WEIGHTS AND MEASURES.

TROY WEIGHT.

Grains.
4.... 1 Carat.
24.... 1 Pennyweight.
480 .. 20 .. 1 Ounce.
5,760 ..240 ..12 .. 1 Pound.

AVOIRDUPOIS WEIGHT.

Drams.
16.... 1 Ounce.
256.... 16.. 1 Pound.
7,168.. 448.. 28..1 Quarter.
28,672..1,792.. 112..4..1 Hundred.
572,440-35,840-2,240-80-20-1 Ton.

By a late Act the stone weight is to be 14 lb., and s stone to be the cwt.; and no contract is to be valid if otherwise made.

APOTHECARIES WEIGHT.

Grains.
20 ...1 Scruple.
60....3.. 1 Dram.
480.. 24.. 8.. 1 Ounce.
5,760..288..96..12..1 Pound.

Medical men use this weight in mixing medicines, but buy and sell simple drugs by Avoirdupois weight.

CLOTH MEASURE.

Inches.
2¼ .. 1 Nail.
9.... 4....1 Quarter of a Yard.
36....16....4....1 Yard.
27....12....3....1 Flemish Ell.
45....20....5....1 English Ell.

LIQUID MEASURE.

Pints.
2 ....1 Quart.
8 ....4.. 1 Gallon.
504.. 252..63..1..1½ Hogshead.
672.. 336..84..2..1½-1 Puncheon.
1,008.. 504 126..3..2..1½-1 Pipe.
2,016-1,008 252..6..4..3- 2..1 Tun.

Also,
Quarts.
4....1 Gallon.
36....9.. 1 Firkin.
72.. 18.. 2..1 Kilderkin.
144.. 36.. 4..2..1 Barrel.
216.. 54.. 6..3..1½..1 Hogshead.
288.. 72.. 8..4..2 ..1 Puncheon.
432..108..12..6..3 ..2..1 Butt.

DRY MEASURE.

2 pints	1 quart	4 bush.	1 sack
2 qs.	1 pottle	8 bush.	1 qutr.
2 pots.	1 gallon	4 qurs.	1 chdn.
2 galls.	1 peck	5 qurs.	1 wey
4 pks.	1 bush.	10 qurs.	1 last
2 bush.	1 strike		

SOLID OR CUBE MEASURE.

1728 inches .....1 solid foot
27 feet .....1 yard
40 feet unhewn } 1 ton
50 feet hewn timber }
108 feet .....1 stack wood
125 feet ....1 cord wood

LONG MEASURE.

3 b. corns	1 in.	5½ yards	1 pole
3 inches	1 bnd.	4 poles	1 chn.
10 inches	1 spn.	40 poles	1 furg.
12 inches	1 foot.	1 furlgs	1 mile
3 feet	1 yrd.	3 miles	1 leag.
5 feet	1 pace	69½ miles	1 deg.
6 feet	1 fm.		

SQUARE OR LAND MEASURE

144 inches .....1 square foot
9 feet .....1 square yard
272¼ feet.....1 rod brickw.
100 feet .....1 sq. flooring
16 poles.....1 chain
40 poles.....1 rood
4 roods, or 4840 sq. yards.....1 acre
640 acres.....1 square mile
30 acres.....1 yard of land
100 acres.....1 hide of land
40 hides.....1 barony

WINE MEASURE.

	Gals.		Gals.		Gals.
Lisbon, per pipe	117	Teneriffe, per pipe	100	Tent, per hhd.....	52
Bucellas.....	117	Vidonia.....	100	Claret	46
Port.....	115	Sicilian.....	93	Hermitage	46
Sherry.....	108	Madeira	92	Hock	30
Malaga	105	Cape	92	Spanish red per tun	210

W. O. BOOK, No. 138.

R.L. Smethwick Factory
Waltham Abbey
20 October 1971

Rl Gunpowder Factory

Waltham Abbey

20th October 1871

[Vertically up left hand side]

W.O.BOOK, No. 138

Brimstone Dome.

The Retort is charged with 5 cwts. 56. lbs. of Grough Sulphur producing 5 cwts. of Refined. On an Average of working 22 cwts. of Grough Sulphur it produces 20 cwts. of Refined 160 lbs. of Rework. Loss in Refining 48 lbs. Refuse 16 lbs.

The Time between charging the Retort and plugging in is 4½ to 5 hours, but you cannot plug in before all the gas has worked off.

From the time you have plugged in to running into the Receiver is about ½ an hour

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it produces 20 cwts. of Refined
160 lbs. of Reworks. Loss in Re-
fining 48 lbs, Refuse 16 lbs.

The Time between charging
the Retort and plugging in
is 4[1/2] to 5[1/2] hours, but you
cannot plug in before all
the gas has worked off.
From the time you have
pluged in to running into
the Receiver is about[1/2] an hour

time of running the liquor into the receiver, about 2½ to 3 hours, and it is generally an hour before fit for casting.

It takes on an average 1 ton of Coal to 1 ton Sulphur.

The way to test Refined Sulphur

Put a small portion of Refined into a vessel and set it on fire, and when burnt out should leave no residue.

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Put a small portion of

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Cylinder House.

The woods used are Alder and Willow for common Powder. Buckthorn commonly called Dogwood for Rifle Powder.

Great care should be used in sorting the wood into different sizes, all rotten and dirty wood should be carefully excluded

In loading the Slips with wood always keep the butt ends towards the mouth the Slip going in mouth first the back part of the Cylinders being hottest.

Cylinder House

_____0_____

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Cylinders being hottest.

Always put the Small wood at the bottom of the Slips, and the large wood at the top.

A Cord of wood is 14 ft. long 3 ft. high. 3 ft. wide, average weight of a Cord of seasoned wood about 16 cwts, it takes ¼ of a Cord of wood to load a set of Slips, which will produce 1 cwt. of Charcoal.

One Cord of wood will pro- - duce 4 cwts. of Charcoal, 10,000. cubic ft. of gass. 50 gallons of Acid. 12 Gallons of Tar

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A Cord of wood is 14 ft. long

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of seasoned wood about

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of wood to load a set of

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1cwt. of Charcoal.

One Cord of wood will pro-

-duce 4cwts. of Charcoal

10,000 cubic ft, of gass, 50 gallons

of Acid, 12 Gallons of Tar

Dogwood is purchased by the ton 1 ton of which will produce 5 cwts. of Charcoal.

Average time of Charing Common is 4 hours.

Average time of Charing Dogwood 3½ hours producing 84 lbs. of Charcoal.

Each sort of wood taking on an average ½ cwt. of Coal to each burning.

All woods properly charred should produce ¼ of its own weight.

When the gass begins to flow into the furnace, it is a dirty yellow, gradually changing its colour

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All woods properly charred
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weight.

When the gass begins to flow
into the furnace, it is a
dirty yellow, gradually
changing its colour

to a Violet when it is generally fit to draw, the burner must use his own judgment Knowing the size of the wood and the heat of his Cylinders.

Length of Cylinder = 5 ft. 3 in.
Diameter at Mouth = 2 ft. 6 in.
" " Interior = 2 ft. 5 in.
Length of Slips = 3 ft. 7 in.
Diameter " " = 2 ft. 2 in.
Extinguishers = 4 ft. 5 in. in
height. Diameter = 2 ft. 7 in
Small coolers = 2 ft. 6 in.
height. Diameter = 2 ft. 1 in.

The difference between the length of the Cylinder

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Small coolers = 2ft. 6 in.

height. Diameter = 2ft. 1in.

The difference between

the length of the Cylinder

and Slip, is 1 ft. 8 in. that is for brickwork for the Cylinders to rest upon, under the Cylinders run 4.8 in flues

9 Slips, 6 Extinguishers, 12 small Coolers are required to work a set of Cylinders, either 2. 3. 4. or 5 burnings per day.

Some Dogwood charcoal for special purposes has been burnt at a lower temperature averaging 8 hours per burning.

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[flourish below last line]

Saltpetre Refinery

The method of refining Saltpetre as now carried on at the Rt. Gunp.r Factory is as follows.

Number of men empld.r — The men employed are one Foreman one Stoker and four Labourers these men are under the Superintendance of the Master Refiner

Capacity of Refining Coppers & Evaporating Pots. — The Refining coppers are capable of containing 500 Galls. each

[The next nine pages are set out in two columns apart from the title and first paragraph, the LH column contains sub headings and the RH column details of the process. The transcription will show the sub headings followed by the detail text]

Saltpetre Refinery

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Capacity of
Refining Coppers
& Evaporating
Pots

The Refining coppers
are capable of con
taining 500 Galls each

the evaporating pots about 300 galls. each The refining coppers are fitted with false bottoms to prevent the Saltpetre adhereing to the bottom of the Coppers.

Stoker — The Stoker lights the fires under the refining Coppers and evaporating Pots, between 5 and 6 Oclock a.m. they having been charged the previous day

Foreman & Labourers — The foreman and labourers come to

the evaporating pots
about 300 galls each
The refining coppers
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day

Foreman
&
Labourers

The foreman and
labourers come to

work at 7 a.m. about 2 hours after the fires have been lighted the greater part of the Saltpetre in the refining coppers is disolved and the liquor begins to boil. Just before boiling the thick scum formed on the surface of the liquor is carefully skimed off and the false bottom pulled out. the liquor then boils.

Refining Coppers

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then boils,

and cold water
is from time to
time thrown in,
and the scum taken
off as it rises to
the surface
The liquor continues
boiling for half an
hour, or till the scum
no longer rises. The
coppers are then filled up
with cold water
and the liquor is
again made to boil
briskly for a few
minutes when the
furnace doors are

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coppers are then [inserted] filled up

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minutes when the

furnace doors are

opened and the fires allowed to go down. In about 2 hrs. the liquor will be the proper temperature for pumping out (220°) Sp. grv. 1.53

Supply Cisterns

The Foreman & labourers on coming to work pump into the supply cistern about 800 galls. of water for washing Saltpetre &c. This water is obtained from an Artisian well of considerable depth.

