

Still Sent and Operated at Corn Show
by Government.

DESTINED TO DO MUCH GOOD

Secretary of Agriculture Wilson Sends
One of His Greatest Experts to
Give Practical Dem-
onstrations.

One of the most interesting of the great
host of interesting things installed for the
National Corn exposition is the denatured
alcohol still recently delivered under the
big stage of the Auditorium. It is designed
to show the process of manufacturing alcohol
which is to be subsequently denatured
so as to prevent its use as a beverage and
that it may be utilized in its denatured
state for commercial, manufacturing and
domestic purposes in lieu of gasoline and
kerosene.

The plant has been installed under the
supervision of the Department of Agriculture
and under the authority of the Revenue
Department by the Vulcan Copper
works of Cincinnati, O. The work of installation has been approved by A. O.
Wente, representing the firm.

The apparatus, which consists of an elaborate
working model still, is designed on
lines of strict theoretical correctness, but
in this effort the manufacturers have not
failed to take into account those conditions
arising in practice beyond which it
would be unwise for false economy to go.
Long experience and constant use of the
operation of distilleries has permitted this
company to effectively blend theory with
practice for obtaining the best and most
comprehensive working results. Every detail
of the installation of the still has been
looked after with painstaking thoroughness,
representing in the completed apparatus
the highest grade of workmanship and
perfect operating results.

The distillation process will be directly
looked after on behalf of the government
by Henry Wood Forger, fermentation
chemist of the bureau of chemistry, United
States Department of Agriculture of Washington,
D. C.

It is the purpose of this still to give
daily practical illustrations in the manufacture
of alcohol, and how the small producer
as well as the large may ascertain the
value of alcohol in its denatured state,
and to the best advantage, obtain the
highest results in quality of product, economy
of operation and durability and permanency
of the apparatus.

That denatured or industrial alcohol has
come into the field to stay and to ultimately
displace the dangerous explosives,
gasoline and kerosene, is daily becoming
more evident.

What is Alcohol?

According to the pharmacopoeia of the
United States, eighth decennial revision,
alcohol, or, as it is technically termed,
ethylic spirit, is a liquid composed of
about 82.5 per cent by weight, or about
64.5 per cent by volume, of absolute ethyl
alcohol, and about 17 per cent by weight
of water. This is the equivalent in proof
of 100, or practically 100 per cent. It is a
transparent, colorless, mobile and volatile
liquid, of a slight agreeable odor and a
burning taste. Specific gravity, about
0.816 at 15.5 degrees centigrade or 60 Fahrenheit,
the standard temperature for alcohol,
or 0.890 at 25 degrees. It should be kept in
well-closed vessels, in a cool place, remote
from lights or fire.

For the purposes of this article, which
proposes to discuss only the process of the
manufacture and denaturing of alcohol
and its uses, it may be stated that this
character of alcohol is made from corn or
potatoes, or other starchy or saccharine
materials.

The first step in the proportion of corn,
potatoes or other starch products for distillation
is to convert the starch which
these products contain, and which is not
fermentable, into a fermentable substance.
To obtain this result when corn is used it
is first ground into meal, then cooked by
subjecting it to a high temperature and
pressure. During this process the starch
becomes partly dissolved and partly gelatinized,
and at the end of the cooking
period, after a proper reduction in the
temperature has been effected malt is introduced
to convert the soluble starch into
sugar, in which state it is readily fermentable.
Technically this conversion is known
as saccharification; its production being
affected by the action on the starch of the
diastase contained in the malt, yielding
maltose and dextrin.

Meal Placed in Vacuum Cooker.

This meal is placed in the vacuum cooker,
which is a cylindrical steel vessel made of
heavy steel plate mounted longitudinally
on substantial cast iron stands, depending
upon its capacity or size. The interior of
this cooker is fitted with cast iron stirrer
arms attached to a steel shaft which makes
about thirty revolutions per minute. The
steam enters at the bottom by means of
pipes conducting it from a manifold or
heater at the side. Attached to each pipe
at its point of entrance is a check valve of
special design to spray the steam through
the mesh and to effect the most thorough
and consequent perfect dissolution of the
starch. A thermometer for regulating the
temperature and a water gauge are placed
in the head.

