

Government of Madras.

EDUCATIONAL DEPARTMENT.

Recd.

Regd.

} 1916.

Enclosures

Spare copies

G.O. No. 727, 3rd July 1916

University regulations

Sanctioning certain alterations in the — relating to the M.D. and M.S. degrees.

Government of Madras.

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Sanctioning certain alterations in the — relating to the M.D. and M.S. degrees.

GOVERNMENT OF MADRAS

EDUCATIONAL DEPARTMENT

Read—the following papers :—

I

Letter—from P. DEWSBURY, Esq., B.A., LL.B., Registrar, University of Madras.
To—the Secretary to Government, Educational Department.
Dated—the 20th March 1916.
No.—2126.

I have the honour to submit for the sanction of Government under section 25 (1) of the Indian Universities Act, 1904, the enclosed alterations in regulations relating to the examinations for the M.D. and M.S. degrees. These alterations were recommended to the Senate by the Faculty of Medicine and were adopted by the Senate at its adjourned meeting held on March 4, 1916.

The alterations in the regulations for the M.D. degree are intended to provide that every candidate for that degree shall pass a test in medicine in addition to the test in the special subject of the particular branch he may select. The alterations in the regulations for the M.S. degree are verbal in character.

ENCLOSURE.

Resolutions adopted by the Senate at its adjourned meeting held on March 4, 1916.

I. That the sub-title "(in medicine and midwifery)" immediately below the words "(i) Doctor of Medicine" and immediately above Regulation 303 be deleted.

II. That in Regulations 303 (b) and 308 (b) the words "in the form hereinafter prescribed" be deleted.

III. That in Regulation 305, for the words beginning with "Branch I—Medicine (including mental diseases and pathology)—" and ending with "(d) A clinical and oral examination with the examination of tropical-pathological specimens" the following be substituted :—

"Branch I—Medicine :

(a) Medicine—one paper.

(b) Medicine, including mental diseases and pathology—two papers.

(c) A clinical and oral examination, including an examination in pathological specimens.

Branch II—Midwifery, including diseases of women and children :

(a) Medicine—one paper.

(b) Midwifery and diseases of women and children, including the pathology of these subjects—two papers.

(c) A clinical and oral examination in midwifery and diseases of women and children including an examination in pathological specimens.

Branch III—Pathology :

(a) Medicine—one paper.

(b) Pathology—two papers.

(c) A practical and oral examination in pathology.

Branch IV—Tropical medicine :

(a) Medicine—one paper.

(b) Tropical medicine, including the pathology of tropical diseases—two papers.

(c) A clinical and oral examination including the examination of pathological specimens."

IV. That in Regulation 306, for the existing time-tables the following be substituted :—

BRANCH I.		
Days	Hours.	Subjects.
First day	.. 10—1	Medicine.
	2—5	Medicine, including mental diseases and pathology—first paper.
Second day	.. 10—1	Medicine, including mental diseases and pathology—second paper.
Third day	.. 10—4	Clinical and oral examination.
BRANCH II.		
First day	.. 10—1	Medicine.
	2—5	Midwifery and diseases of women and children, including pathology—first paper.
Second day	.. 10—1	Midwifery and diseases of women and children, including pathology—second paper.
Third day	.. 10—4	Clinical and oral examination.
BRANCH III.		
First day	.. 10—1	Medicine.
Second day	.. 10—1	Pathology—first paper.
	2—5	Do. —second paper.
Third day	.. 10—4	Practical and oral examination.
BRANCH IV.		
First day	.. 10—1	Medicine.
	2—5	Tropical medicine, including the pathology of tropical diseases—first paper.
Second day	.. 10—1	Tropical medicine, including the pathology of tropical diseases—second paper.
Third day	.. 10—4	Clinical and oral examination.

V. That in Regulation 310 (a)—

(a) In clause (1) the words "one of which may be a subject for commentary" be deleted.

(b) In clause (5), first sentence, for the word "with" the word "including" be substituted.

II

Endorsement No. 2221-1, Public, dated 5th April 1916.

Referred to the Surgeon-General for favour of remarks.

(By Order)

V. T. KRISHNAMA ACHARI,
Acting Under Secretary to Government.

To the Surgeon-General.

III

Letter—from Dr. S. CHELLAYIA, M.B. & C.M., Resident Medical Officer, Borella Convict Hospital, Colombo.

To—the Chief Secretary to Government.

Dated—the 20th March 1916.

I have the honour to state that I passed the M.B. & C.M. examination of the University of Madras in 1912, and came over to Ceylon in search of employment.

I have been preparing for some time past for the M.D. degree examination of 1917, in branch II (Midwifery and diseases of women) under the existing regulations.

I now learn that your Government is considering the desirability of altering the existing regulations relating to the M.D. examination.

If the altered regulations are to come into force at once, it will seriously prejudice those candidates who are now preparing for the M.D. examination according to the present regulations.

I beg that the proposed alterations in the existing regulations, if passed, be not brought into force at once and that sufficient notice of the same be given.

I would humbly suggest that at least three years' notice be given, taking into consideration the difficulty of the examination.

IV

Endorsement No. 2408-1, Public, dated 19th April 1916.

Referred to the Surgeon-General for favour of remarks in continuation of Endorsement No. 2221-1, dated 5th April 1916.

(By Order)

V. T. KRISHNAMA ACHARI,
Acting Under Secretary to Government.

To the Surgeon-General.

V

Official Memorandum No. 2221-2, Public, dated 22nd May 1916.

The Surgeon-General is requested to be so good as to expedite the submission of the report called for in Endorsement No. 2221-1, dated 5th April 1916, and Endorsement No. 2408-1, dated 19th April 1916, regarding certain alterations in the University regulations relating to the examinations for the M.D. & M.S. degrees.

(By Order)

V. T. KRISHNAMA ACHARI,
Acting Under Secretary to Government.

To the Surgeon-General.

VI

Letter—from the Hon'ble Surgeon-General W. B. BANNERMAN, C.S.I., K.H.P., M.D., D.Sc., I.M.S., Surgeon-General with the Government of Madras.
To—the Secretary to Government, Public Department.
Dated—Camp, Kotagiri, the 8th June 1916.
No.—107/T. 139.

With reference to Government Endorsement No. 2221-1, dated the 5th April 1916, referring for my remarks a letter from the Registrar of the Madras University proposing certain alterations in the regulations relating to the examination for the M.D. and M.S. degrees, I have the honour to forward a copy of a letter, dated 14th April 1916, from the Principal, Medical College, Madras, explaining the reasons for the proposed alterations.

2. The alterations may be sanctioned by Government.

ENCLOSURE.

Letter—from the Principal, Medical College, Madras.
To—the Personal Assistant to the Surgeon-General with the Government of Madras.
Dated—the 14th April 1916.
No.—149.

In reply to your Memorandum No. R.C. 538-1, dated 11th instant, I have the honour to state that the alterations in the regulations relating to the M.D. and M.S. degree examinations passed by the Senate on March 4 were proposed by the Faculty of Medicine for the following reasons :—

M.D. degree examination.—The branches were not evenly balanced. Branch II did not include medicine at all, and the Faculty was unanimously of opinion that an M.D. degree should not be given unless the examination included a paper in medicine. Branch II was also much easier than the other branches and the result would probably have been a succession of candidates appearing for branch II only. The different branches under the proposed alterations will be evenly and consistently arranged.

M.S. degree examination.—It was proposed to delete the words "one of which may be subject for commentary" because the Faculty considered that in an honours examination, which the M.S. degree examination is intended to be, the examiners should not be in any way limited as regards the scope of the examination.

The other alteration, viz., replacing the word "with" by the word "including" is merely a verbal one to make the regulations read the same as those for the M.D. degree examination as it was thought the different wording might be read as having a different meaning which is not intended.

VII

Letter—from the Hon'ble Surgeon-General W. B. BANNERMAN, C.S.I., K.H.P., M.D., D.Sc., I.M.S., Surgeon-General with the Government of Madras.
To—the Secretary to Government, Public Department.
Dated—Ootacamund, the 12th June 1916.
No.—71 M./T. 152.

With reference to Government Endorsement No. 2408-1, dated 19th April 1916, I have the honour to solicit reference to my letter No. 107/T. 139, dated 8th June 1916, wherein full reasons have been given for the proposed alterations in the regulations relating to the examination for the M.D. and M.S. degrees.

2. The modification in branch II of the M.D. degree examination, complained of in the memorial forwarded to me for remarks with the above memorandum, is that a paper in medicine has been added to it. I do not see how this addition is necessarily a hardship to candidates who must have previously qualified themselves in that subject for their M.B. degree examination.

3. The memorial referred to is herewith returned.

Order—No. 727, Educational, dated 3rd July 1916.

Under section 25 (1) of the Indian Universities Act, 1904, the Government sanction the alterations in the University Regulations relating to the M.D. and M.S. degrees submitted with the Registrar's letter read above.

(True Extract)

P. RAJAGOPALA ACHARIYAR,
Secretary to Government.

To the Registrar, University of Madras.

Copy to the Director of Public Instruction.
" the Public Medical Department.
" the Surgeon-General.
" Mr. S. Chellayya.

Editors' Table.

EDUCATIONAL DEPARTMENT.

NOTES CONNECTED WITH G.O. No. 727, EDUCATIONAL,
DATED THE 3RD JULY 1916

[SUBJECT.—*Alterations in the University Regulations.*]

*From the Registrar, University of Madras, dated the 20th March 1916,
No. 2126.*

The Public (Medical) Department may, it is submitted, be requested to obtain the views of the Surgeon-General on the proposed alterations.

E.A.V.—27-3-16.

T.K.—27-3-16.

E. A. HARVEY—1-4-16.

To the Public (Medical) Department.

PUBLIC (A) DEPARTMENT.

Draft memorandum to the Surgeon-General is submitted for approval.

V.K.C.—4-4-16.

P.D.R.—4-4-16.

V. T. KRISHNAMA ACHARI—5-4-16.

[Official Memorandum No. 2221-1, dated the 5th April 1916.]

From S. Chellayya, dated the 20th March 1916.

The alterations in the regulations relating to the M.D. degree examination proposed by the Syndicate have been forwarded to the Public (Medical) Department for obtaining the views of the Surgeon-General thereon. Submitted that the present petition may also be forwarded to that department for consideration along with the main question.

E.A.V.—4-4-16.

T.K.—4-4-16.

E.A.H.—10-4-16.

To the Public Department.

PUBLIC DEPARTMENT.

The present petition may be referred to the Surgeon-General for remarks in continuation of Official Memorandum No. 2221-1, dated the 5th April 1916. Draft submitted.

K.N.—18-4-16.

N.K.—18-4-16.

V.T.K.—19-4-16.

[Official Memorandum No. 2221-2, dated the 22nd May 1916.]

From the Surgeon-General, dated the 8th June 1916, No. 107/T-139.

From the Surgeon-General, dated the 12th June 1916, No. 71-M./P-152.

The Surgeon-General supports the proposed alterations in the regulations for the M.D. and M.S. degrees.

2. On the petition of Mr. Chellayya the Surgeon-General observes that the inclusion of a paper in Medicine in Branch II of the M.D. degree examination will not cause any real hardship to the petitioner since he has passed an examination in Medicine for his M.B. and C.M. examination. Further it will be noted from the Principals' letter that Branch II of the M.D. degree examination is the easiest to pass.

3. Submitted that the papers may now be returned to the Educational Department.

K.N.—15-6-16.

N.K.—20-6-16.

V. T. KRISHNAMA ACHARI—21-6-16.

C. G. TODHUNTER—21-6-16.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

A draft order is submitted for approval.

E.A.V.—23-6-16.

T.K.—26-6-16.

P. RAJAGOPALA ACHARIYAR—28-6-16.

P[ENTLAND]—30-6-16.

Issue.

P.R.—1-7-16.

[G.O. No. 727, Educational, dated the 3rd July 1916.]

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Ed. DEPARTMENT.

READ AGAIN G.O. No., dated 191

READ ALSO:—

C. No. 1068, From the Regt. Commr. of, No. 2126, dated to 20th March 1916.

Madras.