Water used in Refining

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This water is obtained

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and is as clear as can be obtained without distillation

Capicity of the Coolers.

These men also pump into the evaporating Pots, the liquor from the previous days washing and run out by means of plugholes the mother liquor from the four coolers amounting to about 300 galls. sp. gr. 1.13

The also pour off the mother liquor from the Saltpetre which has been set to crystalize in pans, the pans on the edge on the stills

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to drain the Saltpetre as much as possible. After this the Saltpetre in the Coolers (about 11cwt) is cleared out and placed in pans, and set on the stills to drain the Saltpetre.

Washing Cisterns

The men then take out the Saltpetre about (4 cwts) from the washing cisterns leaving a depth of 6 in. which contains a large amount of water, and place in one of the Store Bins where it remains till required for use.

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After this the Saltpetre

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is cleared out and

placed in pans, and

set on the stills to drain

the Saltpetre.

Washing

Cisterns

The men then

take out the Saltpetre

about (47cwts) from

the washing cisterns

leaving a depth of 6in.

which contains a large

amount of water, and

place in one of the

Store Bins where it

remains till required

for use.

After the Saltpetre has remained about 3 days it contains from 3 to 5 per cent Moisture according to the Season

The above work occupies about 2 hrs. then the Foreman & Labourers cut open the Bags containing the Rough Saltpetre. fill 49 Barrels each containing (112 lb) of the contents and weigh them so as to be ready for charging the refining coppers.

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to be ready for
charging the refining
coppers.

Temperature of Filtered Solution

The filtering process occupies about 1 hour The filtering process reduces the temperature of the liquor, especially if it runs slowly through the filters. When it reaches the coolers it is about 180° to 190°.

Coolers size of

The coolers 4 in number are each 12 ft. by 7 ft and about 11 in. deep. The liquor from two refining coppers fill them to a depth of 5 3/4 in. a man attends to each cooler for 1 hour or so.

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Formation of Crystals

These men keep the liquor always on the move with long handled wooden hoes and as it cools fine crystals fall to the bottom of the coolers. These crystals are from time to time drawn to the side of the coolers, and thrown out upon the draining racks attached to the washing cistern this process is continued, till a considerable quantity has been collected on the racks. The Saltpetre is left to drain for a few minutes

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siderable quantity
has been collected on
the racks. The Saltpetre
is left to drain for a
few minutes

the cooler portion is then raked into the washing cistern, and a fresh supply of crystals is thrown out on the racks and so on.

Washing cisterns

The washing cisterns are about 9 ft long 4 ft. wide & 3 ft. high and a false bottom of wood pierced with holes each cistern is fitted with a plug hole.

The crystals form more slowly in the coolers as the liquor cools when the temperature is reduced to 90° the shaking is discontinued the coolers are rinsed

the cooler portion is then
raked into the washing
cistern, and a fresh
supply of crystals is
thrown out on the racks
and so on.

Washing Cisterns

The washing cisterns
are about 6ft long 4ft
wide & 3ft high and
a false bottom of wood
pierced with holes each
cistern is fitted with
a plug hole.
The crystals form more
slowly in the Coolers
as the liquor cools
when the temperature
is reduced to 90Â° the
shaking is discontinued
the coolers are rinsed

with hot water and the liquor left to cool till next morning.

All the Saltpetre on the racks is now raked into the washing cistern. The plugs of which are taken out and the Crystals washed with by sprinkling about 60. gall^s of water by means of a rose over each washing cistern.

First Washing

The liquor that passes through the Saltpetre is called the first washing it runs into a clean liquor tank and afterwards

with hot water and

the liquor left to cool

till next morning.

First Washing

All the Saltpetre

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ing cistern. The plugs

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of a rose over each

washing cistern.

The liquor that

passes through the

Saltpetre is called the

first washing it runs

into a clean liquor

tank and afterwards

pumped into the refining coppers

The plugs are now put in and enough water allowed to run into the cistern to cover the Saltpetre, about 130 gallons. This water is allowed to stand half an hour when the plugs are withdrawn and the liquor runs into the clean liquor cistern. This liquor is allowed to run off for half an hour and is called the second washing

Second Washing or Flood.

A third and final washing is then

Third Washing

pumped into the

refining coppers

Second Washing or Flood

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withdrawn and the

liquor runs into the

clean liquor cistern.

This liquor is allowed

to run off for half

an hour and is called

the second washing

Third Washing

A third and final

washing is then

given by sprinkling about 70 gall.s of water over the contents of each of each washing cistern as at the first washing the plug holes remain open the Saltpetre is now left to drain all night.

It is desirable when procurable that distilled water should be used for this washing to avoid the impurities which are contained in the best of ordinary water.

The liquor from the third washing runs into the same tank which contains the

given by sprinkling

about 70 galls of water

over the contents of each

of each washing

cistern as at the first

washing the plug

holes remain open

the Saltpetre is now

left to drain all

night.

It is desirable when

procurable that

distilled water should

be used for this washing

to avoid the impurities

which are contained

in the best of ordinary

water.

The liquor from the

third washing runs

into the same tank

which contains the

the first and second washing and is used the following day in the refining Coppers instead of water.

When all the liquor has passed through the filters they are rinsed with hot water. This water is thrown into one of the evaporating pots. The filters are then washed first in hot water then in cold and afterwards hung up to dry.

Filters Washed

After the liquor has been pumped out

the first and second
washing and is used
the following day in
the refining coppers
instead of water.

Filters Washed

When all the liquor
has passed through
the filters they are rinsed
with hot water. This
water is thrown into
one of the evaporating
pots. The filters are
then washed first
in hot water then
in cold and after-
wards hung up to
dry.
After the liquor has
been pumped out

of the Coppers the Pumps are pulled up and if necessary the coppers cleaned out

Washings pumped into Coppers.

About 260 galls. of liquor from the three washings of the Saltpetre Refined the previous day are ~~then~~ pumped into each copper, fires which propably are not quite out are made up with ashes in order to dissolve so of the Saltpetre during the night.

Reduced Liquors & Nature of Liquors Reduced

The liquor evaporated or reduced consists of the mother liquor from the Coolers. The mother liquor from the Saltpetre

of the Coppers the Pumps

are pulled up and if

necessary the coppers

cleaned out.

Washings pumped into Coppers

About 260 galls of liquor

from the three washings

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the night.

Reducing Liquors & Nature of Liquors Reduced

The liquor evaporated

or reduced consists of

the mother liquor from

the Coolers the mother

liquor from the Saltpetre

crystalized in pans.

This liquor is kept briskly boiling all the morning by the stoker.

Impure Salts

About 11 a.m. he begins to feel the bottom of the pot with a long iron spud if the impure salts have begun to fall he slackens the the fires a little occasionly uses the spud to prevent the salt from caking.

Filtering reduced Liquor

When the liquor is reduced to about ⅛ of its original bulk and the fires allowed to go

crystalized in pans.

This liquor is kept

briskly boiling all the

morning by the Stoker

Impure Salts

About 11am. he begins

to feel the bottom of the

Pot with a long iron

spud if the impure

salts have begun to

fall he slackens the

the fires a little & oc-

casionally uses the spud

to prevent the salt

from caking

Filtering reduced Liquors

When the liquor is

reduced to about 1/4 [written as a fraction] of

its original bulk and

the fires allowed to go

and about 2 P.m. the solution just simmering is ready for filtering it is filtered in the manner already described the filtered liquor is crystallised in copper pans which contain about 17 gls. each

Crystallizing Pans.

When the liquor has been ladalled out of the reduce pots the salts are found at the bottom the Salt taken out and put into baskets lined with Saltpetre Bags to drain the liquor from the salt On the following day the contents of the Baskets

and about 2 P.m. the

solution just simmering

is ready for filtering

it is filtered in the

manner already

described the filtered

Crystatlising Pans [this heading is written where it appears in the text as it is not clear in paragraph breaks where it fits as a heading]

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When the liquor

has been laddled out

of the reduce pots

the salts are found

at the bottom the Salt

taken out and put

into baskets lined with

Saltpetre Bags to drain

the liquor from the salt

On the following day

the contents of the Baskets

are put into the refuse salt store & the Baskets are afterwards washed

By time the liquor from the reduce pots is filtered it will be about 3 p.m. The men then begin charging the Refining Coppers

Charging Refining Coppers

The false bottoms are first put in. Then the cakes of Saltpetre from reduced liquors which have been set up to drain a day or two weight about 11 cwt. and the Crystals from the Coolers which have been set up to drain weight about 11 cwt.

are put into the refuse

salt store & the Baskets

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By time the liquor

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Charging Refining Coppers

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and the Crystals from

the Coolers which have

been set up to drain

weight about 11cwt.

The Coppers are then filled up with about 49 Cwts. of Grough Saltpetre all this together with the Saltpetre in the 200 galls. of the first. second & third washing which have already been pumped into the Coppers will make about 80 Cwts of Saltpetre in 2 Coppers.

When the Coppers are charged and the House moped up. the days work done.

The Coppers are then

filled up with about

49 Cwts of Grough Saltpetre

all this together with

the Saltpetre in the

280 galls of the first

second & third washing

which have already

been pumped into the

Coppers, will make

about 80 Cwts of Saltpetre

in 2 Coppers.

When the Coppers

are charged and the

House moped up

the days work done.

Test of Saltpetre as to its Purity

A portion about 50 grs of the Saltpetre to be tested is put into a test tube with about half an ounce of distilled water on the application of heat the Saltpetre is dissolved a drop or two of Nitrate of Silver is then added and the solution shaken if chlorides are present will appear milky the density of the discoloration being in proportion to the amount of chlorides present.