The operation consists of first filling into
the cooker the requisite amount of water
for each bushel of meal. This water is generally
supplied to a steel shaft which makes
the same being a receptacle for storage of the
hot water overflow from the condenser.
Its temperature, to hasten the operation
and to economize on steam can be from
140 to 150 Fahrenheit; if hotter it is apt to
burn the meal. A scale for weighing the
meal which is provided with a hopper of a
capacity equal to one charge of the cooker
is placed above the latter. From this hopper
the meal is conducted by a spout and
fed into the cooker through the manhole,
during which proceeding the manhole is in
constant motion. After the starch has
been closed the steam valve is opened by
degrees and the cooking continued, the action
of the meal being likewise continued
until a pressure of fifty-five pounds or
about 300 degrees has been attained, at
which point the dissolution of the starch
is complete. The pressure is relieved by

exhausting the steam into the air, the
temperature being at the same time reduced
to 212 degrees. Saccharification is best
effected at about 145 degrees, and to rapidly
reduce to this temperature, preparatory
to introducing the malt, the hot air is ex-
hausted by means of a vacuum pump.

Per Cent of Barley Used.

For a spirit mash from six to ten per
cent of good barley malt is used, which,
first being ground into meal, is mixed with
cold water of the required quantity in the
small grain masher. The thorough mixing
of the malt with the meal is allowed to
continue for about five minutes, after
which it is drawn into the drop tube,
near the cooker. This receptacle is fitted
with a stirrer and completes the mashing,
following which the product is pumped
through the mash cooler, where it is re-
duced to the proper temperature for fer-
mentation.

In the preparation of the potato mash
the same method of operation is pursued,
except that the potatoes are first washed
to remove any adhering earth and then
charged into the cooker, whole.

While the mash is being filled into the
fermentation vats, after leaving the mash
cooler, a ferment or yeast is added to induce
fermentation. This yeast is built up by
successive stages from mother yeast, com-
monly called start yeast, which is either of
the so called pure culture variety, consti-
tuting a particular and especially cultivated
species of yeast as most effective for alco-
holic fermentation, or by spontaneous or
hop yeast, produced by growth of yeast
cells originating in the air.

The ingredients composing the yeast
mash consists of equal parts of barley,
malt and rye wheat in quantities of about
two bushels to 100 bushels of mash.

Water at 100 degrees temperature is

which it issues in the form of alcohol at
the desired proof or strength.
The hydrometer placed in the cylinder
at the outlet from the condenser registers
constantly the proof of the alcohol which
is being obtained.

From the condenser the alcohol is piped
directly to cistern rooms or suitable reservoirs
provided for its reception.

Denaturing the Alcohol.

It will thus be observed that the alcohol
thus far produced is the pure alcohol, dena-
tured by the addition of a small quantity
of wood alcohol and one-half pint of betanin
to every 100 parts of alcohol to be dena-
tured.