9214, Mr. S. Lehellay, Mar 20th March 1916.

107-1.139. 11. 11. 8. 1916

S. L. 71 M T. 152 No 12th June 1916.

ORDER.

No. _____, dated _____, 191

Φ. 3.

7th E. T.

Under Section 25 (1) of
the Indian Universities Act,
1904, the Govt. sanction the
alterations in the University
Regulations relating to the
M. D. and M. S. degrees
submitted with the Registrar
letter read over.

23.6.16

$\frac{26.6.16}{26.6.16}$

10 The Registrar,
University of Montreal
Copy to the S. S. Dept.
the Public Dept.
the S. S.
S. S. Schellenger

MODERN TANNAGE

By
L. A. GROTH, D.Sc., Ph.D.

Knight

Royal Swedish Order Gustavus Wasa.

Royal Commissioner :

The International Industrial Congresses
of Vienna and Paris.

Vice-President :

The International Permanent Commission
for the Protection of Industrial Property,
Paris.

Consulting Engineer.



ELECTRO LEATHER INDUSTRIES

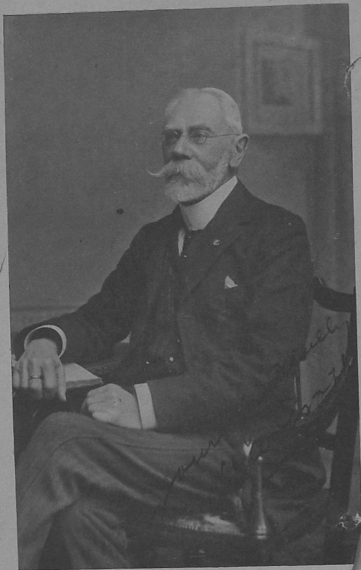
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L. A. Groth
[Signature]

MODERN TANNAGE

STERILIZATION

GROTHINE

ELECTRO-TANNING

By

L. A. GROTH, D.Sc., Ph.D

Knight

Royal Swedish Order Gustavus Wasa.

Royal Commissioner :

The International Industrial Congresses
of Vienna and Paris.

Vice-President :

The International Permanent Commission
for the Protection of Industrial Property,
Paris.

Consulting Engineer.

ELECTRO LEATHER INDUSTRIES

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WESTMINSTER, S.W.

From a Speech by
HIS MAJESTY KING GEORGE

"WE all recognize that without a scientific foundation no permanent superstructure can be raised.

"Does not experience warn us that the rule of science has taken its place, that to-day we cannot be satisfied with the crude methods which were sufficient for our forefathers?"

GOD SAVE THE KING.

Modern Tannage.

*Science give the rule,
Practice test the rule,
Commonsense will rule
If Science with Practice may rule.*

*Great Economic Results
are obtained by substituting
Modern Means and Requirements
for
Waste and Inefficiency,
reducing
Cost of Production to a Minimum,
leaving with absolute certainty
Increased Profit.*

*What we offer we do under
Guarantee of Beneficial Results.*

*Our Advice is free
for addressed stamped envelope.*

Correspondence cordially invited.

*Our Works are open for Inspection
on previous application in writing.*

ELECTRO LEATHER INDUSTRIES,

11 TOTHILL STREET
WESTMINSTER, S.W.
6

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TRADE MARKS



INTRODUCTION

The excellent quality of British tanned leather is admitted the world over.

This does not imply, however, that the method of manufacture is perfect, nor that improvements cannot be made both in regard to means of production and quality of the leather produced.

Progress of science is gaining ground with unprecedented rapidity, revolutionizing processes which were considered perfect, in almost every branch of industry.

The custom in the tanning industry to adhere to ancient methods causes an enormous waste of capital, time and labour, resulting in economic losses of almost incredible amount.

The great development in general, and the creation of new industries, have extended the employment of leather for a multitude of new and important purposes, all of which require special preparations and treatments to suit the various applications.

The demand for new and improved methods is therefore urgent, and advantage ought to be taken of the present favourable opportunity to oust

our trade enemies, once and for all, by adopting modern tannage and the manufacture of the chemicals essential to enable this country to produce the great quantity of leather now annually imported, the value of which amounts to roughly *eleven million pounds sterling; every bit of which could and ought to have been manufactured in the United Kingdom.*

Few industries labour under such peculiar and difficult conditions as the tanning trade, being subjected as it is to such a liability of rapid destruction of its raw materials; fermentation and decomposition playing therein a greater havoc than in any other industry.

Fermentation. During the first week after flaying the loss in weight of gelatinous matter sustained by the hide amounts to 19 per cent. and upwards, representing on an 80 lb. hide a minimum loss of 15 lb., which at present minimum price of 1s. equals 15s. per hide.

Applied to the eighteen millions of hides stated to be required in the United Kingdom, *the annual loss amounts to the astounding and gigantic figure of more than fourteen million pounds sterling*, a loss that may truly be termed a *national abuse*, as it can be avoided by judicious treatment or sterilization of the hides and skins.

The loss of gelatinous matter thus sustained can never afterwards be replaced, and inferior leather only will be produced.

Tanning extracts, and liquors prepared therefrom,

decompose rapidly in proportion to their acidity. Mixed tannages with concentrated extracts will cause great loss of tannin, and also reduce the commercial value of the leather produced.

Pu'refaction, from its destructive nature, plays consequently an important part in the hide, skin and leather industries and their numerous kindred branches.

It cannot be too strongly pointed out that the *improper treatment of the hides* and skins in the various preparatory processes (before as well as during tanning), by means of more or less suitable chemicals, more often than not in their crude commercial state, and taken often in proportions which do not produce their maximum effects, will result not merely in an inferior quality of the article produced but also in great economic loss.

The *influence* exercised by the war upon our industry and commerce is truly a phenomenon of almost incredible nature, having brought forward an earnest and ceaseless desire to detect industrial waste and inefficiency and to overcome them by modern means, thereby reducing cost of production, increasing profit, and supplying products of greater commercial value, more in harmony with progress of time.

The *interest* fostered by *H.M. Government* in raising industrial capabilities cannot but inspire confidence; as soon as facilities are provided, proper co-operation arranged, and economic organiza-

tion adopted, business will force itself inevitably in everywhere, develop rapidly, and open up chances of a magnitude akin to world-wide industrial monopoly.

When the old way cannot be improved upon, it is best to keep it.

When the new way has outdone the old, it is best to adopt it.

The onus of deciding whether the old or the new way is superior, rests with every manufacturer or industrial chemist.

To ignore new methods and to omit to test them for oneself on the excuse that no need for them has hitherto been felt, may prove equivalent to turning away good business—and increased profit.

The object of the following pages is merely to draw attention to valuable research—in addition to important work already done by trade chemists—the results of which will no doubt be of interest to progressive firms, who aim at certainty and economy in production, reduction of waste, and increased commercial value of their products.

L. A. GROTH.

10 GRATTON ROAD,
WEST KENSINGTON, LONDON.

August, 1915.

ELECTRO-TANNING

DR. GROTH'S SYSTEM.

PATENT.

THE "*Electro-leather Industries*"—a British concern with English labour—assisted by leading scientists and tanners of repute, have investigated Dr. Groth's processes of *Electro-tanning* and *Sterilization*, and being fully convinced of their great importance to science and industry alike, have acquired the exclusive right to exploit the said processes and patents in the United Kingdom.

The *General Electric Co., Ltd.*, London, have secured to themselves the exclusive right to manufacture the electrical plants.

The *British Drug Houses, Ltd.*, London, have likewise obtained the exclusive right to manufacture Grothine and other antiseptic and purified chemicals for the leather industries.

Electro-bacteriological chemistry is undeniably one of the most highly specialized branches of industry at the present time, and its application to the

leather industry will result in transformation of the old process of tanning into a manufacturing business, producing leather of finest quality in short and absolutely defined periods of weeks, as against months, at a cost of production considerably less than by any other means or process.

Observations during many years of research, and costly experiments, necessitating also the consideration even of the smallest detail, have enabled Dr. Groth, a recognized Swedish scientist and specialist, Knight of the Royal Swedish Order Gustavus Wasa, and domiciled in London during the last thirty-six years, to simplify his former system of electro-tanning to such an extent that it is practically automatic in its working, dispensing with the ordinary lime-pits, colors, handlers, and layers, together with their great manual labour needed, a few suspender pits only being required.

A *modern tannery* offers many opportunities of profitable introduction of electricity as a medium for various purposes, with great economic advantages in respect of space, time, simplicity, reliability, cleanliness, manual labour and capital.

Opinion still prevails in the leather trade that it is more economical to generate the power in the yard, as it is believed that steam-boiler plants are in any event a necessity, instead of obtaining the power from public mains.

Electricity has in the trade the reputation of being

expensive, in addition to the general scepticism, both of which call for close inspection of our works.

Dr. Groth's system of electro-tanning is applicable to all kinds of leather, from hide to vegetable or mineral tannages, or to a mixture of both, with any blend or mixture of material.

The great point is that a pure and strong tan of heavy hides is produced with the great advantages of reducing time of tanning to six weeks, working capital by 75 per cent., and the cost of production by 50 per cent., whilst the quality of the leather produced is unsurpassed by reason of its uniform tannage.

Attention is drawn to the fact that drums, heated liquors or concentrated extracts are entirely dispensed with; consequently the great disadvantages attached to their use are also avoided.

Dr. Groth's system consists in the hides being suspended in the tanning liquor and kept there in horizontal motion; the tanning liquor being likewise kept in motion, but in a reversed direction to that of the hides, whilst an electric current is forced through the liquor and the hides.

The following illustrations, taken from actual installations for heavy tannages, will show the simple arrangements.

The installation, Fig. 1, will permit a weekly input of fifty hides, which can be tanned and ready for

ANNAGE

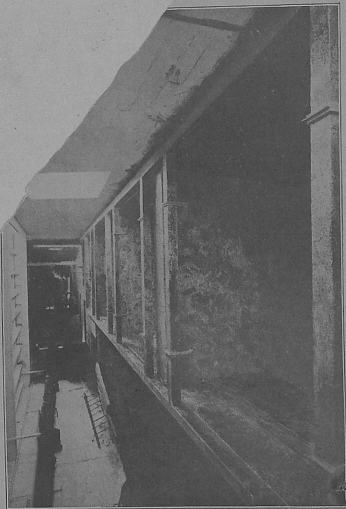


Fig. 1.—One Unit of Four Suspender Pits.

delivery or disposal within six weeks from commencement of operation.

Fig. 2 comprises twenty-four suspender pits,

ELECTRO

which will enable a weekly
wise to be completely tanned.

Special attention should be

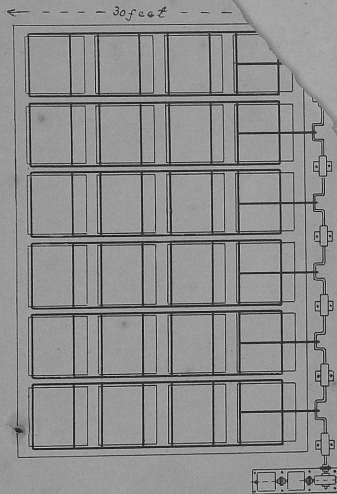


Fig. 2.—A Six Units Installation.

B

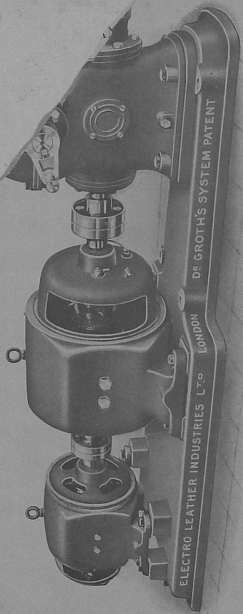


FIG. 3.—The Generating Plant.

ELECTRO-

number of tanpits and the space required for the tannage of a very large number of hides. For the twenty-four pits measures about thirty feet, and the motive power, if the pits are filled, i.e. with 1,200 hides, amounts

Fig. 3 illustrates the Generating Plant. The motor is combined with the generator and has a reduction gear on each side, mounted on one of the same bedplate—simple and ready for direct installation.

The energy required to act upon the motor may be obtained from the main of an existing power station.