A fair sample of the Saltpetre is weighed

Test of Saltpetre as to its Purity

A portion about 50 qrs [abbreviation for quarts]
of the Saltpetre to be
tested is put into a test
tube with about half
an ounce of distilled
water on the application
of heat the Saltpetre
is disolved a drop or
two of Nitrate of Silver
is then added and
the solution shaken
if chlorides are present
will appear milky
the density of the
discoloration being
in proportion to the
amount of chlorides
present.
A fair sample of the
Saltpetre is weighed

in a crucible of Berlin ware, provided with a cover. The weighed sample is then carefully fused over a lamp, the cover of the crucible being nearly but not quite closed after fusion it is set aside to cool when cold the crucible and contents are weighed the loss in weight represents the amount of water in the Saltpetre weighed from which the percentage may be calculated.

Determination of the amount of Water in Saltpetre.

in a crucible of Berlin

ware, provided with

a cover the weighed

sample is then carefully

fused over a lamp

Determination

of the amount

of Water in

Saltpetre

the cover of the crucible

being nearly but not

quite closed after fusion

it is set aside to cool

when cold the crucible

and contents are weighed

the loss in weight

represents the amount

of water in the Saltpetre

weighed from which

the percentage may

be calculated.

Mixing House

The Machine. Is a drum revolving in an enclosed hopper in the drum run flyers working in opposite directions to the drum, it makes 10 revolutions per minute and the flyers 132, and the water wheel 15 per min.

Men employed. Four mixers and a Master Mixer.

On them coming to work at 7 o'clock, they wheel to the mixing house the quantity of Saltpetre, Brimstone and Charcoal required they then get to work mixing

Mixing House

The Machine [underlined] Is a drum revolv-
-ing in an enclosed hopper
in the drum run flyers
working in opposite direc-
tions to the drum, it making
40 revolutions per minute
and the flyers 132, and
the water wheel 15 per min.
Men employed [underlined] Four mixers
and a Master Mixer.
On them coming to work
at 7 oclock they wheel to
the mixing house the
quantity of Saltpetre Brim
stone and Charcoal required
they then get to work mixing

Charges, one man attends to the Machine, another to weigh the Ingredients and the others to sift the Charges, and fetch if wanted more Charcoal Saltpetre &c.

To mix a 30 lbs. Charge. A man weighs 7½ lbs of Charcoal 3 lbs. of Brimstone 30 lbs of Saltpetre with the weight of the Moisture added to it. it is then put into the mixing bags and taken up into the machine and run for 3 min. when sufficiently mixed it is let out through the hopper into a Charge tub. and sifted through a sieve into the bags for to be incorporated

Charges, one man attends

to the Machine, another

to weigh the Ingredients

and the others to sift the

Charges, and fetch if wanted

more Charcoal Saltpetre &.

To mix a 50 lbs Charge [underlined] A man

weighs 7 1/2 [written as a fraction] lbs of Charcoal

3lbs of Brimstone 38lbs of

Saltpetre with the weight

of the Moisture added to it

it is then put into the mixing

bags and taken up into the

machine and run for 3 min

when sufficiently mixed

it is let out through the

hopper into a Charge tub

and sifted through an 8 mesh

sieve into the bags for to be

incorporated

Table for weights of Wet Saltpetre allowing 7 per cent for Powder. For 30 lbs Ch.

		lbs	ozs.
3.	per Cent Moisture	39	3
3.1	"	39	4
3.2	"	39	5
3.3	"	39	5
3.4	"	39	6
3.5	"	39	6
3.6	"	39	7
3.7	"	39	8
3.8	"	39	9
3.9	"	39	9

Continued.

			lbs.	oz.
4. per Cent Moisture			39	10
4.1	"		39	10
4.2	"		39	11
4.3	"		39	12
4.4	"		39	12
4.5	"		39	13
4.6	"		39	14
4.7	"		39	14
4.8	"		39	15
4.9	"		40	0
5.	"		40	0

Continued

		lbs.	ozs.
5.1	per Cent. Moisture	40	1
5.2	"	40	2
5.3	"	40	3
5.4	"	40	3
5.5	"	40	4
5.6	"	40	5
5.7	"	40	5
5.8	"	40	6
5.9	"	40	7
6.	"	40	7

Sulphur is ground in quantities of 2½ cwts.
at a time under a pair of Iron runners fitted
with scrapers and sifted in a slope reel covered
with 32 Mesh wire.

Sulphur is ground in quantities of 2 1/2 cwts.

at a time under a pair of Iron runners fitted

with scrapers and sifted in a slope reel covered

with 32 Mesh wire.

Incorporating Mills.

Weight of the Runners. Iron. ton.. ℔ 8 .. 10
Stone. 7 .. 0

Diameter of Beds. Iron. 2 ft.. 3½ in
Stone 2 ft.. 3 in

Revolutions per Min. Iron. 8½ per m.
Stone 7½ per m.

Time of Running the Charges under the Iron Runners.

Dogwood. — 4 hrs.
Sped. Dogwood. 2 = 8 hrs.
Dust = 40 minutes
Common = 2½ hrs.
Dust = 40 minutes

Time of Running the Charges under the Stone Runners.

Dogwood — 5½ hrs
Dust — 40 minutes
Common — 3½ hrs
Dust — 40 minutes

Incorporating Mills.

		ton	lbs
	Iron	8	10
Weight of the Runners	Stone	7	0

[waight - original correction]

Diameter of Beds	{ Iron	2ft.	3 1/2in
	{Stone	2ft.	3in

Revolution per Min.	{Iron	8 1/2 per m.
	{Stone	7 1/2 per m.

Time of Running the Charges

under the Iron runners.

Dogwood	=	4 hrs.
Spec. Dogwood [ ]	=	8 hrs.
Dust	=	40 minutes
Common	=	2 1/2 hrs.
Dust	=	40 minutes

Time of Running the Charges

under the Stone runners.

Dogwood	-	5 1/2 hrs
Dust	-	40 minutes
Common	-	3 1/2 hrs
Dust	-	40 minutes

The 50 lbs Charge when sent from the Mixing house contains about 2 pints of liquor and requires from 5 to 7 pts of liquor in Milling.

The dust requires from ¾ to 1½ pts.

On the Charge being properly distributed on the bed, the powder should be brushed clean away where the outside plough works and round the chase, and if the powder adheres to the curb when starting on a green Charge it may be scalded off with boiling water, then it may easily be spudded off and swept in and started.

When the mill has been at work about 20 or 30 minutes, the Millmen should go in the Mill and sweep the curbs and runners, in case there should be any composition

The 50 lbs Charge when sent
from the Mixing house contains
about 2 pints of liquor and
requires from 5 to 7 pts of liquor
in Milling.
The dust requires from 3/4 to 1 1/2 pts.
on the Charge being properly
distributed on the bed, the
powder should be brushed
clean away where the out-
side plough works and round
the cheese and if the powder
adheres to the curb, when
starting on a green Charge
it may be scalded off with
boiling water, then it may
easily be spudded off and
swept in and started.
When the mill has been at
work about 20 or 30 minutes,
the Millmen should go in
the Mill and sweep the curbs.
and runners in case there
should be any Composition

fall on the kerb that sticks to the outside of the runners. The millmen if he thinks that the charge has not got sufficient liquor to run it up to its proper time & moisture he will put some more on through the rose of his watering pot, and should then be mixed up with the shover, if not when the charge is ready it might be spotted.

When the charge is got to its proper moisture, it is spudded up, and put into a charge tub, to go to Breaking Down House.

fall on the Curb that sticks

to the outside of the runners.

The Millmen if he think

that the charge has not

got sufficient liquor to run

it up to its proper time &

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up with the Shover, if

not when the charge is ready

it might be spotted.

When the charge is got to its

proper moisture, it is speed

-ded up, and put into a

Charge tub, to go to Break-

ing Down House.

Temperature at 40° add 3 on the density from 40° and under 45° add 2 on, over 45° and under 55° add 1 on to the density. from 55° up to 70° register the densities according to the tables at 60° & at 70°

For every 3 degrees the temperature rises take 1 of the weight of the mercury.

Temperature at 40[degree symbol] add 3

on the density from 40[degree symbol] and

under 45 [degree symbol] add 2 on, over 45[degree symbol]

and under 55 [degree symbol] add 1 on to

the density, from 55[degree symbol] up to

70[degree symbol] register the densities accor-

-ding to the tables at 60[degree symbol] &

at 70[degree symbol]

For every 3 degrees the temperature

rises take 1 of the weight of the

mercury.

The density of Powder is then calculated by the by the following

D = Specific gravity of mercury
P = weight of globe full of Powder & mercury
P^1 = weight of globe full of mercury.
100 = weight of Powder used.

$$\therefore \text{Density} = \frac{D \times 100}{P^1 - P + 100}$$

The density of Powder is then calculated by the

by the following

D = Specific gravity of mercury

P = weight of globe full of Powder & mercury

P1 = weight of globe full of mercury.

100 = weight of Powder used.

Density = D x 100 [underline]

P1 - P+100

The specific gravity of mercury is at 50° F. = 13.57

" " " " 60° = 13.56

" " " " 70° = 13.54

" " " " 80° = 13.53

" " " " 90° = 13.52

Receipt for Making Cement

5 Parts Beeswax
1 Part of Red ochre or Vermilion Red
1 part of Black Rosin

Placed in an Earthenware Saucer and heated until it melts into a Liquid the Iron mountings to be made hot with a piece of Hot Iron so as to make the cement run well

Receipt for Making Cement

5 Parts Beeswax

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Placed in an Earthenware Saucer and heated

until it melts into a Liquid the Iron mountings

to be made hot with a piece of Hot Iron so as

to make the cement run well.

The L.G. from Granulating Machine is put into Horizontal Reel clothed with 28 Mesh canvas and is run 1½ hours which dusts it, and it is then fit for the stove.

L.G. when brought from the Granulating Machine in its foul state is run through a sloped reel clothed with 56 Mesh silk at an angle of 4° to take out the dust before put into the Glazing Barrels for 3½ hours.

The L G from Granulating machine is fed

into Horizontal Reel clothed with 28 Mesh canvas

and is run 1 1/2 hours which dusts it, and it is then

fit for the store.

F G when brought from the Granulating

Machine in its faul state is run through

a sloped reel clothed with 56 Mesh Silk

at an angle of 4[degree symbol] to take out the dust before

put into the Glazing Barrels for 3 1/2 hours.