The denaturing is done in suitable tanks
or cisterns under government supervision.
The alcohol, after being denatured, is
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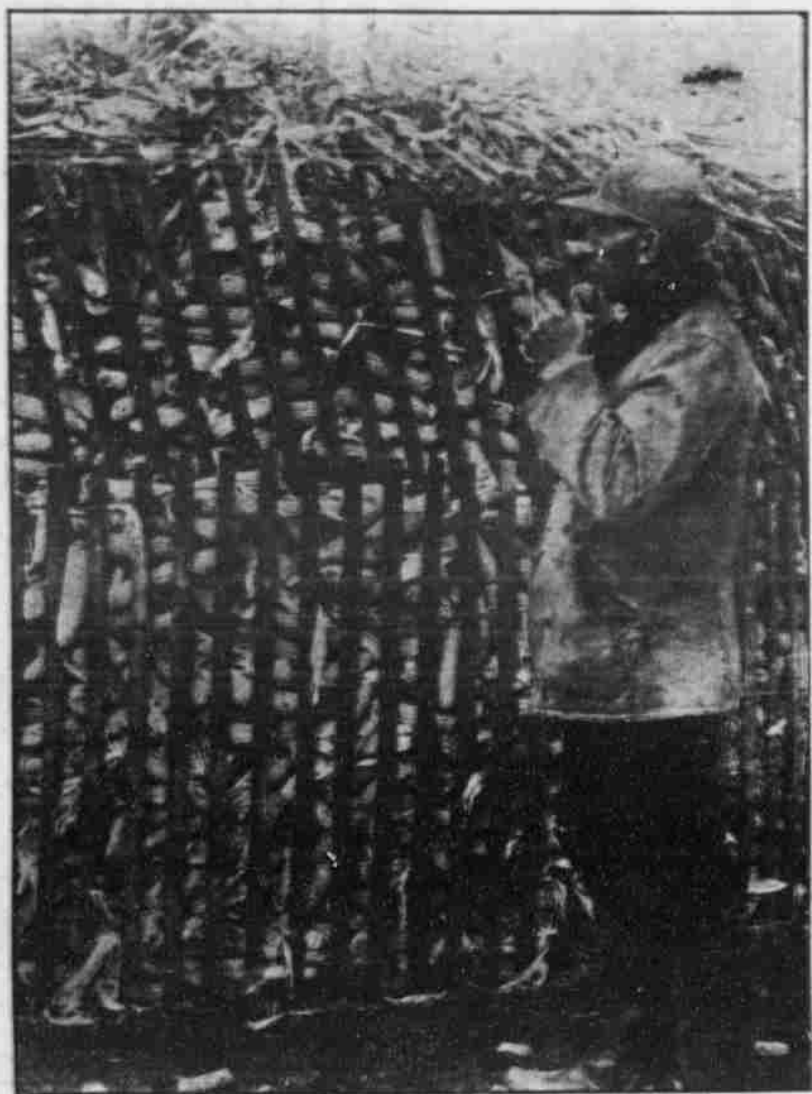
The cost of the government supervision is
paid by the Department of Internal Revenue,
no charge whatever being made for
government supervision.

Purposes of Denatured Alcohol.

Denatured alcohol may be used as a sub-
stitute for gasoline and kerosene for all
sorts of cooking, heating and lighting, as
well as in the operation of engines of the
internal combustion type.

The alcohol possesses many points of ad-
vantage over gasoline and kerosene in that

His Golden Hoard



first put in the yeast tub in the requisite
proportion for each bushel of meal. One
or more of these tubs are needed for each
day's mash, depending upon the capacity
of the plant. The rake is then put in
motion and the meal run in slowly to avoid
lumping. The steering continues for about
twenty minutes after the meal is all in,
during which time the formation of the
sugar from the action of the malt
on the rye is being effected. It is then
allowed to stand for eighteen to twenty
hours during which time the mash takes
on a wine sour, by the growth of a lactic
acid ferment, which protects the mother
yeast from infection by suppressing other
wild species of yeast and bacteria inter-
fering with the fermentation. Care must
be taken during the souring process by
covering the yeast tub and guarding against
an undue reduction of temperature in the
yeast room to prevent the temperature of
the mash from falling below 12 degrees,
at which temperature the highly injurious
butyric and acetic acid fermentation are
developed.

Cooling of Sour Mash.

The sour mash is then cooled by circu-
lating water through the coil and thor-
oughly agitating the whole until reduced
to sixty degrees. The so-called yeast dome
previously prepared from the start yeast
is now added and thoroughly mixed with
the mash. As a result of the yeast fer-
mentation effected during the next ten or
twelve hours a temperature of eighty-four
degrees will be attained, when further fer-
mentation is discontinued. It is then cooled
to sixty-five degrees, at which temperature
it is maintained by circulation of water
through the coil and stirring it until it
is to be conducted to the fermenting vats,
where fermentation of the sweet mash at
begins.

When the yeast fermentation has pro-
ceeded to eighty-four degrees, and before
stirring and cooling, the rich top yeast,
or stock yeast, is removed in proportion to
ten gallons to 100 bushels of mash and
preserved for subsequent use.

The fermenting period covers about
seventy-two hours. This fermented pro-
duct is called in distilling parlance the
"beer." From the fermenting vat, which is
fitted with a brass valve at the bottom,
operated by a lever at the top pipe
manifold into the beer well. From the
beer well the beer pumps discharge it
into the beer heater of the distilling
apparatus or upper chamber of the beer
still.