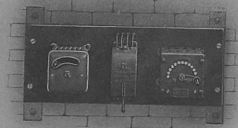


FIG. 4.—The Generating Distribution Board.

The switchboard, Fig. 5, is provided with safety and controlling instruments, all of which are working

TANNAGE

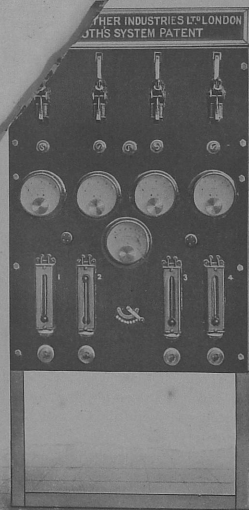


FIG. 5.—The Switchboard, with Automatic Controllers.

ELECTRO-

automatically, therefore no
needed, permitting the tannage
night.

Drying Leather.

The drying apparatus is distinguished from other systems hitherto known by its enormous capacity, uniform and perfect drying qualities at desired temperature and with any quantity of air. Its compactness, small consumption of steam and power, easiness of manipulation, facility of erection without special foundation, its great durability and great economy. It is automatic in its action, requiring the attendants merely to hang in and remove the skins. For instance 3,000 to 4,000 skins daily require the services of but three persons. The operation of this apparatus is based on the only just and approved counter-current principle, contrary to the hot-chamber system hitherto adopted, in which the skins for the most part were overdried in places, while still being wet in others.

These apparatuses, Figs. 6, 7, 8, 9, are built in any size and for any quantity and kind of skin.

The leather-drying chambers are of special construction, into which the wet tanned hides are removed, on the frames upon which they have been suspended in the tan-pits and remain so until the

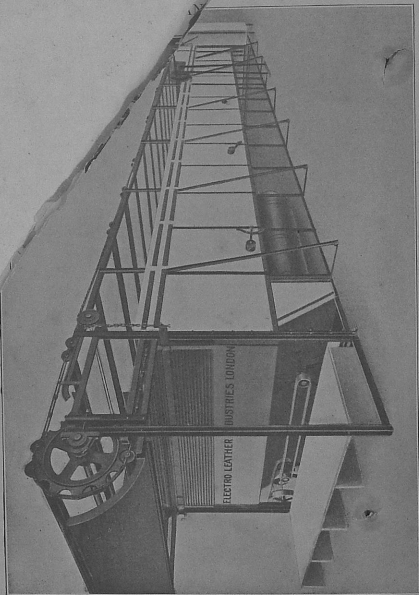


FIG. 6.—Drying Apparatus for the quick and uniform drying of all kinds of skins in the undyed and dyed state.

OPERATION OF THE APPARATUS

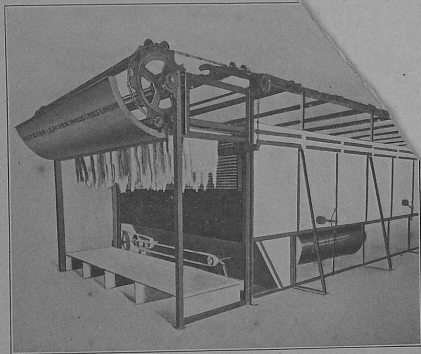


FIG. 7.—Charging: the skins are either slung over the rods or hung on the two back claws while the doors are closed.

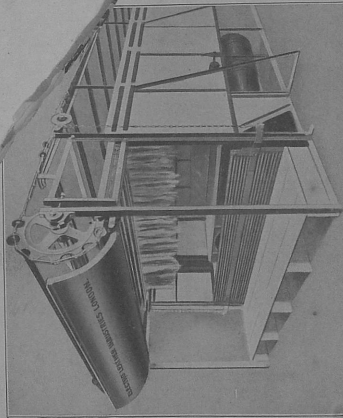


FIG. 8.—Charging end at the moment the door sinks and the suspended skins run automatically into the drying passage.

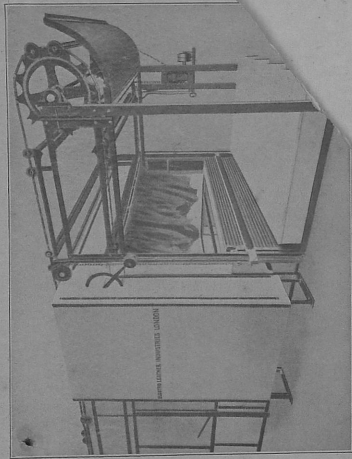


FIG. 9.—Discharging end with the doors open for the dried skins.

MANAGE

When they are removed to be
dry. Each chamber contains
see Fig. 10.
carried out without the use of

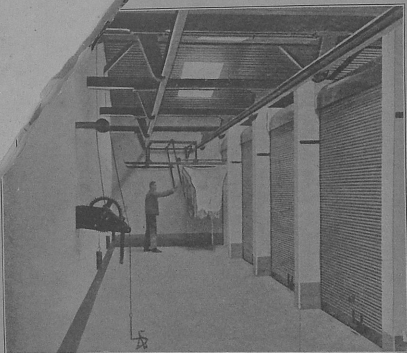


FIG. 10.—Leather-drying Chambers.

steam, but in places where the outside air is very
changeable, or of a low temperature, stoves are
used for the regulation of the temperature in the
drying chambers.

ELECTRO

The Storage Stoves, Figs. 11.
storage stoves, and the very s
them is shown in Fig. 11.



FIG. 11.—Storage Stove.

They are made from a special material, which
enables the heat produced in them, by means of
electricity, steam, coal or any other fuel, to be
retained and, so to say, stored in order to be auto-
matically distributed continuously and uniformly in

ANNAGE

humidity of the air, and the desired. One such storage

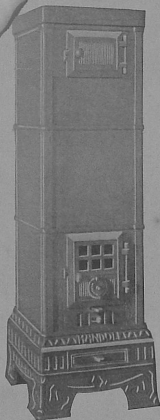


FIG. 12.—Storage Stove.

stove, five feet high, will, under ordinary conditions, heat sufficiently the air of one chamber.

ELECTRO

Ventilating

The construction of the fan for these purposes plays an important part in the factory results at a minimum cost.

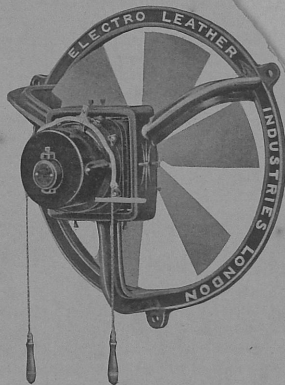


FIG. 13.—Ventilating Fan.

An effective and economic fan should be strongly built, instantly reversible, with perfect speed control,

ANNAGE

combination highly desirable

fan in the preceding illustration, aluminium straight blades, which are stronger than the curved blade. It is the only fan in which the current is proportionate to the speed of the fan, half speed cutting the motor bill in two. Its combination with the variable speed reversible motor, and its low starting current requirement and economical operation on low speeds, makes this fan the most satisfactory. The fans are instantly reversible from full speed one way to full speed the other by a simple pull on one or the other of the two pendant chains, enabling the same fan to force out the foul air, or draw in the fresh air at will. This is an important and characteristic feature of Dr. Groth's fans.

Unhairing.

The Unhairing Machine, Figs. 14, 15, has great improvements; it will unhair and scour the lightest as well as the heaviest hides. For quality and quantity of work turned out it is unequalled by any other system. It completely unhairs or scours the hides at one passage only without being turned, the finished stuff falling automatically either into a pit filled with water or on to a truck placed to receive it. Moreover the work done by the machine is, if not better, at least equally as good as that done by hand.

UNHAIRING MACHINE.

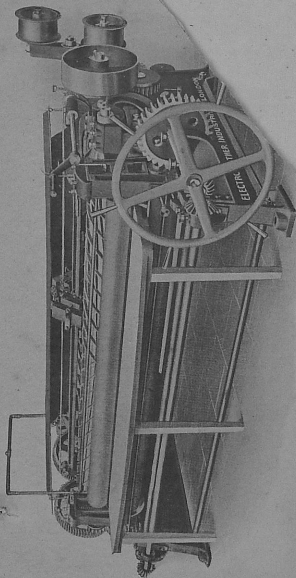


FIG. 14.—Front View of Machine from which

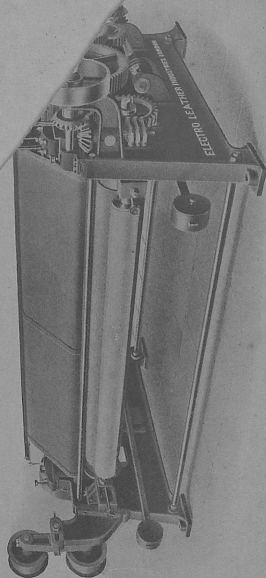


FIG. 15.—Back View of the Machine.

ELECTRO-1

Owing to the elasticity of the band, and the special arrangement of the rolls, no injury can happen to the operator be ever so careless.

The heaviest ox hide is completely and scoured in about $1\frac{1}{2}$ minutes, a process hitherto unequalled on any other machine.

The construction is simple but powerful, so repairs and their incumbent stoppages are entirely eliminated. The machine may be manipulated by one or two men, requiring for a capacity of forty to fifty heavy hides per hour, a motive power of from four to six h.p. Enormous saving of time and capital is obtained.

Band Knife Splitting Machine.

Fig. 16.

The endless knife machine is acknowledged as the best of splitting machines. The practical alterations on various individual parts, and the simplified and easy adjustment of the knife guides, are valuable improvements. Moreover, all vibration is eliminated and an absolutely clean cut obtained when splicing.

Both limed, dyed and tanned work can be spliced.

Our band-knife splitting machine is equally well adapted for calf and sheep skins, as well as for semi-heavy and large hides, horse necks and for splicing heavy head pieces of bullock hides. In

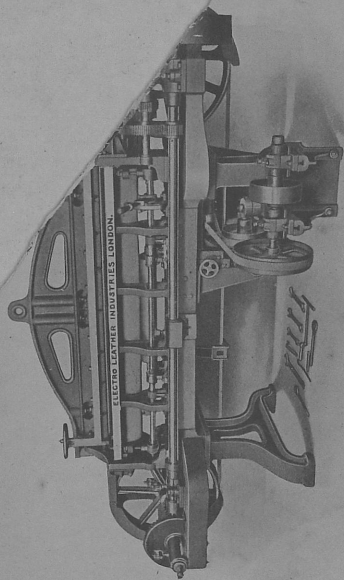


Fig. 16.—Band-Knife Splitting Machine.
Machine No. 2 with a working width of 6' 14".
Machine No. 4 with a working width of 9 feet.

ELECTRO-VA

making coach and covershes
band-knife splicing machine is 1-

Capacity in ten hours: 800 to
400 to 800 calf skins, 400 to 500 be
hides, up to 1,000 necks.

Motive Power: 3 to 5 h.p. Small
hides can be spliced on the larger mach
equal exactness.

Despite its great efficiency this new machi
very simple, the pressure and feed of the skins und
operation are automatic, requiring but little driving
power, 2-4 h.p., and the attendance of one man.

Fleshing.

The hide, after having been unhaired by machine,
may be brought direct into the fleshing machine
without previous soaking.

The Roller Fleshing Machines shown in Figs. 17
and 18 possess special features of practical working,
easy attendance and great efficiency, combined with
comparatively small consumption of motive power.
The machine is provided with an instantaneous
and automatic pressure-regulating device, enabling
the most uneven hides, such as a bull hide, to be
fleshed perfectly clean; the pressure may be regu-
lated, so as to correspond with the heaviest as well
as the thinnest hide without necessitating the
previous loosening of screws, which is generally

ROLLER FLESHING MACHINE.

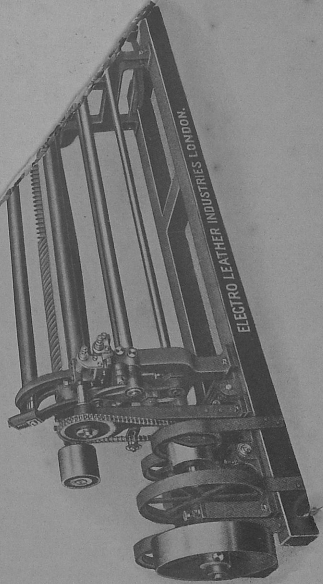


FIG. 17.