Brimstone Refinery

At 170° Fahrenheit it begins to evaporate and increase of 15° to 20° causes it to melt and at 229° it becomes a fluid if the heat be suddenly increased to 250° it becomes firm and of deeper colour. And at 600° it sublimies and may be collected in the form of flowers of Sulphur

Brimstone Refining

At 170[degree symbol] Fahrenheit it begins

to evaporate and [d crossed out] increase

of 15 [degree symbol] to 20 [degree symbol] causes it to melt

and at 220[degree symbol] it becomes a

fluid if the heat be suddenly

increased to 250[degree symbol] it becomes

firm and of a deeper colour.

And at 600[degree symbol] it sublimes and

may be collected in the

form of flowers of Sulphur.

A Sloped Reel set an angle of 4° and clothed with 32 mesh wire is used for the ruling of Saltpetre. Brimstone Charcoal.

A Sloped Reel set an angle

of 4[degree symbol] and clothed with 32

Mesh wire is used for the

reeling of Saltpetre Brimstone

Charcoal.

Velocities obtained with R.L.G. made with different Descriptions of Charcoal

Description of Powder	Charcoal	Density	Velocity at 105 ft
R.L.G. 26th April 1870	W. A. Black.	1.684	1001.8
" 30th " "	" " "	1.690	987.0
" stoved 4th Feb. 1869	" " "	1.68	938.4
" " 10th " "	" " "	1.69	959.8
" " 12th " "	" " "	1.69	960.3
" " 18th " "	" " "	1.69	942.7
Rework. P & W. 6th June 1870	P & W. Redditch.	1.698	1031.6
" " " 7th " "	" " "	1.679	1037.5
" " " 8th " "	" " "	1.687	1041.4
" " " 10th " "	" " "	1.694	1040.6
" " " 30th May "	" " "	1.681	1030.7
" " " 1st June "	" " "	1.691	1026.4

Density of Refined Sulphur = 2.018

" " " Saltpetre = 2.076

" " " Salpetre = 2.089

R. L. G.

1.697 Glazed Density

1.672 Finished "

1. Water Mill working 50 lbs Charges working the Green 3 hours will produce 4700 lbs per week.

2

1 Water Mill working 60 lbs Charges working the green 3 hours will produce 5640 lbs per week.

2

1 Water Mill working 50 lbs Ch. working the green 3½ hours will produce 4200 lbs per week.

2

1 Water Mill working 60 lbs Ch. working the green 3½ hours will produce 5040 lbs per Week.

2

1 Steam Mill Working 50 lbs Ch. working the green 2 hours will produce 6300 lbs per week

2

1. Water Mill working 50 lbs Charges

working the Green 3 hours will

produce 4700 lbs per week.

1 Water Mill working 60 lbs Charges

working the green 3 hours

will produce 5640 lbs per week.

1 Water Mill working 50 lbs Ch.

working the green 3 1/2 hours

will produce 4200 lbs per week.

1 Water Mill working 60 lbs Ch.

working the green 3 1/2 hours

will produce 5040 lbs per Week.

1 Steam Mill Working 50 lbs Ch.

working the green 2 hours

will produce 6300 lbs per week

1. Steam Mill working 60 lbs Ch.
working the green 2½ hours
will produce 7560 lbs per week

1 Steam Mill working 50 lbs Ch.
working the green 2½ hours
will produce 5300 per week

1 Steam Mill working 60 lbs Ch.
working the green 2½ hours
will produce 6360 lbs per week.

1. Steam Mill working 60 lbs Ch.

working the green 2 1/2 hours

will produce 7560 lbs per week

1 Steam Mill working 50 lbs Ch.

working the green 2 1/2 hours

will produce 5300 per week

1 Steam Mill working 60 lbs Ch.

working the green 2 1/2 hours

will produce 6360 lbs per week.

Memo: Shewing how to get the equal proportions of Saltpetre Brimstone & Charcoal allowing 75 per cent for 100 lb Charge Do for a 60 lbs Charge with an addition of 20 lbs or 20 per cent of Charcoal in place of 15 per cent.

75 Saltpetre
10 Brimstone
20 Charcoal

105

106 : 75 :: 50 } Saltpetre
106 : 76 :: 60 }
106 : 10 :: 50 } Brimstone
106 : 10 :: 60 }
106 : 15 :: 50 } Charcoal
106 : 15 :: 60 }

Memo: Shewing how to get

the equal proportions of Saltpetre

Brimstone & Charcoal allowing

75 per cent for 100 lb Charge

Do [75 per cent] for a 60 lbs Charge with

an addition of 20 lbs or 20 per cent

of Charcoal in place of 15 per cent.

75 Saltpetre

10 Brimstone

20 Charcoal

———

105

1

———

106 : 75 :: 50) Saltpetre

106 : 76 :: 60)

106 : 10 :: 50) Brimstone

106 : 10 :: 60)

106 : 15 :: 50) Charcoal

106 : 15 :: 60)

4. Mesh = For R L G to pass and to be retained on an 8 mesh.

7 Mesh = For Separates

8. Mesh = For L.G. to pass and to be retained on 16 Mesh

10. Mesh = For Separating Chucks from R. T. G after Glazing

12. Mesh = For separating Chucks from T.G. after Glazing and for R. T. G to pass to be retained on a 20 Mesh

16 Mesh = To retain L G and for separates &c

2

4. Mesh = for R. L. G to pass

and to be retained on an

8 mesh.

7 Mesh = for Separaters

8. Mesh = for L. G. to pass and

to be retained on 16 mesh

10. Mesh = for Separating Chucks

from R. F. G. after Glazing

12. Mesh = for separating Chucks

from F.G. after Glazing and for

R. F. G. to pass to be retained

on a 20 Mesh.

16 Mesh = To retain L. G and

for separaters Do

20. Mesh. To retain R. F. G and for separaters.

24. Mesh. For Separaters

28. Mesh. For reeling dry ground Saltpetre and for Separaters

32. Mesh. For Charcoal & Brimstone Reels and for Sep.

36. Mesh. For Separaters.

24. Mesh Canvas. Reels for R. L. G. and for Slope Reels for Foul Rifle F. G.

28. Mesh Canvas Reels for L. G. and for Finishing R. F. G. and Slope Reel for R. F. G. after Glazing

20. Mesh. To retain R. F. G. and

for Separaters.

24. Mesh. for Separaters

28. Mesh. for reeling dry ground

Saltpetre and for Separaters

32. Mesh. for Charcoal &

Brimstone Reels and for Sep.

36. Mesh. for Separaters.

24. Mesh Canvas = Reels for

R. L. G. and for slope Reels

for Foul Rifle F. G.

28. Mesh Canvas. Reels for L.G.

and for finishing R.F.G. and

slope Reel for R.F.G. after

Glazing

44. Mesh Stuff Reel for finishing
F. G. and Slope reel for foul
F. G.

56 Mesh - Slope Reel for F. G.

72 Mesh - Finishing Reel for
F. G. Shell.

44. Mesh. Stuff Reels for finishing

F.G. and slope reels for foul

F.G.

56 Mesh - Slope Reel for F.G.

72 Mesh - Finishing Reel for

F.G. Shell.

R. L G. worked to about 3 1/2 per
" cent of moisture
" Velocity from 14 00 to 14 50
" Density from 1.67 to 1.72.

R.L.G. worked to about 3 1/2 per

" cent of moisture

" Velocity from 1400 to 1450

" Density from 1.67 to 1.72.

Pebble. Common Mill Cake worked at 3½ per cent of moisture pressed at 14½ inches should be set at 1.78 and when finished would be about 1.760.

Pebble. When worked at 4 to 5 per cent of moisture should be 1.770.

Pebble. When worked at 5 to 6 per cent of moisture should be 1.780 set at 1.820

Pressed from 15 to 15½ in. worked at 3¼ per cent set at 1.820. when finished 1.777

Pebble. Common Mill Cake worked
at 3 1/2 per cent of moisture
pressed at 14 1/2 inches should
be set at 1.78 and when
finished would be about
1.760

Pebble. When worked at 4 to 5
per cent of moisture
should be 1.770.

Pebble. When worked at 5 to 6
per cent of moisture
should be 1.780 set at
1.820

Pressed from 15 to 15 1/2 in.
worked at 3 1/4 per cent
set at 1.820.
when finished 1.777

R. F. G. 2nd Mill Cake worked at
2 3/4 per cent of Moisture
Pressed at 11/8 inches
set at 1.735 will give
a density of about 1.727
this is very good and
will give about 1315
feet Velocity
Cube when Glazed. 56.9
" " Finished 55.3
The size grain 12 to 20
The siftings should be
of 16 lbs

	lbs.	oz.	drs.
12 to 16 =	13	10	0
16 " 20 =	2	3	0
Pass. 20 =		4	"

This Powder is run 12 hours in the Glazing Barrels which makes a difference of .1. And worked at the Incorporating Mills 8 Hours. (7 1/4 hours.)

R.F.G. 2 Mill Cake worked at

2 3/4 per cent of Moisture

Pressed at 11 1/8 inches

set at 1.735 will give

a density of about 1.727

this is very good and

will give about 1315

feet Velocity

Cube when Glazed. 56.9

" " Finished 55.3

The size grain 12 to 20

The Settings should be

of 16 lbs

	lbs "	oz "	dis
12 to 16 =	13 "	10 "	0
16 " 20 =	2 "	3 "	0
Pass 20 =		4 "	

This Powder is run 12 hours in

the Gazing Barrels which makes

a difference of .1 And worked

at the Incorporating Mills

8 Hours. (7 1/4 hours.)

The following table shows what the R.L.G. and R.F.G. powders undergo after leaving the Granulating Machine.