At the same time live steam is blown
into the bottom chamber of the beer still
so that the beer in working down through
the different compartments in the still is
deprived, by the boiling which ensues, of
its alcohol.
This alcohol passes out as a vapor from
the top of the beer still and enters to-
gether with a considerable quantity of
water vapor, which passes over with it,
into the lower portion of the rectifying
column. The condensation in the base of
this column is kept boiling by means of a
steam scroll, so that the alcohol vapor
ascending the column has to pass through
the various rectifying chambers in the
column and through its own condensation
in such a manner that it becomes highly
concentrated and passes out in the form
of nearly pure alcohol vapor from the top
of the column into the condenser, where
it is condensed to liquid form, and from

it is nonexplosive and cleanly and that a
fire caused by alcohol can be readily ex-
tinguished with water, water readily uniting
with alcohol and causing its dilution.
It may further be used in large quantities
in the arts and manufactures.

In 1906 there was used in the manu-
facture of explosives \$50,550 gallons, in the
plastic industries \$357 gallons, essential
oil \$4,800 gallons, fine chemicals 1,220,700
gallons and in the paint and varnish in-
dustry \$5,004 gallons. Statistics of the use
of denatured alcohol for the last two years
are not yet compiled, at least not accom-
plish, but sufficient is known that there has
been a very great increase in its use for
the succeeding years over that of 1906.

Another important consideration in favor
of denatured alcohol in the operation of
engines is that it has materially reduced
the cost of insurance where such engines
are used.

Other Stills of Its Kind.

The still installed at the Omaha Corn ex-
position is one of several types of its kind
in existence. Another is located in Wash-
ington, D. C., for governmental ex-
perimental use and another is owned
by private parties in El Paso, Texas,
where it is manu-
facturing alcohol from cactus, and is
meeting with considerable success.
Another still of this same type is in
operation at Hartsville, Miss., where it is
distilling alcohol from sawdust.

It is a fallacy to presume that every
farmer can put up his own still and manu-
facture his own alcohol at pleasure. A
still is a pretty expensive luxury. The
apparatus needed to do a still to do profitable
work is not much less than \$10,000.

The only way that the manufacture of
alcohol can be undertaken in communities
is for the establishment of one still in
some central location and then the farmers
can bring their corn, potatoes or other
products to be made into alcohol and then,
after the stuff is denatured by the govern-
ment officers, the product can be divided
among those participating in the enterprise.

As a rule it is cheaper for the users of
small quantities to buy the denatured al-
cohol rather than to participate in its man-
ufacture. It is probable that for a long
time to come the manufacture of alcohol
will be confined exclusively to the large
distilleries that are already equipped and
prepared for the work.

Used for Distiller's Shop.

The residue remaining after the produc-
tion of the alcohol is known as distiller's
shop, and is especially valuable as a food
for stock. This is particularly applicable
to the residue from the corn, potatoes or
sugar beets after distillation. This dis-
tiller's shop is prepared by drying and is
then known as distiller's grain and has a
peculiar value as stock feed, being fully
as nutritious as the original raw product
from which the alcohol has been distilled.
The stock residue from sugar beets is
valuable as a fertilizer, probably more so

A Proclamation to the People of Omaha, Council Bluffs and So. Omaha

The three cities have been hon-
ored by the location of the Na-
tional Corn Exposition.

The responsibility of making a
thorough success of the most im-
portant agricultural event, in the
interest of our grain and grass
crop, that the United States has
ever known, rests, not only on
those who have been actively en-
gaged in the work, but upon every
loyal citizen of the three cities.
It cannot be a success without
the cordial and enthusiastic sup-
port of each and every man and
woman in the community.

If you have friends who should
or might be interested in the Ex-
position, write them a personal
letter. The homes and hospital-
ity of our people must be extended
to our guests.

Merchants and business houses
should prepare to decorate their
places of business and vie with
each other to see who can pro-
duce the most attractive outward
appearance of welcome.

There are innumerable small
courtesies, that count for much,
which each of us can show the
strangers within our gates after
our visitors are with us.

Having been made hosts on so
important an occasion, the oppor-
tunity is offered us to show our
visitors that true hospitality which
is characteristic of the spirit of
the West.

The National Corn Exposition.

C. C. Rosewater, Chairman Committee.

"Give men their gold and knaves
their power;
Let fortune's bubbles rise or fall;
Who sows a field, or trains a flower,
Or plants a tree is more than all."

denatured alcohol. The impurities to be
extracted from city garbage, and its com-
ponents of saccharine and fermenting or-
ganisms with the bacteria would make it
extremely deleterious as to the successful
transformation of garbage into a com-
mercial alcohol.