ROLLER FLESHING AND UNHAIRING MACHINE,
FOR SHEEP AND GOAT SKINS.

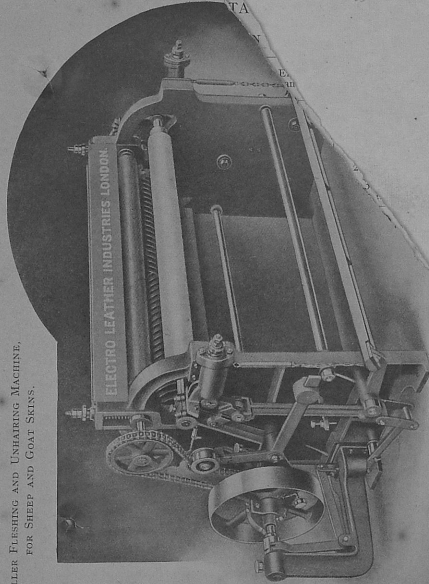


FIG.

TANNAGE

...ines of other make. The
...e made with the greatest care,
...ings of greater commercial value
...ted by any other machine.

...ion of the machine is very simple, and
...e attendance of two men only. One
...the hide is being fleshed first and then twisted
...to enable the other half to be fleshed; the
...is after fleshing passed by another attendant
...to the flesher for inspection. The fleshings fall
...in a tank at the back of the machine.

The capacity of the machine is forty to fifty
hides, or 200 to 300 skins per hour, at an expenditure
of motive power of from 20 to 30 h.p.

The machine may be used with equal advantage
for unhairing and scouring, with simple and uniform
operation and large capacity.

The machine is provided with an automatic
reciprocating working roller, operating backwards
and forwards, which greatly simplifies the opera-
tion and admits an enormous output.

Quality of Leather.

The extraordinarily good quality of the electro-
tanned leather may be judged from the multitudes
of tests (about eighty-four) made by Professor W. C.
Unwin, LL.D., F.R.S., M.Inst.C.E., Hon. M.In. M.E.,
etc., London, for the purpose of ascertaining its
tensile strength. The results of some comparative
tests are illustrated in Fig. 19.

ELECTRO-TANNAGE

Nos. 1 and 2 represent Dr. C.
Nos. 3, 4, 5, 6 represent lea-
different tanners of high repute.

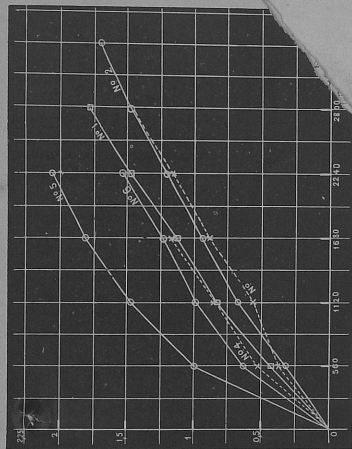


FIG. 19.—Diagram of Tensile Strength.

No. 5 has already, at a load of 560 lb., an elonga-
tion of 0.79 inch, measured on a length of $7\frac{1}{2}$ inches,

TANNAGE

2,240 lb. obtained the great increase of one hundred and thirty per cent. instead of a straight line, indicating an increase in tannage. The same is the case with sheepskins, 3, although in less degree. The five weeks' tannage represented by the curves 1 and 2, show even at the great load of 1,120 lb. an elongation of 0.23 and 0.66 inches, measured on a strip of eight inches, and at the load of 2,800 lb. only 1.78 and 1.44 inches respectively; their elongations are thus very small and proceed, as near as possible, in a straight line, which indicates an exceptionally uniform tannage, all parts through the whole thickness of the hide being thoroughly tanned alike. The leather is well known for its *strength, durability and finish.*

Raw Materials.

"Live-stock," otherwise cattle and sheep, provide the greatest raw materials in nature for food and manufactures, for they furnish meat, fat, hides, skins, wool, blood, hair, bone and manure, all of which afford enormous possibilities of profitable development of highly remunerative character, when subjected to modern processes, based upon scientific investigation combined with practical knowledge.

Cattle have increased during the last twenty-five

ELECTRO-TANNAGE

years by seventy-six million, and the population increase of one hundred and thirty per cent.

As the world's cattle is decreasing at a faster rate than that of the annual increase of population it is evident that the supply of hides will not be in adequate proportion to the requirement. Consequently prices will continue to rise, although they are already 100 per cent. higher than two years ago.

The economic outlook for the future is therefore a serious one, requiring earnest and immediate investigation in order to ascertain what means may be taken to ameliorate the position.

Consideration must especially be given to the loss of gelatinous matter, caused by fermentation, and amounting to 20 per cent. upwards in fresh market hides, equal to 15s. per hide.

The mode of tanning, at present based upon the employment of methods thousands of years old, cannot evidently answer the economic and commercial demands of present day progress, and the losses sustained accordingly, which are visible during every stage of the tanning process, are notoriously great and almost incredible; yet, they are being patiently overlooked or ignored by the tanner, probably because he knows that he will be fully reimbursed at proper time by the consumer of the leather, who consequently has to pay an excessive price, corresponding in no way with the quality of leather received.

TANNAGE

with the consumer to take nobody is more able and more than the boot and shoe manufacturer has been compelled to obtain from our part of the leather needed at an annual *seven million pounds sterling*, although of this leather could and ought to have made in the United Kingdom. The time for to act is now ripe, and, as on various other occasions, with his powerful co-operative principles and great economic organization, he can enforce his right and demand to obtain his raw materials of a quality and at a price which will enable him to provide the public with a product consistent with fair trading.

Extending the co-operative principles to the erection of their own tanneries can only be a question of time, as it would not only make the boot and shoe manufacturer independent, but would also secure to him the tanner's profit, together with many other advantages. Take, for instance, the example of the *Co-operative Wholesale Society*, with an annual production of something like three million pairs of boots, for which would be needed, roughly speaking, 120,000 hides, representing a weekly tannage of 2,400 hides, which could easily be done in one tannery alone, working upon modern principles, whereby the boot manufacturer could be absolutely sure to obtain weekly, at his own door, the quantity of leather he requires,

ELECTRO-LEATHER

and moreover of the very kind thereby from keeping the usual material, and the capital needed.

The Electro Leather Industries have considered the matter and have for such purposes obtained concessions for the erection of from five leading towns in the United Kingdom while similar offers from other towns are at

Consumption of Leather.

From the diagram, Fig. 20 on next page, it will be seen that leather for twenty-five pairs of boots may be obtained from one hide. Assuming that each individual out of the forty-five million inhabitants in the United Kingdom requires two pairs of boots a year, and that each pair has an average weight of 3 lb., it follows that the quantity of leather required for boots every year would be

Lb. 270,000,000

To this should be added the quantity of leather needed for beltings, harness, industrial purposes, and army accoutrements, which, at a conservative estimate, may be taken at an equal figure

270,000,000

Equal to an annual total of leather

Lb. 540,000,000

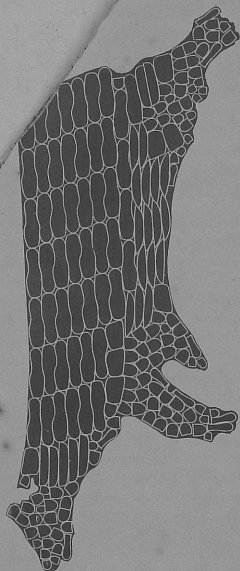


FIG. 20.—Cutting up of Leather for Boots.

ELECTRO-1.

Representing at 30 lb. of leather per hide

The value of which, at an average weight of 70 lb., and at present price of 1s. per lb. or £3 10s. od. per hide, would be

It is stated that twelve millions of the es millions of hides are annually tanned in the U Kingdom.

The consumption of leather is, in reality, considerably greater.

The Army estimate a renewal of the equipment of each soldier every four months. Estimating thus 9 lb. of leather for each soldier, and two million men, the annual requirement of leather by the Army would be . Lb. 18,000,000

Which at 30 lb. of leather per hide, would require annually . Hides 600,000
or for every month . „ 50,000

The loss of hide substance by fermentation amounts to 20 per cent., or 15s. per hide, which applied to the above army number of hides, equals a loss per year of £420,000
or per month £35,000
or per week £8,700

The loss on the annual consumption of 18 million hides at 15s. would be £13,500,000, or a total annual loss of £14,000,000 sterling, a loss that can

TANNAGE

by sterilization of the hides with
 aims that there is no commercial
 importance to humanity and industry
 in the systems of Sterilization and Electro-

Capital in the Tanning Trade.

The trading capital employed in the tanning
 industry is enormous, the most important raw
 materials being subject to cash transactions only.

The working capital for heavy tannages, including
 the keeping of small stock of raw materials and
 finished products, amounts to rather more than £3
 per hide, which is being locked up by the ordinary
 process of tanning during a period of forty weeks
 upwards, but by the electro-tanning process for ten
 weeks at the utmost, before any return from the
 sale of leather may be obtained.

COMPARATIVE WORKING CAPITAL.

Number of Hides per Week.	Working Capital.		
	Ordinary Process.	Electro- Tanning.	Saving.
100 hides per week.	£ 12,000	£ 3,000	£ 9,000
250 " " "	30,000	7,500	22,500
500 " " "	60,000	15,000	45,000
1,000 " " "	120,000	30,000	90,000

ELECTRO-TA

INTEREST AT 5 PER CENT. ON

Number of Hides per Week.	Ordinary Process.	Electro- Tanning.	
100 hides weekly .	£ 450	£ 30	
250 " " "	1,150	70	
500 " " "	2,300	140	
1,000 " " "	4,600	280	4.5

Any industry working under such adverse con-
 ditions must encounter economic difficulties.

INDUSTRIAL ORGANIZATION TANNING TRADE LOSSES¹

great reformatory power of the world, when studied, understood, and analysed, opens up for earnest consideration many points relating to the practical application of the progress of science and civilization to industry and the welfare of mankind.

The new forces of material and social invention will play upon our human life with unprecedented energy, and gradually remodel the whole world of human life, thought, and action, re-shaping all things on a scale so vast that no individual mind can hope to grasp its infinite complexity.

Intervals of seeming inaptitude have been shortened, reconstructions have followed, always with a more inclusive embrace of interests, each taking over something of abiding worth from the creative efforts that went before.

By the scientific vision of to-day, we see the atom as a system of ions and corpuscles as big, in its way, as a sidereal universe. In these components of the atom, as we now know, are locked

¹ By Dr. L. A. Groth, K.G.V. Reprint from the *Leather World*. London, September. 11, 1913.

INDUSTRIAL ORGANIZATION

the mysteries of electricity, which we shall understand its essential nature has been so applied by man as to have opened up, literally, a new world, pressing its problems of economic life, with results that are otherwise described than as astounding.

The business man of to-day must above all be a good organizer. He sees then what things can be put together, and moreover, how things can be put together in profitable combination; he sees where labour-saving devices may be substituted for human effort; he perceives the aptitudes of other men, and how the specialization of aptitude can be pushed to its economic limit.

No fact is more potent than the necessity for modern industrial organization. But a general academic treatment of such an important matter does not disclose its enormous value from a practical point of view, therefore, some reference as to its economic value can only be gathered from figures as actually supplied by our industrial life, and applying them to figures as existing in our special trade. Indications of great importance will be given, not only to trade experts as to the proper field of extended research, but may also disclose mismanagement, of more or less grave nature, of the business, and will show to the tanner the almost incredible mismanagement of his business from the economic point of view.

We are apt to forget that industrial difficulties are caused by disregard to progress of time, and

N TANNAGE

is especially a too-pronounced referring to comfort himself with that his present perilous position by the increasing prices of hides. From indications of all kinds, there is reason to assume that the prices of hides will continue to increase, and the time is probably not far distant when the price will be double of to-day. The matter must therefore be looked into without fear, with open eyes and without prejudice.