—	R. L. G.	R. F. G.
1st Dusting.	In a horizontal reel covered with 24 Mesh canvas making 40 revolutions for half-an hour.	Run through a slope reel covered with 24 Mesh canvas making 40 rev. per min.
Glazing	In wooden barrels making 34 revolutions per minute with 2 oz of graphite per barrel	In wooden barrels making 34 revolutions per min. for 5½ hours.
2nd Dusting.	In a horizontal reel covered with 24 Mesh canvas making 40 revolutions for half-an hour.	Run through a slope reel covered with 28 Mesh canvas making 40 revolutions per minute
Stoving	Same for both.	

The following table shows what the RLG. and R. F. G. powders undergo after leaving the Granulating Machine.

-	R. L. G.	R. F. G.
1st Dusting.	In a horizontal reel covered with 24 Mesh canvas making 40 revolutions for half - an hour.	Run through a slope reel covered with 24 Mesh canvas making 40 rev. per min.
Glazing.	In wooden barrels making 34 revolutions per minute with 2 oz of graphite per barrel	In wooden barrels making 34 revolutions per min. for 5 1/2 hours.
2nd Dusting.	In a horizontal reel covered with 24 Mesh canvas making 40 revolutions per min for half - an hour.	Run through a slope reel covered with 28 Mesh canvas making 40 revolutions per minute
Stoving	Same for both	

3rd Dusting or Finishing	Not Required	In a horizontal reel covered with 28 mesh canvas making 40 revs a minute for 2½ hours.

3d Dusting Not Required	In a horizontal
or	reel covered with
Finishing	28 Mesh canvas
	making 40 revs
	a minute for
	2 1/2 hours.

Granulating

For R L G. the top pair of rollers have pyramidal teeth $\frac{1}{4}$ in. high, the second pair similar teeth $\frac{1}{8}$ in high; the two lower pairs have chisel-shaped teeth. formed by cutting longitudinal V shaped groves and circumferential rectangular ones.

The top short screenes would be a 4 Mesh & also the upper long one and the bottom long screene of 8 mesh.

Granulating

For R L. G. the top pair
of rollers have pyramidal teeth
1/4 in. high, the second pair
similar teeth 1/8 in. high; The
two lower pairs have chisel-
shaped teeth formed by cutting
longitudinal V-shaped groves [sic]
and circumferential rectangular
ones.
The top short screenes would
be a 4 Mesh & also The upper
long one and the bottom
long screene of 8 mesh.

For. R. F. G. the two lower pair of rollers would be replaced with plain ones.

The top short screens would be a 12 Mesh and the bottom long one 20 Mesh.

The rollers make 30 rev. per min.

For R. F. G. The two lower

pair of rollers would be re-

placed with plain ones.

The top short screens

would be a 12 Mesh and

The bottom long one 20 Mesh.

The rollers make 30 rev. per min.

19th Jany. 1875.

Memo: of R. T. C. 2 worked with 4 per cent of Moisture and pressed at 11 inches.

300 lbs reeled in 18 mesh reel produced 216 of grain. & 84 of dust. Cube 57. 0. Density 1.731

Siftings $\frac{16}{13.4}$ $\frac{20}{2.8}$ $\frac{\text{Pass. } 20}{.4}$

300 reeled in 28 Mesh reel produced 260 lbs grain. & 40 lbs dust. Cube 56. 8.

Density – 1. 731

Siftings = $\frac{16}{11.2}$ $\frac{20}{3.12}$ $\frac{\text{Pass. } 20}{1.2}$

This Powder was marked

A. 1B.

19th Jany. 1875.

Memo. of R. F. G. [ ] worked with

4 percent of Moisture and

pressed at 11 inches.

300 lbs reeled in 18 mesh reel

produced 216 of grain. & 84

of dust. Cube 57.0. Density 1.731

Siftings 16 20 Pass. 20 [each pair underlined as a fraction]

13.4 2.8 .4

300 reeled in 28 mesh reel produced

260 lbs grain. 40 lbs dust. Cube 56.8

Density - 1.731

Siftings = 16 20 Pass. 20 [each pair underlined as a fraction]

11.2 3.12 1.2

This powder was marked

A. B.

Memo.—

R. F. G worked at 2 to 2½ per cent of moisture. Pressed at 10¼ inches & set at 1.649. will give a finished density of 1.620 and will give about 1264 feet Velocity

Cube when Glazed 53.6

" Finished 52.4

" the size of grain 12 to 20 the setting of 16 lbs.

	lbs.	oz.	drs
12 to 16 =	13	1	0
16 " 20 =	2	10	"
Pass. 20 =		5	0
lbs	16	0	0

Memo.-

R.F.G. worked at 2 to 2 1/2 per

cent of moisture. Pressed at

10 1/4 inches & set at 1.649.

will give a Finished density

of 1.620 and will give about

1264 feet Velocity

Cube when Glazed 53.6

" " Finished 52.4

The Size of grain 12 to 20

the sifting of 16 lbs.

	lbs	oz	dis
12 to 16 =	13	1	0
16 to 20=	2	10	
Pass 20 =		5	0 [this line underlined]
	Lbs 16	0	0 [this line underlined twice]

Memo:-

R. T. G. Mill Cake worked at about 2 per cent of moisture pressed at 10 inches and set at will give a finished Density of 1.597 and will give about feet Velocity

Cube when Glazed = 53. 13

" " finished = 52. 3

The siftings are as follows.

	lbs	oz	drs
12 to 16	13	9	0
16 to 20	2	3	0
Pass 20		4	0
	16	0	0

Memo.

R.F.G. Mill Cake worked at

about 2 percent of moisture

pressed at 10 inches and set

at [space left here] will give a Finished

Density of 1.597 and will

give about [space left here] feet Velocity

Cube when Glazed = 53.13

" " Finished = 52.3

The siftings are as follows.

	lbs	oz	dis	
13 to 16 =	13	9	0	
16 to 20=	2	3		
Pass 20 =		4	0	[this line underlined]
	Lbs 16	0	0	[this line underlined twice]

Table of Weights of Wet Saltpetre allowing 7 6 % in a 60 lbs Charge.

	lbs.	ozs.
2.0 per Cent	46	8
2.1 " "	46	9
2.2 " "	46	10
2.3 " "	46	11
2.4 " "	46	12
2.5 " "	46	12
2.6 " "	46	13
2.7 " "	46	14
2.8 " "	46	15
2.9 " "	46	15
3.0 " "	47	0
3.1 " "	47	1
3.2 " "	47	2
3.3 per Cent	47	3
3.4 " "	47	4
3.5 " "	47	4
3.6 " "	47	5
3.7 " "	47	6
3.8 " "	47	7
3.9 " "	47	8
4.0 " "	47	8
4.1 " "	47	9
4.2 " "	47	10
4.3 " "	47	11
4.4 " "	47	11
4.5 " "	47	12
4.6 per Cent	47	13
4.7 " "	47	14
4.8 " "	47	15
4.9 " "	47	15
5.0 " "	48	0
5.1 " "	48	1
5.2 " "	48	2
5.3 " "	48	3
5.4 " "	48	4
5.5 " "	48	4
5.6 " "	48	5
5.7 " "	48	6
5.8 " "	48	7

Table of Weights of Wet Saltpetre allowing 76%

in a 60lbs Charge.

	lbs. ozs.		lbs. ozs.		lbs. ozs.
2.0 per Cent	46 - 8	3.3 per Cent	47 - 3	4.6 per Cent	47 - 13
2.1 " "	46 - 9	3.4 " "	47 - 4	4.7 " "	47 - 14
2.2 " "	46-10	3.5 " "	47 - 4	4.8 " "	47 - 15
2.3 " "	46 - 11	3.6 " "	47 - 5	4.9 " "	47 - 15
2.4 " "	46 - 12	3.7 " "	47 - 6	5.0 " "	48 - 0
2.5 " "	46 - 12	3.8 " "	47 - 7	5.1 " "	48 - 1
2.6 " "	46 - 13	3.9 " "	47 - 8	5.2 " "	48 - 2
2.7 " "	46 - 14	4.0 " "	47 - 8	5.3 " "	48 - 3
2.8 " "	46 - 15	4.1 " "	47 - 9	5.4 " "	48 - 4
2.9 " "	46 - 15	4.2 " "	47 - 10	5.5 " "	48 - 4
3.0 " "	47 - 0	4.3 " "	47 - 11	5.6 " "	48 - 5
3.1 " "	47 - 1	4.4 " "	47 - 11	5.7 " "	48 - 6
3.2 " "	47 - 2	4.5 " "	47 - 12	5.8 " "	48 - 7

Continued.

	lbs.	oz.
5.9 per cent. =	48	8
6.0 " " =	48	9
6.1 " " =	48	9
6.2 " " =	48	10
6.3 " " =	48	11
6.4 " " =	48	12
6.5 " " =	48	13
6.6 " " =	48	14
6.7 " " =	48	14
6.8 " " =	48	15
6.9 " " =	49	0
7.0 " " =	49	1
7.1 " " =	49	2
7.2 " " =	49	2
7.3 " " =	49	3

Continued

	lbs. ozs.
5.9 per Cent	48 - 8
6.0 " "	48 - 9
6.1 " "	48 - 9
6.2 " "	48 - 10
6.3 " "	48 - 11
6.4 " "	48 - 12
6.5 " "	48 - 13
6.6 " "	48 - 14
6.7 " "	48 - 14
6.8 " "	48 - 15
6.9 " "	49 - 0
7.0 " "	49 - 1
7.1 " "	49 - 2
7.2 " "	49 - 2
7.3 " "	49 - 3

Memo. of Rocket Composition.

Proportions

Saltpetre	=	68.75
Charcoal	=	18.75
Sulphur	=	12.5.
lbs		100.0

Memo. of Rocket Composition.

Proportions { Saltpetre = 68.75
{ Charcoal = 18.75
{ Sulphur = 12.5 [underline 12.5]

100.0 [double underline 100.0]

Common Charcoal

Barrels of Powder	Require Charcoal				Require Cords of Wood
	Tons	Cwts	Qrs	lbs	
1	"	"	"	16	.035714
10	"	1	1	20	.35714
100	"	14	1	4	3.5714
1000	7	2	3	12	35.714
10000	71	8	2	8	357.14

A Cord of Wood is 4' long; 3' high & 3' wide.