Alcohol from Sawdust.
A number of successful experiments have
already been made, as in the case of Mis-
sissippi, in the production of alcohol from
sawdust. It yet remains to be determined
whether sawdust alcohol can be made com-
mercially successfully. With the improved
stills and processes the time will come when
sawdust alcohol may be made commer-
cially profitable, but at present it is in an
experimental stage.

STUDENT JUDGING CONTESTS
Points and Premiums Governing and
Given in This Important
Department.

One of the essential features of interest
in the National Corn exposition will be
the student judging contests. Around those
will revolve much of the real life of the institu-
tion. It will form one vital element in the
educational system.

Valuable prizes have been hung up for
the various winners in the exposition, but
none more valuable nor desirable than
the grand sweepstakes trophy, the
Mexican corn trophy valued at \$1,000
and offered by Hon. Zeffrine Demin-

gues of Pueblo, Mexico, the philanthropist
and advocate of intensive farming in the
southern republic, who will attend the ex-
position. This premium will be awarded
to the student judging team winning the
highest number of points in the corn judg-
ing division of the student judging con-
test.

Another valuable premium is the Grain
Dealers' cup trophy valued at \$1,000 and
founded by the Western Grain Dealers' as-
sociation. It will go to the student judg-
ing team winning in the corn contest.

Here are the points of interest
about the student
judging contest:
1. This contest is
open to all students
of the agricultural
colleges. Each
member of the
team must be a
senior or junior
student in the
college which
will be judged.
2. In judging
corn, ten-ear sam-
ples of five of the
leading standard
varieties will be
judged, in addition
to the commercial
grading of corn.
The ear samples
should be judged
from the standard
of each corn.
The commercial standard with all grades
shall be the standard prevailing upon the
several markets as indicated below:
(a) Chicago: Corn and oats.
(b) Kansas City: Hard winter wheat.
(c) St. Louis: Red winter wheat.
(d) Minneapolis: Spring wheat.

3. The commercial samples used in this
contest shall be officially inspected from
the source of origin. The ten-ear
samples of corn will be officially inspected
by the committee in charge of the com-
mercial grading of corn. The ten-ear
samples of corn will be officially inspected
by the committee in charge of the com-
mercial grading of corn. The ten-ear
samples of corn will be officially inspected
by the committee in charge of the com-
mercial grading of corn.

4. Each student shall grade fifty com-
mercial samples of corn, wheat and oats.
Samples shall be numbered from one to
fifty. Contestants will each be known by
number.

5. Students shall be provided with a
card on which there are spaces for name,
the number running from one to fifty,
with sufficient space for memorandum.

6. Each student shall have an oral ex-
amination, giving reasons and answering
questions by the judge.

7. Sixty points shall be allowed for plac-
ing and forty points for reasons.

See Want Ads Produce Results

CATECHISM OF CORN SHOW

Summary of the Principal Facts
About the Big Exposition.

PITHY AND PUNGENT POINTERS

Questions and Answers that Tell
the Whole Story in a Simple
and Direct Nutschell
Manner.

Q—What is the National Corn exposition?
A—The National Corn exposition is a
scientific movement to teach farmers how
to make two hundred of grain grow where
but one blade grew before.

Q—Where is the National Corn exposition
to be held?
A—The National Corn exposition is to be
held at the Auditorium in Omaha, on De-
cember 5-18, inclusive.

Q—Why is the National Corn exposition
held in Omaha?

A—The National Corn exposition is held
in Omaha this year because Omaha is the
center of the great Corn Belt and can be
reached with less expense and difficulty by
a larger number of persons interested in
the production of corn than any other
available city.

Q—Who are engaged in the promotion
and maintenance of the National Corn ex-
position?

A—The executive management of the Na-
tional Corn exposition is vested in the
hands of business men of high standing
and large affairs, capable of discharging
the various duties given them with the ut-
most skill and satisfaction.

Q—By whom is the scientific research
and instruction of the National Corn ex-
position carried on?

A—By the highest authorities and the
most notable experts in the United States,
England, Canada and Mexico.

Q—Has the government given its en-
dorsement to the National Corn exposition?

