is a fast tanning process in which following the beamhouse there is only the drum for the various operations. The main advantages of such a procedure are: much shorter production time, reduced consumption of tanning materials, reduced losses of tanning materials, fewer drums and less floor space are required, the quantity of remaining flicats is reduced, expenditure of raw material and capital is much lower, productivity is higher, good adaptability to changing market conditions. A drum with a speed between 2 and 6 r.p.m. is necessary. The motor power should be such as to ensure 0.75 kilowatt per 100 kg pelt weight. While some further measures for equipping the drum would have to be considered the cost involved is negligible. A drum can be loaded with a weight between 500 and 1,000 kg pelt weight.

I hope to have given you some major points regarding the planning of beamhouse and tanning department. Mistakes made in these sectors are less repairable than those regarding finishing.





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