The principal effort must be directed towards arresting or preventing altogether the fermentation which affects hides and tanning liquors to such an enormous extent, causing a waste which cannot be termed but a *national abuse*, as effective means are available which will entirely overcome this difficulty.

How often is proper regard taken to the cleansing of the hides, freeing them from dirt, salt, and colloidal matter, and the effect of the composition of the water used; to the destructive action of the liming process, still accelerated by the de-liming; to the continuous use of sour tanning liquors, causing such a great loss of tannic acid, and its injurious effect upon the leather produced; and to the influence of injudicious drying?

Add to this the great and unnecessary working expenses caused by wrongful mechanical constructions and arrangements; for instance, the great loss of steam by condensation in the drying pipes;

INDUSTRIAL OR

the loss by the continuous use of pulleys, and belting, whether working or not; the great and superfluous labour; and the great loss through the employment of gigantic working capital and adherence to ancient methods and by tannage.

The actual losses will be more apparent by giving figures to a weekly tannage of 1,000 hides of 80 lb., taking the time of tannage at forty weeks, and the working capital at £3 per hide, the latter, with small stock, representing a sum of £150,000, two-thirds of which, or £100,000, would be superfluous by the adaptation of modern methods.

The loss of interest at 5 per cent. represents £3,840; the loss of hide substance at 20 per cent. represents, at 1s. per lb., £32,000; the loss of tanning material at 25 per cent. and £15 per ton, £1,350; making an annual loss of £37,000 from these three sources alone, equal to 5d. per lb. of leather produced, or 20 per cent. upon the total capital. Applied to the eighteen millions of hides required in the United Kingdom, the annual loss exceeds seventeen million pounds sterling, sustained by adherence to ancient methods.

These enormous losses, which may all be entirely avoided by modern means, disclose in forcible and true manner the reason of the present perilous position of the trade and the absolute necessity of modern industrial organization.

ALS FOR THE LEATHER INDUSTRIES

MANUFACTURED ACCORD-
ING TO SPECIFICATIONS
BY THE PROCESSES OF
PURIFICATION AND UNDER
THE SUPERVISION OF
DR. GROTH.



Preparing Hides and Skins for Tanning

THE treatment of hides and skins in the various preparatory processes before they are ready to be submitted to the action of the tanning liquors is of vital importance, as not only is the quality of the leather produced dependent thereon, but moreover the economic result is almost entirely determined thereby.

Water.

One of the principal conditions for a satisfactory tannage is the quality of the water employed.

So indispensable as water is, so general is also the opinion that its composition has no influence upon the manufacture of leather, and yet its composition will cause a considerable loss in proportion to its degree of hardness.

CHEMICALS FOR LEATH

In addition to hardness when apparently pure, are infected with bacteria and germs of both vegetable and animal origin to such an extent as to render them unsuitable for soaking and tanning purposes, necessitating the addition of some efficient antiseptic chemicals.

The water used for soaking must be *pure* to reduce risk of putrefaction, and *soft* so as to enter into the hide; if it is *hard*, soaking will be unduly prolonged; if *impure*, putrefaction will rapidly set in and greatly injure the hide substance, causing loss of gelatinous matter, resulting in loose and spongy leather and poor weight.

When gelatine has been lost in the soaks it can never afterwards be replaced.

Water-Softening Plant.

The demand for simple means to obtain soft water of proper composition, in sufficient quantity, at low cost and without the employment of complicated and costly machinery, is a matter of urgency and great economic importance.

Dr. Groth's water-softening process is claimed to be the most simple, the least expensive and yet the most effective of its kind, an ordinary tank only being needed in addition to the compound named.

AQUETOL.

THE ANTISEPTIC WATER SOFTENER.

It is prepared as a powder and in tablets, ready for immediate use.

TANNAGE

of Hides and Skins.

Fresh market hide should always be cleansed from dirt, colloidal and at proper time after flaying, by means

COLLOIDOL,

pure and inexpensive composition. It removes dirt from the hair, softens up the grease of the grain and forces the water into the body of the hide more quickly than any other known substance. It produces a soft and silky grain, allowing the hair and scurf to be easily removed.

Colloidol is prepared as powder or tablets ready for immediate use.

De-Liming.

De-liming requires considerable attention, as an excess of acid produces an acid plumping, the danger of which is the greater the stronger the acid used.

Almost any acid which shows a low dissociation-constant may be used for de-liming purposes if it fulfils the following conditions:

1. It must form a soluble lime salt.
2. It must be non-poisonous and odourless.
3. It must be low in cost.

CALXOL.

This compound contains the only acid fulfilling

CHEMICALS FOR LEATHER

the above conditions. It is powerful, which only needs to be dissolved in water ready for immediate use.

The hides are suspended in Dr. G. Calxol containing Calxol, and remain there for 24 hours, de-limed, according to ordinary tests.

The bath of Calxol can be brought back to its original state, at very little expense to its original state, and remain permanent.

Unhairing of Hides.

The removal of the hair from the hide by means of lime is not in accordance with scientific and economic demands.

The unhairing of heavy hides is completed in twenty-four hours, without the destruction of the hair by the specially prepared

VILLUSOL,

an antiseptic compound which is brought upon the market as a powder or in tablets, free from iron. When diluted in water it is ready for immediate use.

The unhairing should be organized so that the daily input of hides is prepared in the morning enabling the hides to be unhaired the following morning, either by hand or by machine.

The unhairing machine of to-day is almost perfect in its working.

IN TANNAGE

Belmongery.

of skins requires much attention. Hides which have been well washed they are treated with

LANATOL,

an antiseptic composition ready for treatment of hides; the goods should be pulled within twenty-four hours.

As the skins are pulled, they should immediately be removed and well washed by means of Dr. Groth's agitator, containing water treated with "Aquetol," before consigning them to the lime, which should be very weak. Give the goods one or two draws, and consign to the buyers without delay.

Soaking Back of Dried Hides.

The softening or soaking back of dried hides and skins is connected with many difficulties and even with danger; much care and attention are therefore essential.

Hides dried in the usual way, and even those which have been exposed to the most rational drying, are very hard and almost waterproof; in order to be fit for tanning they must therefore be softened and brought back to their natural state, and cleansed from dirt and other adhesive undesirable matter.

During the softening process the thinner parts

CHEMICALS FOR LEATHER

are apt to putrefy before thickened. Hides are equally softened, causing less waste of matter, more or less, according to the nature of soaking.

The great aim should be to obtain for the leather good weight, firmness, yet with pliability, grain and a nice appearance. For *upper* leather softness, with fine silky grain. These qualities are obtained by

(a) SOFTENING OF HIDES WITH MARCEROL,

an effective and inexpensive antiseptic compound free from iron and formic acid. It is brought upon the market in a concentrated form, as powder or tablets, and needs only to be dissolved in water.

The hides are suspended in Dr. Groth's agitator containing the dissolved solution, and remain there without handling until the hides are properly softened, when they are shifted into another agitator to be rinsed.

It should be remembered that hides selected for sole leather should be softened in the shortest time possible, whilst those for upper leather may remain advantageously for a longer period in the agitator.

(b) SOFTENING OF WOOL-SKINS WITH LEVIGOL.

The skins should be treated in a similar manner to hides.

URN TANNAGE

to deleterious dissolving action

Tanning Effluents.

Public Health Act 1875, under sections 45, defines tanning as an offensive trade. The effluents and their discharge cause manufacturers as well as local authorities an ever increasing difficulty and unnecessary expense. We are apt to forget that consideration must be taken not merely to the effluents in themselves, but perhaps even more so to the influence which they may exercise by reason of their chemical and bacteriological compositions upon other effluents or matter with which they may come in contact, be it in the same sewer or elsewhere, forming with them other combinations more or less objectionable, and which may tend to choke and even burst the sewer.

The nature of the subsoil is also an important matter to be taken into consideration, by reason of its usual content of iron salts, which will have the effect of turning the tannic acid, and even the gallic acid, of the effluent into a black inky colour. One and the same effluent, while almost inoffensive in one place, may therefore be objectionable and even dangerous in another.

It is desirable to distinguish between the effluents from the lime-yard and that from the tan-house, by reason of their different composition and the

CHEMICALS FOR LEATHER

results they will produce according to the nature of the soil. The effluent from the lime-yard contains not only dissolved but also undissolved lime mixed with some hair, and should not be discharged into the sewer by reason of its tendency to choke the same. The effluent from the tan-house offers various objections of a more serious nature.

The treatment of trade effluents by Dr. G. H. Williams' system is as easy and inexpensive as it is effective, and complies with the requirements of the Act.

The liquid part of the effluents is converted into a clear and inoffensive liquor, which may be discharged anywhere. The solid matter is rapidly converted into marketable products, ready for immediate sale, offering thus an additional source of revenue.

If the means at our disposal be judiciously applied, there is not the slightest reason why the tanning industry should be classed amongst the trades of an offensive nature.

Effluents from Soak Liquors

may be purified by means of

PERFLUOL, I,

an effective antiseptic compound, prepared in liquid form and ready for immediate use, reducing the number of germs originally present in the effluent from 2,000,000 to 4,000, as against 81,000 remaining by other methods tested simultaneously.

ERN TANNAGE

n Sulphide Effluent.

after use of sodium sulphide for
y be purified by means of

PERFLUOL, II,

optic compound, in liquid form, which will
tely sterilize the matter.

Waterproofing of Leather for Belting, Harness, Boots and Shoes.

Many diseases have recently been declared to be the result of damp boots and shoes, hence the imperative duty to impregnate them with a solution which is absolutely waterproof. It should also be insignificant in cost and easy of application.

Beltings and harness exposed more or less to damp and water should be similarly treated in order to retain their flexibility and durability.

AQUEMOL

fulfils all these conditions.

Army tests during long wintry and rainy campaigns have proved Aquemol to be the best and cheapest of all leather preservatives tested.

Aquemol penetrates the leather, retains its firmness, yet produces that pliability so agreeable and essential to the feet, and so indispensable for harness and belts.

STERILIZATION OF ANIMAL AND VEGETABLE MATTER

BY MEANS OF GROTHINE



THE MOST POWERFUL
AND THE ONLY
PRACTICAL GERMICIDE.



Sterilization of Animal and Vegetable Matter.

THE mode of action of living matter is both complex and mysterious, and our limited knowledge of it is accountable for much of the delay in scientific and industrial progress.

The extraordinary development, however, which has taken place in the bacteriological-chemical department of research and the discoveries made accordingly must, indeed, be held to be among the most brilliant of the age.

There is no organic structure which is not subject to attack by some form of microbe, therefore everything is subject to fermentation, decay and destruction.

Animal matter, particularly, undergo with extreme rapidity putrid fermentation, and the richer the

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ner by acids or alkalis, nor should it corrode or injuriously affect the matter with which it is brought in contact. The mode of action of antiseptics must be various in character. Some owe their power to oxidation, others to a reducing action, while others again may render the medium in which the microbes exist unfit for their further maintenance by entering into combination with the albuminous principles upon which they may have hitherto depended for food, thus converting them into substances which they cannot decompose. In this way they may be starved out of existence.

A few antiseptics only are suitable for the treatment of hides, the antiseptic qualities of some not being sufficiently powerful; others having the effect of precipitating the tannin; others, if they destroy bacteria, do so only imperfectly by their failure to prevent the development of a multitude of vegetable growths, while others, far from opposing their invasion, appear to increase their number to a point when the necessary quantity of antiseptics becomes so considerable that its use is no longer possible. The effect is greatly increased by warmth and moisture.

Many of the mineral salts, for instance those of iron and zinc, have the effect, when combined with tannin, of actually hastening the production of mould; others, such as sulphate of copper, tartrate of antimony and arsenic, act as antiseptics only

STERILIZ.

when present in considerable quantity, and are therefore been rejected.

Salts of mercury possess great antiseptic power, but the greater number of them decompose by mouldiness, while many are precipitated, and being almost insoluble in water it is necessary in order to effect their solution, to employ a solvent.

The method of preservation by salting the hides does not prevent fermentation and decay, as common salt does not under any circumstance act as a germicide.



Grothine.