Common Charcoal

[section below is in a tabular format]

Barrels of Powder	Require Charcoal Tons	Cwt	Qrs	Lbs	Require Cords of Wood
1	-	-	-	16	.035714
10	-	1	1	20	.35714
100	-	14	1	4	3.5714
1000	7	2	3	12	35.714
10000	71	8	2	8	357.14

[end of tabluar form]

A Cord of Wood is 14' long; 3' high & 3' wide

Common Charcoal

Cords of Wood	Produce Charcoal				Make barrels of Powder
	Tons	Cwts	Qrs.	lbs.	
1	"	4	"	"	28
10	2	"	"	"	280
100	20	"	"	"	2,800
1,000	200	"	"	"	28,000
10,000	2,000	"	"	"	280,000

Average weight of a Cord of wood = 18 Cwts.

Common Charcoal

[section below is in a tabular format]

Cords of Wood	Produce Charcoal Tons	Cwt	Qrs	Lbs	Make Barrels of Powder
1	-	4	-	-	28
10	2	-	-	-	280
100	20	-	-	-	2,800
1,000	200	-	-	-	28,000
1,0000	2,000	-	-	-	280,000

[end of tabluar form]

Average weight of a Cord of wood = 18 Cwts.

Dogwood Charcoal

Barrels of Powder	Require Charcoal				Require Tons of Dogwood as Purchased
	Tons	Cwts	Qrs	lbs	
1				16	.031746
10		1	1	20	.31746
100		14	1	4	3.1746
1,000	7	2	3	12	31.746
10,000	71	8	2	8	317.46

Dogwood Charcoal

[section below is in a tabular format]

Barrels of	Require Charcoal				Require Tons of Dogwood
Powder	Tons	Cwt	Qrs	Lbs	as Purchased
1	-	-	-	16	.031746
10	-	1	1	20	.31746
100	-	14	1	4	3.1746
1000	7	2	3	12	31.746
10000	71	8	2	8	317.46

[end of tabluar form]

Dogwood Charcoal

Tons of Dogwood as purchased	Produce Charcoal				Make barrels of Powder
	Tons	Cwts	Qrs	lbs.	
1		4	2	"	31.5
10	2	5	"	"	315.
100	22	10	"	"	3150.
1,000	225	"	"	"	31500.
10,000	2250	"	"	"	315000.

Dogwood Charcoal

[section below is in a tabular format]

Tons of Dogwood as purchased	Produce Charcoal Tons	Cwt	Qrs	Lbs	Make Barrels of Powder
1	-	4	2	-	31.5
10	2	5	-	-	315
100	22	10	-	-	3150
1,000	225	-	-	-	31500
1,0000	2250	-	-	-	315000

[end of tabluar form]

Brimstone

Barrels of Powder	Require Refined Brimstone				Require tons of Grough. Brimstone
	Tons	cwts	qrs	lbs.	
1	"	"	"	10¼	.0047018
10	"	"	3	18½	.047018
100	"	9	0	17	.47018
1,000	4	11	2	2	4.7018
10,000	45	15	0	20	47.018

One ton of Refined Brimstone will make 218.5 barrels of Powder

The extra ¼ lbs is allowed for loss in Grinding &c.

Brimstone

[text below is in tabular form]

Barrels of Powder	Require Refined Brimstone				Require tons of Grough Brimstone
	Tons	Cwts	qrs	lbs	
1	-	-	-	10 1/4	.0047018
10	-	-	3	18 1/2	.047018
100	-	9	0	17	.47018
1000	4	11	2	2	4.7018
10000	45	15	0	20	47.018

[end of tabular text]

One ton of Refined Brimstone will make 218.5 barrels

of Powder

The extra 1/4 lbs is allowed for loss in Grinding do.

Brimstone

Tons of Grough Brimstone	Produce Refined Brimstone				Make barrels of Powder
	Tons	cwts	qrs	lbs	
1	"	19	1	24	212.6829
10	9	14	2	16	2126.829
100	97	6	1	20	21268.29
1,000	973	4	1	4	212682.9
10,000	9732	2	3	12	2126829.

Brimstone

[text below is in tabular form]

Tons of Grough Brimstone	Produce Refined Brimstone				Make barrels of Powder
	Tons	Cwts	qrs	lbs	
1	-	19	1	24	212.6829
10	9	14	2	16	2126.829
100	97	6	1	20	21268.29
1000	973	4	1	4	212682.9
10000	9732	2	3	12	2126829.

[end of tabular text]

Refined Saltpetre

Barrels of Powder.	Require Barrels of Refined Saltpetre each 3/4 cwt. allowing 75 lbs	Require Barrels of Refined Saltpetre each 3/4 cwt. allowing. 76 lbs.	Require Barrels of Refined Saltpetre each 3/4 cwt. allowing. 77.5 lbs
1	.892857	.904761	.922619
10	8.92857	9.04761	9.22619
100	89.2857	90.4761	92.2619
1,000	892.857	904.761	922.619
10,000	8928.57	9047.61	9226.19

Refined Saltpetre

[text below is in tabular form]

Barrels of Powder	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 75 lbs	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 76 lbs.	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 77.5 lbs
1	.892857	.904761	.922619
10	8.92857	9.04761	9.22619
100	89.2857	90.4761	92.2619
1000	892.857	904.761	922.619
10000	8928.57	9047.61	9226.19

[end of tabular text]

Refined Saltpetre

Barrels of Powder.	Require Tons of Refined Saltpetre allowing 75 lbs.	Require Tons of Refined Saltpetre allowing 76 lbs	Require Tons of Refined Saltpetre allowing 77.5 lbs.
1	.0334821	.0339285	.0345982
10	.334821	.339285	.345982
100	3.34821	3.39285	3.45982
1,000	33.4821	33.9285	34.5982
10,000	334.821	339.285	345.982

Refined Saltpetre

[text below is in tabular form]

Barrels of Powder	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 75 lbs	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 76 lbs.	Require Barrels of Refined Saltpetre each 3/4 cwt allowing 77.5 lbs
1	.o334821	.0339285	.0345982
10	.334821	.339285	.345982
100	3.34821	3.39285	3.45982
1000	33.4821	33.9285	34.5982
10000	334.821	339.285	345.982

[end of tabular text]

Refined Saltpetre

Tons. of Refined Saltpetre.	Make number of Barrels of Powder allowing 75 lbs.	Make number of Barrels of Powder allowing 76 lbs	Make number of Barrels of Powder allowing 77. 5 lbs
1	29.86666	29.47368	28.90322
10	298.6666	294.7368	289.0322
100	2986.666	2947.368	2890.322
1,000	29866.66	29473.68	28903.22
10,000	298666.6	294736.8	289032.2

Refined Saltpetre

[text below is in tabular form]

Tons of Refined Saltpetre	Make number of Barrels of Powder allowing 75 lbs	Make number of Barrels of Powder allowing 76 lbs.	Make number of Barrels of Powder allowing 77.5 lbs
1	29.86666	29.47368	28.90322
10	298.6666	294.7368	289.0322
100	2986.666	2947.368	2890.322
1000	29866.66	29473.68	28903.22
10000	298666.6	294736.8	289032.22

[end of tabular text]

Refined Saltpetre

Barrels of Refined Saltpetre each. cwts. 0 qrs. 3 lbs. 0	Make number of Barrels of Powder allowing 75 lbs.	Make number of Barrel of Powder allowing 76 lbs	Make number of Barrels of Powder allowing 77.5 lbs.
1	1.12	1.105263	1.08387
10	11.2	11.05263	10.8387
100	112.	110.5263	108.387
1,000	1120.	1105.263	1083.87
10,000	11200.	11052.63	10838.7

Refined Saltpetre

[text below is in tabular form]

Barrels of Refined Saltpetre each cwts qrs lbs 0 3 0	Make number of Barrels of Powder allowing 75 lbs	Make number of Barrels of Powder allowing 76 lbs.	Make number of Barrels of Powder allowing 77.5 lbs
1	1.12	1.105263	1.08387
10	11.2	11.05263	10.8387
100	112.	110.5263	108.387
1000	1120.	1105.263	1083.87
10000	11200.	11052.63	10838.7

[end of tabular text]

Memo. of 1.5. Inch Cubes.
Common Mill Cake worked
at 4 to 4½ per cent of moisture
Pressed at 15 5/8 inches. gives
a density of about 1.796.
Glazed 4 hours and then gives
a density of 1.792

4 Glaz

Memo. of 1.5 Inch Cubes

Common Mill Cake worked

at 4 to 4 1/2 per cent of moisture

Pressed at 15 5/8 inches gives

a density of about 1.796.

Glazed 4 hours and then gives

a density of 1.792

[pencil note below text " 4 Glaz"]

Weight of Saltpetre, Charcoal & Sulphur for a

42 ℔s Charge.

	℔s	oz	drs.
Saltpetre =	31	" 8	" 0
Charcoal =	6	" 4	" 13
Sulphur =	4	" 3	" 3.

Weight of Saltpetre, Charcoal, & Sulphur. for a

42 lbs Charge. viz

	lbs	oz	[dis]
Saltpetre =	31	8	0
Charcoal =	6	4	13
Sulphur =	4	3	3

In Grinding one Ton of Charcoal, we lose 6 per cent.

In Grinding one Ton of charcoal, we

loose 6 per cent.

The Siftings of 16 Lots of R L C.
should be as follows.