A—Yes, the government of the United
States has given the most emphatic en-
dorsement to the National Corn exposition.
President Roosevelt has spoken in approval
of it and has instructed his Country Life
commission to visit Omaha and participate
in the exposition; Secretary of Agriculture
Wilson has placed at the disposal of the
National Corn exposition C. A. Shamel, his
expert in the bureau of plant industry, and
has sent to Omaha one of the largest al-
cohol stills for use in making practical
demonstrations during the exposition.

Q—Will actual instruction be given those
attending the National Corn exposition?

A—Yes, regular class room work will be
carried on by these scientists, and men,
women and children will be given careful
training in the various methods of intensive
farming by practical demonstrations.

Q—What results are expected to accrue
from these courses of study?

A—The result that those who receive this
training will go back to their farms and at
once begin putting into practical operation
the lessons they have learned, and that
next year they and others whom they have
influenced will attend the Corn exposition
again and receive other lessons, and that
this will continue a practical system of ed-
ucation in intensive farming until it will
have spread all over the country and be-
come thoroughly established.

Q—What then is expected to be the re-
sult?

A—The result will be that farmers will
know how to till and fertilize their soil
and how to select and treat their seed so
as to multiply manifold their harvest and
in like ratio increase the value of their
land and their annual income.

Q—Is corn the only grain to be exhibited
at the National Corn exposition?

A—No, every other grain grown where
corn is grown is to be exhibited at the Na-
tional Corn exposition.

Q—Will the same scientific tests be made
in these other cereals as are made in corn?

A—Yes, and by an expert in each kind
of grain.

Q—Will there be any other kinds of ex-
hibit besides grain?

A—Yes, every kind of grass grown for
hay or stock feed in the corn belt will be
exhibited, as also will farm implements and
foods made from cereals.

Q—Will this complete the National Corn
exposition?

A—No, in addition to this school in in-
tensive farming there will be a domestic
science institute in the hands of the most
capable women scientists in this line of
work, and this domestic science work will
form one of the significant and extensive
departments of the exposition.

Q—How will it be conducted?

A—In classes. Regular class room in-
struction will be given daily. Classes will
be organized and taught by the women
scientists and an elementary education in
this important department of woman's life
work will be given.

Q—And does this complete the National
Corn exposition?

A—No, fourteen state agricultural col-
leges are sending exhibits and experts to
show what they are doing to further the
campaign of education of which this ex-
position is the outgrowth.

Q—Will there be any premiums awarded
for the best exhibits?

A—Yes, the premium list amounts to
\$4,000 in cash.

Q—Are all the exhibits—grain, grass, im-
plements and food products—admitted to
this list of premiums?

A—Yes.
Q—What is the highest reward offered?

A—The highest reward offered is the
grand premier sweepstakes trophy, valued
at \$1,000, to be awarded for the best ten
ears of corn winning the \$1,000 in gold.

Q—By whom or what is this trophy of-
fered?

A—This trophy was founded and is of-
fered by the Indiana commission to the
National Corn exposition, and is to be per-
manent.

Rate in Girls' Dungeons.

According to an official report made to
Governor Fort, solitary confinement in a
dark dungeon at a cell of bread and water
with rats for companions, is one form of
punishment inflicted upon refractory in-
mates of the New Jersey State House of
Girls, in Trenton, just outside the city
dungeon, and the story was still in use.
The governor has taken steps for their im-
mediate discontinuance.—New York Herald.

English in the Making.

In the quick-lunch room the gradual
growth of language must be observed.
"Corn beef and beans" shows one whom
you recognize as a new waiter.

"Beef and" is the abbreviated order given
by the veteran waiter.

"Beef and" is a blunder and more pro-
gressive man.

Now and then a hurried patron orders
and shouts "Pam!"

And no doubt one of these days etymo-
logists will be tracing the word "Pam!" to
"corn beef and beans."—New York Sun.



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and nothing more
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pensive Lanpher Furs
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mended by men and women
everywhere. It is a standard ar-
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this kind. I have used it myself
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perfect condition of my hair and
scalp is sufficient proof of its ex-
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Hundreds of thousands of people
all over the civilized world will
say as much in favor of Yale
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Tonic is good for Falling Hair,
Thin Hair and Gray Hair. It
is also recommended for Scalp
Treatment."

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richness of tint. Everyone can
use it with decided benefit to
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