After years of scientific research and costly experiments on a commercial basis, Dr. Groth, Knight of the Royal Swedish Order Gustavus Wasa, has ultimately discovered an antiseptic germicide, now known under the name of Grothine, for the sterilization of animal and vegetable matter, or the prevention of putrefaction, which, it is believed, will play an important part in the various industries that employ as raw material hides, skins, wools, jute, hemp and the like.

Grothine is produced, greatly concentrated, either in the form of tablets, or as a liquid. When dissolved or diluted in cold water, it is ready for immediate use. Each tablet is proportioned so

ERN TANNAGE

necessary quantity for the sterilization of one hide. In liquid form, it is kept in each containing solution sufficient for the sterilization of ten hides.

COMMERCIAL VALUE OF GROTHINE.

Yam, or about 15 grains, is generally sufficient for the sterilization of one hide, as compared with about 25 lb. of common salt, which generally constitutes the present means of preservation of hides, but it must not be forgotten that common salt does not stop fermentation. *The small quantity of 3 lb. of Grothine would thus suffice for the sterilization of 1,000 hides, in comparison with 12 tons of salt, which latter, especially in South and Central America, the principal hide producing countries, would have to be imported from Europe and again re-shipped with the salted hides.*

Grothine, on the other hand, can be sent by post for thousands of hides to the most remote and inaccessible place in the world, enabling the hides and skins to be sterilized and preserved from decomposition, on the very spot of slaughtering, increasing thereby their commercial value immensely.

In a similar way hide collectors may easily carry the quantity of Grothine needed for hundreds of hides in their pockets, enabling them to sterilize the hides when collected at the butcher's or the slaughter-houses.

STERILIZATION

The value of Grothine is entirely due to it by reason of its ability to act as a powerful antiseptic, even in very dilute solutions. It destroys the vitality of anthrax spores and practically all other forms of disease-germs, at the moment of application. It also prevents, for an indefinite time, the development of micro-organisms.

GERMICIDAL POWER OF GROTHINE.

At the request of the Home Office the Royal Institute of Public Health, London, has made investigations, and reports as follows :

"After twenty-four hours of contact cultures on agar were made from each vessel, with the result that no growth could be obtained from any of the dilutions tested.

"It appears, therefore, that Grothine destroys Anthrax spores."

Grothine accomplishes what has not hitherto been successfully attempted in the preservation or sterilization of animal and vegetable matter. It is therefore claimed to be a discovery of great scientific, industrial, and commercial value and of the greatest importance to humanity.

There is no waste of any kind in the world that equals that of fermentation.

INFECTIOUS DISEASES OF ANIMALS

Anthrax.

It was in this malady that disease-producing germs (bacteria) were first discovered (in 1849).

Anthrax is a most virulent and fatal disease affecting certain animals, and may be conveyed from them to man by the handling of hides, wool, hair of animals which have died of the disease, and also from the handling of vegetable fibres such as jute, hemp and the like.

The germs of the disease (Anthrax spores) are found in the dust and in the substance of the pieces of skin and vegetable fibres and in excrement, and may remain active for years.

The disease is communicated to man sometimes by breathing or swallowing the dust, and sometimes by the poison lodging in some point where the skin is broken, such as a fresh scratch or cut, or a scratched pimple, or even chapped hands. This happens more readily on the uncovered parts of the body, the hand, arm, face, and most frequent of all, on the neck, owing either to infected hide, wool, or



Fig. 21.

Fig. 22.

Fig. 21.

RAT TANNAGE

Against the bare skin, or to dust a raw surface. Even a raw surface nothing is not free from risk, for dust on the clothes may sooner or later work on the skin beneath. Infection may also be brought about by rubbing or scratching a wound with hand or nail carrying the Anthrax germs.

Use of the nail brush, and frequent washing and bathing of the whole body, especially of the arms, neck and head, will lessen the chance of contracting Anthrax.

The first symptom of Anthrax is usually a small inflamed swelling, like a pimple or boil, often quite painless, which extends, and in a few days becomes black at the centre, surrounded by other "pimples."

Figs. 21, 22 and 23 illustrate stages of Anthrax infection.

The poison is liable to be absorbed into the system, and will cause risk of life, which can be avoided ONLY by prompt and effective medical treatment within two days, while the poison is still confined to the pimple.

Hence it is of the utmost importance that medical assistance should be obtained at once, if there is any suspicion of infection.

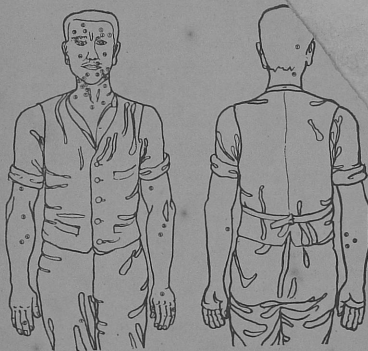
The treatment consists of rest in bed, the use of mercury ointment, and the giving of abundant nourishment. The treatment can only be properly carried out in a hospital, and under no condition

INFECTIOUS

should self-treatment be permitted.

painless and generally with satiation.

The following statistics, obtained from a hospital, are instructive. Persons



FIGS. 24 and 25.—Places of Infection.

obtaining medical treatment during first day of sickness are all cured; those treated on the second day were also saved, although 55 per cent. of them had fever and other symptoms. Out of

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On the third day 72 per cent. had
in, 8 per cent resulting in death;
entering the hospital on the fourth
cent. had very severe and serious
out of which 25 per cent. had fatal
The small number entering on the fifth
in days had fatal results.

Figures 24 and 25 show the parts of the body
which the workmen were affected. In sixty-one
cases the pimples were located on the head and
neck, of which thirty-nine were on the right and
twenty-two on the left side, while twenty-four
were on the arms.

Suitable overalls, protecting the neck and arms,
as well as ordinary clothing, add materially to the
safety of the workmen, and should be provided
and worn where practicable, if hides suspected to
be dangerous are handled. They should be dis-
carded on cessation of work. Similarly for the
protection of the hands, gloves should be pro-
vided and worn, where the character of the work
permits.

As a preventive measure the sterilization or disinfection, by means of Grothine, of suspected material, before handling, cannot be too strongly recommended.

Grothine accomplishes what has not hitherto been successfully attempted in the preservation or sterilization of animal and vegetable matter; it is therefore claimed to be a discovery of great scientific, industrial

INFECTIOUS

*and commercial value and of the
to humanity.*

GERMS AND ULTRA-VIOLET

Dr. Roux, Director of the Pasteur Institute, has just communicated to the Academy of Sciences a note from Madam Victor Henri, a scientific worker in his laboratory, relating the curious transformation of a microbe under ultra-violet rays. The bacillus under observation was that of Anthrax, which was subjected to the prolonged action of the rays. Under this influence the investigator obtained a new race of microbes. This new microbe, with which guinea-pigs were inoculated, communicates a new disease, having a toxic character and not that of blood poisoning.

It is not possible to generalize from a single or even from a number of instances, nor to argue from one set of circumstances to another. The importance of the discovery is therefore at present scientific rather than therapeutic, a matter of knowledge rather than of medicine. It lends strong support, however, to what has long been suspected—namely, that transformations of common germs within the body may occasionally occur, and may lead to their assumption of altered life processes, and as a consequence to the production of this or that disease process. It tends, in short, to break down ultra-contagionist doctrines, and to pave the way for the more general recognition that

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like "Foot and Mouth" disease (s), may be still arising *de novo*. Stimulate research for the discovery of the origins of such diseases.

GERMS AND DIET.

The fact in reference to diet and germs, of importance from a health point of view, recently come to light.

A high authority of the International Congress of Surgery states that germs are capable of being altered in character by the foodstuffs supplied to them by the bacteriologist. Feed them on one medium, say potato, and they will develop the power of causing one kind of disease; change their diet, say to gelatine, and soon another propensity will manifest itself and a new disease be created.

GERMS AND DYES.

Similarly in reference to dyes and germs there is no more romantic chapter in modern medicine than that devoted to the uses of the aniline dyes. These dyes have already afforded us some extraordinary drugs, including the famous atoxyl used in the treatment of sleeping sickness.

The fact is fully established that certain of the dyes have specific effects for certain germs.

The importance of this knowledge cannot be exaggerated, since the power to "poison" a particular bacillus without at the same time poisoning

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the tissues in which it has imbedded, the power to cure the disease cannot have been demonstrated for instance Ehrlich's Salvarsan.

The latest step in this direction has been made with the so-called "brilliant green," which has a remarkable power over the germ known as *Bacillus Coli Communis*. This germ plays a part in many of the diseases, and is a frequent cause of death among children.

Certain high authorities believe that the future of medicine is with specifics like the aniline dyes, and that members of this or other series will ultimately be discovered having a specific action upon each variety of living organism. Drugging will then cease to be empiric as at present and become an exact science. That this ideal may be realized is very probable.

Foot and Mouth Disease.

This is a violent contagious and inoculable malady of animals, characterized by initial fever, followed by the formation of vesicles or blisters on the tongue, palate and lips, sometimes in the nostrils, stomach and all parts of the body where the skin is thin, as in the udder and teats, between the hoofs, or the heels, coronet and pastern. The diseases begins suddenly and spreads very rapidly.

It is transmitted by the saliva and the discharges

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through all the secretions and is as harmless as well as all the secretions soiled by them.

It is usually a fatal malady, except in domestic animals or when malignant, yet it is a scourge. In one year (1892) in Germany it attacked 150,929 farms, with an estimated loss to the owners of £7,500,000.

It is transmissible to nearly all the domestic animals, but its ravages are most severe among cattle, sheep, goats and swine.

Human beings are also liable to infection. The preventive measures recommended are isolation of the diseased animals, boiling the milk before use, and *thorough disinfection with Grothine of all places and substances which are capable of carrying infection.*

Treatment of the foot and mouth disease with Grothine is simple and effective; the affected places in the mouth and the hoofs are washed with a diluted solution of Grothine by means of a syringe, which will immediately arrest the violence of the disease.

The Warble Pest.

The enormous damage caused by these pests is due to the flies depositing their eggs upon the hair of the beast. The animal licks the place where the eggs are placed and the larvæ hatched from them are carried by the tongue into the mouth. The

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maggots pass into the gullet, pass through the stomach and wander through the connective tissue between the flesh and skin, taking up the skin on the back, producing the warble, which soon becomes perforated. The skin, which soon becomes perforated, and the larvæ of the infected animals below the parts where the larvæ is lodged is also destroyed. In Germany, reared for beef, or in cows giving milk, it causes considerable deterioration, producing an annual loss in the United Kingdom estimated at £6,000,000.

It is asserted that the harmful effect of the warble fly on cattle produces colossal annual losses.

In *Belgium* the War Minister has stated that the wear of sound leather is 30 per cent. greater than that of warble-scarred leather. Other authorities state that 80 per cent. of the Belgian hides are affected by warbles.

In *France* the damage is estimated at sixteen to seventeen francs per hide.

In *Germany* the leather from warbled hides is sold at a reduction of 1½d. to 5d. per lb., equal to a loss of 2s. 6d. to 9s. in a butt of 18 lb.

In *Holland* the annual loss is estimated at £350,000.

The simple wetting or brushing over the warbled parts with a dilute solution of Grothine has given satisfactory results.

Ringworm.

This contagious disease attacks cattle and is transmissible to human beings. It is caused by a

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ashes itself at the base of the
breaks off. The fungus also
permits of the skin to be injured.
s of the skin apply Grothine externally
ompress, wetting or a spray, which will
er development of the disease.

Sheep Diseases.

Sheep diseases of parasitical nature, such as
ab, reds, ticks, lice, as well as the maggots of sheep
maggot-fly, cause great injury. In their endeavour
to allay the irritation caused by the mite the
sheep constantly rub the affected part, thereby in-
juring the skin; it is followed by an exudation of
serum and the formation of crusts or scabs. The
wool is shed, and the fleece becomes broken and
tufted or matted together.

With a view to the eradication of this disease
sheep-dipping has been made compulsory.

*The best and most efficacious sheep-dip is believed
to be a solution of Grothine, which, when properly
employed, will neither cause suffering to the sheep
nor stain the wool.*

STERILIZATION OF ANIMAL FIBRES

THERE are three kinds of animal fibres met with
nature; two of these are derived from quadruped
animals—"live-stock"—while the third class is
derived from certain insects, e.g. silk.