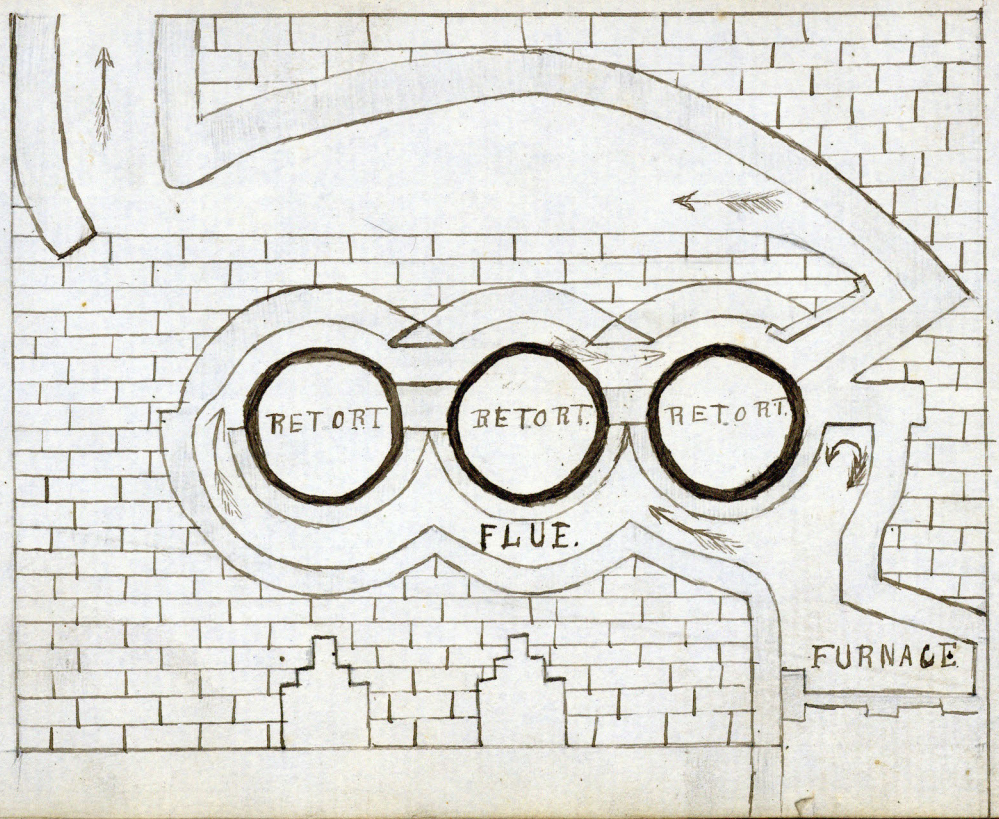
The Sifting of 16 lbs of R. L. G.

should be as follows

[There is no text after this statement]

Transverse Section of Retorts

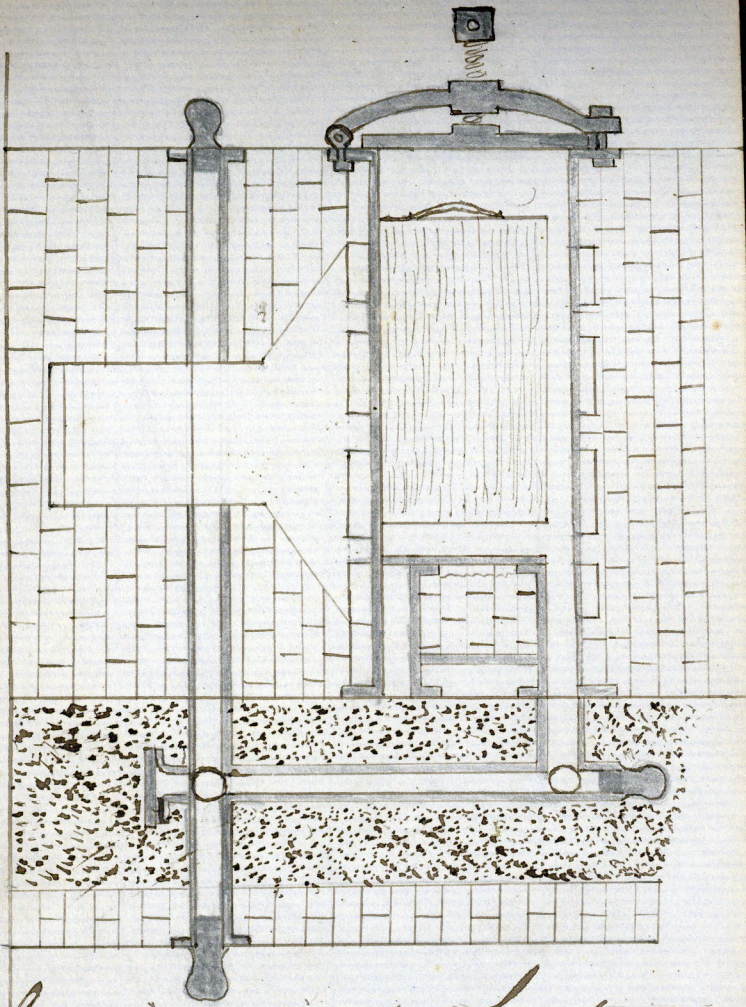
Scale about 3/4 in. 2



[Diagram of 3 round retorts in horizontal line with furnace below heating the retorts via a surrounding flue. The whole in a brick structure.]

Transverse Section of Retorts

Scale sbout 1/34



Longitudinal Section
of Retort
Scale 1/26.

[Diagram of horizontal Section of Retorts]

Longitudinal Section

of Retort

Scale 1/26

Pressing

2

Gunpowder is generally pressed in layers of between plates of copper or Gunmetal in Hydraulic Presses. The details of the apparatus require little explanation. The press box is made of gun metal lined inside and out with oak boards. the bottom & one side are permanently attached to each other the other three sides are hinged

Pressing

Gunpowder is generally

pressed in layers of

between plates of copper

or Gunmetal in Hydraulic

Presses. The details of the

apparatus require little

explanation. The press

box is made of gun

metal lined inside

and out with oak

boards the bottom &

one side are perma

nently attached to each

other the other three

sides are hinged

to the bottom so
they can be opened
out to facilitate un-
loading & then closed
they are secured with
strong, coarse threaded
screws of gun metal
the box has two pro-
jecting gunmetal
claws which hinge on
to a fixed horizontal
rod of the same
metal so that the box
can be turned over
it, on to the table
of the hydraulic press.
when filled and ready
for pressing, or outwards

to the bottom so

they can be opened

out to facilitate un -

loading. When closed

they are secured with

string, coarse threaded

screws of gun-metal

The box has two pro-

jecting gunmetal

claws, which lunge on

to a fixed horizontal

rod of the same

metal so that the box

can be turned on

it on to the table

of the hydraulic press.

When filled and ready

for pressing or outward

when it has to be unloaded. It is loaded as follows Being first turned down on its side the open top is closed temporarily with a piece of board which is fitted to it. What is now the uppermost side is uncovered and raised and the other two sides are extended to their places Iron metal racks to hold the press plates having perpendicular grooves at their ends about

when it has to be un-

loaded. It is loaded

as follows Being first

turned down on its

side the open top is

closed temporarily with

a piece of board which

is fitted to it. What is

now the uppermost

side is uncovered and

raised and the other

two sides are fastened

to their placed Gun

metal racks to hold

the press plates having

perpendicular grooves

in them 1/2 apart

are then slid in on
each side and the
plates being put on
the mold from the
breaking down mold
shoot is shovelled in
and readily falls
between the plates till
the box is full, the
racks are then drawn
out leaving the plates
free with layers of
powder between them
the excess of powder
being carefully shovelled
off the edge of the
box the upper side

are then slid in on

each side and the

plates being put in

the meal from the

breaking down and

[ ] is shovelled in

and readily falls

between the plates till

the box is full, the

racks are then drawn

out leaving the plates

free with layers of

powder between them

the excess of powder

being carefully swept

off the edge of the

box. The upper side

is lowered and screwed to the other three, the overhead block and tackle is made fast to the Gun-metal eye on the side of the box and the box is then turned over on to the press table the box now stands on its bottom and the temporary board with which the top has been closed during charging being lifted off the plates will be found to have settled down several

is lowered and screwed

to the other three, &

overhead block and

tackle is made fast

to the Gun-metal eye

on the side of the

box and the box

is then turned over

on to the press table

The box now stands

on its bottom and

the temporary board

with which the top

has been closed during

charging being lifted

off the plates will be

found to have

settled down several

inches with stuff over
weight. the vacant space
is then filled up by
shovelling in a few more
layers of mud placing
a plate by hand on
each in succession till
the box is filled
As the box now
stands on the table
of the ram all
that remains to
be done is to run
the overhead block
into its place directly
over and nearly touching
the contents of the box

inches with their own

weight. the vacant space

is then filled up by

shovelling in a few more

layers of meal placing

a plate by hand on

each in succession till

the box is filled

As the box now

stands on the table

of the ram all

that remains to

be done is to run

the overhead block

into its place directly

over and nearly touching

the contents of the box

to secure the box
and apply the pressure
until the box rises
to a sufficient height
the amount of pressure
to be given to the
contents of the box.
is always estimated
at Waltham Abbey
by the distance what
the overhead block
enters the box. This
is a rough but
tolerably exact method
of regulating pressure
for if the same
amount of pressure

to secure the base

and apply the pressure

until the box rises

to a suffficient height

The amount of pressure

to be given to the

contents of the box

is always estimated

at Waltham Abbey

by the distance which

the overhead blocks

enter the box. This

is a rough but

tolerably exact method

of regulating pressure

for if the same

assessment of pressure

immense effect on
the qualities of the powder
by means of it. The
cube box is no longer
in use being entirely
replaced by the densim
eter.
The densimeter consists
of a barometer tube
supported on stout
metal stands, and
having a cock at the
bottom by which it can
be opened or closed
attached to the tube
is a flexible tube com-
municating with an

immense, effects on
the qualities of the powder
by means of it. The
cube box is no longer
in use being entirely
replaced by the densim
eter.
The densimeter consists
of a barometer tube
supported on stout
metal stands, and
having a cock at the
bottom by which it can
be opened or closed
attached to the tube
is a flexible tube com-
municating, with an

air pump by means of which the air can be exhausted from the tube A glass globe fitted with metal collars on which again are screwed other collars provided with stop cocks, can be attached to the barometer tube by means of a closely fitting screw the lower collar of this globe is provided with a nozzle which dips into an iron bowl filled with mercury

air pump by means of

which the air can be

exhausted from the tube

A glass globe fitted

with metal collars on

which again are screwed

other collars provided

with stop cocks, can

be attached to the baro-

meter tube by means

of a closely fitting screw

The lower collar of

this globe is provided

with a nozzle which

dips into an iron bowl

filled with mercury

If then the lower cock
be kept closed and the
other one opened the
air can be exhausted
from the barometer tube
and globe, and the
lower cock being then
opened the mercury
rushes in rises up
till it fills the globe
and continues to rise
in the tube till it has
attained the same
height from the sur-
face of the mercury
left in the bowl at

by then the lower cock

be kept closed and the

other ones opened the

air can be exhausted

from the barometer tube

and globe, and the

lower cock being then

opened the mercury

rushes in rises up

till it fills the globe

and continues to rise

in the tube till it has

attained the same

height from the sur-

face of the mercury

left in the bowl at

as the column is an ordinary barometer stands at the time.