By far the most important of the animal fibres
is *wool*, a modified form of hair. At what point
an animal fibre ceases to be hair and becomes
wool it is impossible to determine, because the one,
by imperceptible graduations, merges into the
other, so that a continuous chain can be formed
from the finest and softest merino to the rigid
bristles of the wild boar.

Hardly second in importance to Australia as a
wool-growing country comes South America, or,
more correctly, Argentina, along with Patagonia,
Punta Arenas and the Falkland Islands.

The considerable Cape wool trade is largely
centred in Port Elizabeth, East London, Cape
Town, Mossel Bay and Port Natal, and large quanti-
ties of wool also come from the East and from
Russia and even from Iceland. Europe, however,
still maintains its supremacy as the chief wool-

although, as the wool is largely
ally, one hears little of European

with wool from a practical point of
it be recognized that it is by no means a
y, but has a somewhat complex structure.
here is the wool-yolk, which may be termed
atural impurity; the wool fat "lanoline,"
h is not only present in the yolk, but also
ermeates the fibres and seems to give it its plastic
and soft feel; and the cell structure proper of
the fibre.

The bulk of the wool of commerce comes into
the market in the form of fleece wool, the product
of a single year's growth cut from the body of the
living animal. The fleece wool is either in "the
grease," that is unwashed, and with all the dirt,
or it is received as "washed wool," the washing
being done as a preliminary to the sheep shearing.

The surface of a fleece is generally firmly caked
together into solid masses from the adhesion of the
dirt to the wool constantly moist with the exudation
from the skin of the greasy yolk. Sometimes
the wool is found matted together by clots of blood
which often contain the Anthrax spores, and offer
thus the greatest source of danger.

It is therefore evident that much depends upon
the careful and complete manner in which the
scouring, sterilization and treatment of the wool
is done. The qualities of the fibre may be

seriously injured by injudicious treatment, while
if the wool is imperfectly cleaned it will dye un-
evenly and the manufacturing operations will be
more or less unsatisfactory. The water used should
be soft and pure, both to save soap and, still more,
because the insoluble lime soap formed in dissolving
soap in hard water is deposited on the wool fibres,
and becomes so fixed that its removal is a matter of
extreme difficulty. Excess of alkali has to be
guarded against, since uncombined caustic acts
energetically on the wool-fibre, especially in the
presence of heat, and is indeed a solvent of it. A
soap solution of too great strength leaves the wool
harsh and brittle, and the same detrimental result
arises when the soapy solution is applied too hot.

While the "emulsion" method of wool scouring
is practically universal in England, the "solvent"
method is largely in use in the United States;
the two desired points being quantity of production
and cheapness.

Quality is sacrificed to quantity, and cheapness
results from the ease with which the agent employed
—say carbon disulphide—is recovered by volatilizing
and condensing, thus being used over and over
again.

*Animal fibres, either in their crude or raw conditions,
or partially or wholly manufactured, may be sterilized
with Grothine, either by immersion into the antiseptic
solution, or by treatment in the usual washing and
rinsing process.*

STERILIZATION OF VEGETABLE FIBRES

THE most important of the vegetable materials which require sterilization, are perhaps such vegetable fibres as cotton, flax, hemp, jute, China grass, etc., which are used for the manufacture of various fabrics.

Vegetable fibres may be roughly divided into two classes. The first class comprises those which are, like cotton, found attached to the seeds of various plants. These consist almost entirely of cellulose, and in all their properties resemble cotton. The second class of textile fibres are those which, like linen, hemp and jute, are found in the stem portion of the plant, lying between the woody portion of the stem and the bark; these are known as bast fibres. They do not consist entirely of pure cellulose, but often contain ligno-cellulose, or a body known as bastose; the presence of these bodies causes them to possess different affinities for metallic salts to what the pure cellulose fibres have.

The necessary treatment of bast fibres by the usual steeping; the composition of the water in the dams or pits in which they are immersed

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affecting the colour of the fibres, varying it from white to a bluish shade and sometimes to silvery grey; the proper period for remaining in the pits, the time allowed to drip before being pressed into bales, almost as hard as wood, all of which are matters of importance and require careful attention in order to prevent heating and fermentation. Considering further the means of steeping, for instance of Chinese grass and Indian hemp in pits, which are generally the local drains, and the clouds of dust produced, when the heads of plaits are untwisted, the risk of infection or contagion is very great indeed.

It is a common occurrence that people handling such fibres lose the nails on the fingers, and that the workmen often strike on account of the dust.

The sterilization with Grothine of such vegetable fibres will under all circumstances prevent any serious effects, either from the preliminary handling or the untwisting of the fibres.

The sterilization with Grothine of timber, wood shavings, sawdust, bark, cork, or allied substances, will strengthen, harden, consolidate and preserve them against decay, and the attacks of worms, insects, dry-rot, etc.

THE IDEAL HIDE MARKET¹

The great commercial value of hides and skins as raw materials for one of the most important staple industries of the world does not seem to be fully recognized, judging from the inadequate methods of treating and handling them before and after killing the animal, methods which undoubtedly offer objections of a most serious nature from sanitary, hygienic, and commercial points of view.

The welfare of common humanity demands that earnest consideration should be given to the danger to those who have to handle the hides and skins, an operation attended by constant fear of infection, producing diseases of virulent nature, ending, more often than not, with fatal results.

Anthrax spores, embedded in the colloidal matter of hides and skins, are recognized as the most dreadful of the micro-organisms, causing an alarmingly great increase in the destruction of human and animal life.

The danger to human life is considerably increased by transit on land and water of such hides and skins

¹ By Dr. L. A. Groth, K.G.V., Extract from the *Leather World*, London, November 13, 1913.

in a wet condition by reason of their exposure to heat and moisture, which constitute the most forcible means of rapidly increasing their fermentation, causing their decay and even total destruction.

There is ample evidence to show that animal food-stuff placed in the neighbourhood of such hides during carriage—for instance, shipment—receive contagion. The dangerous effect of this may be judged from our import of foodstuff amounting to £130,000,000 a year.

The evil causing such danger to human and animal life is to be found solely in fermentation, which also is the cause of the rapid and destructive effects upon the hide substance or gelatinous matter of the hide, resulting in a loss amounting to 19 per cent. upwards during the first week after flaying, equal to a loss of 15 lb. on a hide of 80 lb., which at 1s. gives a loss of 15s. per hide, to which should be added its reduced commercial value.

These are only a few of the indisputable facts indicating urgent reforms of a drastic nature in fairness to the protection of human and animal life, and to the demands of advanced commerce, demands so much more justified as science offers ample and absolute means for the complete destruction of these militant micro-organisms, means which would enable hides and skins to be sterilized or preserved for an indefinite period at a cost

even less than that of the ordinary salt generally used.

Salt does not under any circumstances stop fermentation; the best evidence of a practical nature will be found in Liebig's hides, which undergo the best process of conservation possible so far as salt is concerned, at great expenditure of time, labour, and salt, entitling them to their increased commercial value; yet, their fermentation is constantly going on.

Modern means of drying without the use of steam would ensure the preservation of sterilized hides and skins, even in those tropical and semi-tropical countries which constitute the hide centres of the world, and would increase immensely their commercial value.

The carriage of hides and skins thus sterilized and dried would save more than half the usual freight and greatly facilitate their shipment, as even passenger steamers would find no objection to such a cargo by reason of the entire absence of dirt, brine, and bad odours; it would also reduce the present difficulties of finding special cargo-boats for the exclusive carriage of wet and salted hides.

The soaking back of dried hides and skins could not meet with any justifiable objection, considering that more than 60 per cent. of all the hides that are being tanned are supplied in a dried condition; any such objection would be consider-

ably minimized by modern means at disposal for the purpose, enabling the hides to be soaked back in twenty-four hours in a simple and inexpensive way, leaving them in a softer and more plump condition than even in their primary fresh state; there would be no loss of hide substance, and the pelt would be more suitable for tanning and dressing, producing leather of increased commercial value at considerably less cost.

The necessity for definite steps being taken in this direction is accentuated by recent proposals made by the majority of leading tanners abroad in the calf-skin trade by reason of the increasing difficulties to obtain uniformity in the valuation of the fresh market skins. A proposal has been adopted that, under heavy penalty, all calf skins shall henceforth be purchased in a dry condition only.

Surely these are steps in the right direction, and will, it is hoped, be followed by similar stipulations in reference to hides generally.

It is significant that there is no law regulating the slaughter of cattle in the United Kingdom. Any butcher is permitted to slaughter his beasts at the back of his shop, subject only to the lenient inspection as to sanitary conditions. Corporations who have gone to the expense of erecting abattoirs find them empty, because the butchers cannot be compelled to use them. Nothing is being done to ameliorate such conditions, although official reports

say: "*There is unanimous testimony from towns at home and abroad where public slaughter-houses have been established, showing that the abattoir system has resulted in an improvement in the public health and a diminution of nuisance and cruelty. Private slaughter-houses are an abomination to the town, and a standing reproach to the authorities.*"

The way from the slaughter-houses leads to the hide markets. There is no necessity to go a hundred miles out of London to find the true state of hide markets. In most places they are merely sheds; in others, they are constructed without claim even to the faintest knowledge of scientific principles.

The handling there of the fresh hides and skins is permitted in a manner which is apt to prove either absence of knowledge of their great commercial value, or indifference to the state in which they are offered to the purchaser. As the tanner has to pay for this negligence, causing him such an enormous loss, there can be no wonder that he feels the injustice, and consequently desires an alteration of the present deplorable conditions.

If the British tanner would follow the principles accepted by the foreign tanners of calf skins, and agree to purchase sterilized hides only, in a wet or dried condition, the dealers would soon be compelled to improve the conditions of treating and disposing of the hides, so much easier for the tanners to do, as there are plenty of dried hides in the market for every conceivable purpose. Besides,

the insistence of using fresh hides only proves that the specialization, so important and necessary in every trade, has not yet got that acknowledgment in the tanning trade it deserves.

EXTRACTS FROM REPORTS UPON

Dr. Groth's Systems of Electro-Tanning and Sterilization.

AWARDED:

SILVER MEDAL, LONDON. SILVER MEDAL, STOCKHOLM.
GOLD MEDAL, PARIS.

S. RIDEAL, D.Sc. Lond., F.I.C., Fellow of University College, London, Past Vice-President Society of Public Analysts, and Member of Council of the Institute of Chemistry, 28 Victoria Street, London, S.W., and ALEXANDER P. TROTTER, B.A., M.Inst.E.C., M.Inst.C.E., Chief Electrical Adviser to the Board of Trade, London, in a paper read by them in 1891 before the Society of Chemical Industry—

"The rate of tannage under the continued influence of electricity and motion (*Groth's System*) is sixteen times faster than when neither are used (*the ordinary system*)."

DR. RIDEAL in his letter of January 7, 1914, says—

"The suggestions which you make for preventing the wastage of hide substance and tanning should assist in making your new proposals a success. I have no occasion to modify my views as to the possibility of good commercial results being attained."

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Professor W. G. UNWIN, LL.D., F.R.S., M.Inst.C.E., Hon. M.Inst.M.E., 7 Palace Gate Mansions, Kensington, London, W. Dated December 23, 1913—

"I have pleasure in stating that between 1891 and 1901, I tested various samples of your leather stated to be electrically tanned. The strength of the leather was satisfactory, and rather above the average strength of good leather."

Messrs. FLEMING, BIRKBEY & GOODALL, LTD., Belting Manufacturers, Contractors to His Majesty's War and Admiralty Departments, India Office, Colonial and Continental Governments, Halifax and London—

"We are highly pleased with the leather. The results are astounding. The leather is quite as tough as some of the better tannages, and the results are quite equal to any to be produced under the original system of tanning."

Dr. J. GORDON PARKER, Head of Herold's Institute, London, S.E. Extract from Leather Trades Circular and Review, London, April 12, 1898—

"The cost of tannage by Groth's system works out considerably cheaper than any other oak bark tannage with which I am acquainted."

"I am convinced that by no other process known to me could leather be produced of such uniform and good quality in such a short space of time and at so small a cost."

"There is a complete absence of the faults that have been found in all previous rapid tanning processes, whether by drum tannage or otherwise."

LEONARD G. TATE, A.M.I.E.E., F.E.C.A., Mansion House Chambers, London, E.C. Dated December 30, 1913—

"During the six months' demonstration at Wem, in 1900-1901, 330 hides were purchased, having a total

weight of 22,000 lb., including horn, and a total amount of 11,104 lb. of leather were obtained, 996 lb. of horn, 1,777 lb. of hair and 300 lb. of dried white pieces of glue. In no case were the hides in the tanning solution for more than six weeks."

"As far as demonstrations were conducted, the results certainly proved that leather could be obtained under Dr. Groth's process within six weeks from the time the hide was put into the tanning solution, during which time, however, the process was only in action during ten hours of the twenty-four per day. The labour involved in handling the hides is extremely small."

A. CHARLTON, Electrical Engineer, Kidderminster, January 14, 1914—

"I have pleasure in stating that I erected at Kidderminster during the latter part of 1912 the plant for the demonstration of your system of Electro-Tanning, consisting of one unit of four tanks, with small converting plant and all electrical appliances; supplying the energy from the mains. It is interesting to note how simple and almost automatic in its working your system is, and the astonishingly small amount of current required, and so little skilled attention. I am sure your system has a great future in front of it."

W. JOHN M. GRANT, President, Grant Tanning Company, Canada—

"I am really astonished such favourable results could have been obtained."

Mr. JULES BUSE FILS, Brussels, Belgium—

"Dr. Groth has discovered the best solution of the problem of hastening the process of tanning by aid of electricity."

ARMOUR PACKING COMPANY, Kansas City, Mo., U.S.A.—

"At the meeting held at our packing house, leather experts present declared the quality of Dr. Groth's leather, which had been tanned here in less than eight weeks from hides supplied by us, was decidedly superior to the bulk of that on the Western market."

SAMUEL REDLICH, Esq., Technical Tanning Director, Budapest—

"The sole-leather hides are very firm all through, and the croupins (butts) are excellent. The first batch of horse-hides have been curried, and they have turned out very good; the second batch have already been split and are good."

J. EDELSTEIN, Esq., Tanning Director, Budapest—

"Your tanning is really extraordinary, the hides measure 10 millimetre (about $\frac{5}{16}$ inch) in thickness. The leather merchants have now received the tanned horse-hides, and praise their quality highly. They have offered to buy the whole annual production at even higher price than they are paying now."

THE ROYAL INSTITUTE OF PUBLIC HEALTH, London—

"After twenty-four hours of contact cultures on agar were made from each vessel with the result that no growth could be obtained from any of the dilutions tested. It appears, therefore, that 'Grothine' destroys anthrax spores."

HARRY HOWELL, Esq., Managing Director of the Wolverhampton and District Butchers' Hide, Skin, Fat and Wool Co., Ltd., writes—

"You will be pleased to know that, as far as we are concerned, the hides that were treated with 'Grothine' turned out very well indeed. After lying

to drain for just over a fortnight, and looking then in a very fresh and fairly dry condition, they showed an increase in weight of 2 to 4 lb."

THE LEATHER TRADES CIRCULAR AND REVIEW, London—

"Apart altogether from the action of electricity, the nature of the mechanical means forming part of Dr. Groth's System goes a long way in justification of the patentee's claims, and if Groth's System did no more than this it would deserve attention."

THE BOOT AND SHOE TRADES JOURNAL, London—

"The leather produced by Dr. Groth's System lacks nothing to be desired in appearance, being of a bright, clean and even colour throughout and firm in texture; the process bids fair to revolutionize the art of tanning, and is likely to prove a scientific and commercial success."

THE SCOTTISH LEATHER TRADER, Glasgow—

"Dr. Groth's tanning by the aid of electricity will revolutionize a great industry to the benefit of the public, also the nation."

HIDE AND LEATHER, Chicago—

"Dr. Groth's System has attracted much attention in tanning circles; the samples show surprising quality considering that they have been in process only four weeks."

USEFUL DATA

ELECTRIC DEFINITIONS.

To enable the tanner to make his own calculations the expressions used in electrical measurements are as follows:

Ampère expresses a *Unit of Volume* of electric current, and conveys the idea of *quantity*.

Volt expresses a *Unit of Intensity* or *force* in the sense of pressure, analogous to the "head," or pressure of a stream of water.

Watt expresses a *Unit of Power* or *Energy* in a current, and is determined by multiplying the quantity of electric current passing in a circuit in amperes by the pressure in volts.

Ohm expresses a *Unit of Resistance*.

Unit. The Board of Trade unit is 1,000 *Watts* used for one hour. To see how long a lamp will burn before one unit of electricity is used, divide 1,000 by the wattage of lamp. Thus a 20 watt lamp gives 50 hours light per unit.

Candle Power is the measurement of the luminous intensity of a source of light in one direction.

Foot candle expresses the *Unit of Illumination* produced by a standard candle upon a normal surface at a distance of one foot.

The illumination varies inversely as the square of the distance, thus: if the distance between the light source and the area illuminated is halved, the illumination is increased four times, and so on.

Efficiency expresses the *Relation* between *current consumption* and *candle power*.

Thus a carbon lamp consumes 4 Watts for every candle power, while, for instance, a metal filament lamp consumes only a trifle over one watt per candle power.

Working Plane expresses the *Surface* upon which the illumination is required.

Life of a lamp expresses the *number of hours* it will burn before losing 20 per cent. of its initial candle power.

The metal filament lamp has an average useful life of over 1,000 hours. It is good economy to renew lamps that have burned that period.

METRIC CONVERSION TABLE.

Millimetres $\times .03937$ = inches.
 Millimetres $\div 25.4$ = inches.
 Centimetres $\times .3937$ = inches.
 Centimetres $\div 2.54$ = inches.
 Metres $\times 39.37$ = inches.
 Metres $\times 3.281$ = feet.
 Metres $\times 1.094$ = yards.
 Kilometres $\times .621$ = miles.
 Kilometres $\div 1.6093$ = miles.
 Kilometres $\times 3280.9$ = feet.
 Square Millimetres $\times .00155$ = square inches.
 Square Millimetres $\div 645.1$ = square inches.
 Square Centimetres $\times .155$ = square inches.
 Square Centimetres $\div 6.451$ = square inches.
 Square Metres $\times 10.764$ = square feet.
 Square Kilometres $\times 247.1$ = acres.
 Hectare $\times 2.471$ = acres.
 Cubic Centimetres $\div 16.386$ = cubic inches.
 Cubic Centimetres $\div 3.88$ = fluid drachms,

Cubic Centimetres $\div 31.07$ = fluid oz.
 Cubic Metres $\times 35.316$ = cubic feet.
 Cubic Metres $\times 1.308$ = cubic yards.
 Cubic Metres $\times 220.1$ = gallons.
 Litres $\times 61.027$ = cubic inches.
 Litres $\times 32.19$ = fluid oz.
 Litres $\times .22$ = gallon (Imperial).
 Litres $\div 28.316$ = cubic feet.
 Hectolitres $\times 3.531$ = cubic feet.
 Hectolitres $\times .131$ = cubic yards.
 Hectolitres $\div 22.01$ = gallons (Imperial).
 Grammes $\times 15.432$ = grains.
 Grammes (water) $\div 31.07$ = fluid oz.
 Grammes $\div 28.32$ = ounces avoirdupois.
 Grammes per cubic centimetre $\div 27.7$ = lb. per cubic in.
 Joule $\times .7373$ = foot pounds.
 Kilogrammes $\times 2.2046$ = pounds.
 Kilogrammes $\times 35.3$ = ounces avoirdupois.
 Kilogrammes $\div 1016$ = tons.
 Kilogr. per sq. cent. $\times 14.223$ = lb. per square inch.
 Kilogrammetres $\times 7.233$ = foot lb.
 Kilo per Metre $\times .672$ = lb. per foot.
 Kilo per Cubic Metre $\times .062$ = lb. per cubic foot.
 Kilo per Cheval $\times 2.235$ = lb. per H.P.
 Kilo-Watts $\times 1.34$ = Horse Power.
 Watts $\div 746$ = Horse Power.
 Watts $\div .7373$ = foot pounds per second.
 Calorie $\times 3.968$ = B.T.U.
 Cheval vapeur $\times .9863$ = Horse Power.
 (Degrees Centigrade $\times 1.8$) $+ 32$ = degree Fahrenheit.
 1 Litre = 1 cubic decimetre.
 1,000 Litres = 1 cubic metre.
 1,000 Cubic Centimetres = 1 cubic decimetre.
 1,000 Cubic Decimetres = 1 cubic metre.
 1,000 Milligrammes = 1 gramme.
 1,000 Grammes = 1 Kilogramme.
 100 Kilogrammes = 1 quintal.
 1 Litre of Water = 1 kilogramme.

HYDRAULIC EQUIVALENTS.

- 1 imperial gallon = 277·274 cubic inches.
 1 imperial gallon = 0·16045 cubic foot.
 1 imperial gallon = 10 lb.
 A cubic foot of sea water = 64·00 lb.
 A cubic inch of sea water = 0·037037 lb.
 A cubic foot of water = 62·32 lb.
 A cubic inch of water = 0·03616 lb.
 A cylindrical foot of water = 48·96 lb.
 A cylindrical inch of water = 0·0284 lb.
 A column of water 12 in. long 1 in. square = 0·434 lb.
 A column of water 12 in. long 1 in. diam. = 0·340 lb.
 The capacity of a 12 in. cube = 6·232 gallons.
 The capacity of a 1 in. square 1 ft. long = 0·0434 gallons.
 The capacity of a 1 ft. diameter 1 ft. long = 4·896 gallons.
 The capacity of a cylinder in gallons 1 yd. long = 0·1 diameter squared.
 The capacity of a 1 in. diameter 1 ft. long = 0·034 gallon.
 The capacity of a cylindrical inch = 0·002832 gallon.
 The capacity of a cubic inch = 0·003606 gallon.
 The capacity of a sphere 12 in. diameter = 3·263 gallons.
 The capacity of a sphere 1 in. diameter = 0·00188 gallon.
 1 imperial gallon = 1·2 United States gallon.
 1 imperial gallon = 4·543 litres.
 1 United States gallon = 231·0 cubic inches.
 1 United States gallon = 0·83 imperial gallon.
 1 United States gallon = 3·8 litres.
 1 cubic foot of water = 6·232 imperial gallons.
 1 cubic foot of water = 7·476 United States gallons.
 1 cubic foot of water = 28·375 litres of water.
 1 litre of water = 0·22 imperial gallon.
 1 litre of water = 0·264 United States gallon.
 1 litre of water = 61·0 cubic inches.
 1 litre of water = 0·0353 cubic foot.
 437½ grains = 1 fluid ounce.
 20 fluid ounces = 1 pint.
 6 feet = 1 fathom.
 One shipping ton (for measuring cargo) = 42 cubic feet.

- 1 Admiralty knot = 6080 feet.
 1 Statute mile = 5280 feet.
 1 kilometre = 3280·899 feet.
 Statute miles = Admiralty knots $\times 1·151515$.
 Kilometres = Admiralty knots $\times 1·8531505$.

GALLONS IN A CASK.

Take the area, in square inches, of interior circle at bung + area of interior circle at head $\div$ by 2 and $\times$ by interior length in inches. Then $\div$ by 277·274 for gallons capacity.

TEMPERATURE BY FAHRENHEIT AND CENTIGRADE:—

$$F \text{ to } C = 5 \frac{(F-3)}{9} = C$$

$$C \text{ to } F = \frac{9C}{5} + 32 = F$$

Example:—212° Fahr. 212 less 32 = 180. Divide by 9 = 20. Multiply by 5 = 100.
 100° Cent. 9 times 100 = 900. Divide by 5 = 180.
 Add 32 = 212.

Water boils at 1° less temperature (Fahr.) for every 521 feet in height above the sea. This is approximate only, and is corrected by relative barometric and thermometric readings in actual practice.

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