The process of taking the density of a sample of Powder is as follows. The air is first exhausted from the globe and tube and the mercury allowed to fill them the upper and lower cocks of the globe are then closed the nozzel is taken off and the globe unscrewed from

as the column in an

ordinary barometer stands

at the time.

The process of taking

the density of a sample

of Powder is as follows

The air is first ex

-hausted from the

globe and tube and

the mercury allowed

to fill the up-

per and lower cocks

of the globe are then

closed the nozzle is

taken off and the

globe unscrewed from

the barometer tube & weighed. This weight the weight of the globe filled with mercury is registered

The globe is then emptied & a definite weight of the powder (generally 100 grammes) is introduced into the globe. The globe is then attached to the tube as before the air exhausted and the mercury allowed to rise & fill

the barometer tube &
weighed. This weight
the weight of the globe
filled with mercury is
registered
The globe is then
emptied & a definite
weight of the powder
(generally 100 grammes)
is introduced into
the globe. The globe
is then attached to
the tube as before
the air exhausted
and the mercury al-
lowed to rise & fill

the globe as before
The stop-cocks of the
globe are provided
with diaphragms the
upper one of chamois
leather and the bottom
of fine wire gauze
to prevent any particle
of powder being car-
ried out of the globe
As soon as the
mercury has risen
to the proper height
the stop cocks attached
to the globe are
again closed, the

the globe as before.

The stop-cocks of the

globe are provided

with diaphragms the

upper one of chamois

leather and the bottom

of fine wire going

to prevent any particle

of powder being car

-ried out of the globe

As soon as the

mercury has risen

to the proper height

the stop cocks attached

to the globe are

again closed. The

nozzle unscrewed
the globe taken off
and weighed. This second
weight plus the weight
of the powder and
less the weight of the
volume of mercury
displaced by it is
also registered

The density of the
powder is then cal-
culated by the following
formula.

$$\text{Density} = \frac{D \times 100.}{(P^1 - P) + 100.}$$

nozzle unscrewed &

the globe taken off

and weighed. This second

weight plus the weight

of the powder and

less the weight of the

volume of mercury

displaced by it is

also registered

The density of the

powder is then cal-

culated by the following

formula

$$\text{Density} = \frac{D \times 100}{(P1 - P) + 100}$$

where D = specific gravity of mercury at the time of experiment.

P = weight of globe full of Powder Weight

P' = weight of globe full of mercury

100. = weight of Powder employed

The sp. grav. of mercury at 50° F — — 13.57

" " " " 60° " — 13.56

" " " " 70° — — 13.54

" " " " 80° — — 13.53

" " " " 90° — — 13.52

Where .D. = specific gravity of mercury at the time of experiment.

.P. = weight of globe full of Powder & Mercury

Pl. = weight of globe full of mercury

100. = weight of Powder employed

the sp grav. of mercury at 50°F- - 13.57

" " " " 60°- -13.56

" " " " 70°- -13.54

" " " " 80°- -13.53

" " " " 90°- -13.52

An actual example worked out is subjoined

Weight of globe filled with mercury 4138 grms. = P^1

" " " " " + Powder 3434 = P

Difference 704

Temp. at time of experiment 60°

Consequent Sp. grav. of mercury 13.56 = D.

Then D × 100 = 1356.000

$(P^1 - P) + 100$ = 804

804) 1356 (1.689 = density required.

an actual example worked out is subjoined

Weight of globe filled with mercury [written above: ? Grams] 4138= Pl

" " " " & Powder 3434= P

Difference 704

Temp. at time of experiment 60

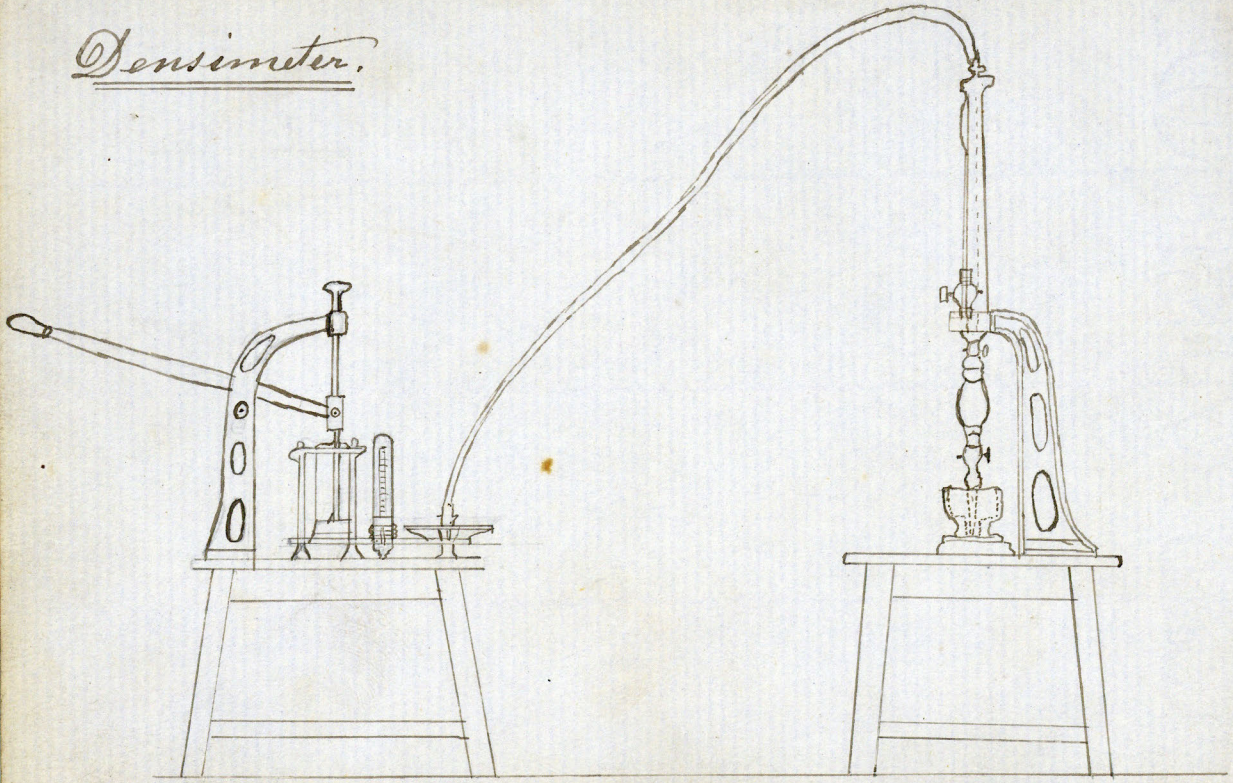
Consequent sp. grav. of mercury 13.56= D.

then D x 100 = 1356.000

(Pl- P) + 100 = 804

804) 1356 (1.689 = density required.

Densimeter.



The Dogwood is worked the same but it runs 4 hours because it is wanted much dryer than the common.

To rework a Dust Charge

It is distributed on the bed in the same way as common green charge but will not take near so much liquor has it only runs between 30 or 40 minutes.

When the Charges is properly worked it is spudded up and taken to the magazine

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After the Bed is covered then it is brushed clean round the curb where the outside plough comes and round the cheese where the inside plough works. After the Wedge is been properly put on. The Runners are moved about ¼ revolution, then the cake that is left under the runners is broken up and some composition laid over it. Then the Mill is started and allowed to run 3½ hours. The Iron runners 2½ hours.

After the Bed is covered
then it is brushed clean
round the curb where
the outside ploug comes
and around the cheese
where the inside plough
works. After the charge
is been properly put on.
The runners are moved
about 1/4 revolution, then
the cake that is left
under the runners is
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composition laid over it.
Then the Mill is started
and allowed to run
3 1/2 hours. The iron run-
ners 2 1/2 hours.

and it turns out a
very hot day, the Charge
must be watered very
moderatly for the Run-
-ners, and Beds will
be running with
water, and will turn
the charge over for ½ hour
or 1 hour,
After it is Mixed well
with the water it is
distributed over the
bed with the rake
taking care to cover
the whole of the bed.
and always put plenty
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the runners that is com-
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Incorporating Mills

To work a Green Charge
The charge is shot on
the bed, half at each
opening, then it is liquored
according to the atmosphere
if it be a very hot
day it would take 7 or
8 pints of distilled water
for the stone Runners.
for the Iron Runners
will take much more.
Great care should be
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The Machine is a drum
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in the drum are flyers
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Mixing House

To mix a 50 lbs Charge.

It takes 7½ lbs. of Charcoal
5 lbs of Sulphur, and
the weight of the Saltpetre
with the moisture is
sent from the Office.
Then it is put into the
Machine and, mixed
for about 3 minutes.
Then let out and sifted
through into the Com-
position bags, and sent
to the mills.

Mixing House

To mix a 50 lbs Charge
It takes 7 1/2 lbs of Charcoal
5 lbs of Sulphur, and
the weight of the Saltpetre
with the moisture is
sent from the Office.
then it is put into the
Machine and, mixed
for about 3 minutes.
Then let out and sifted
through into the Com-
-position bags and sent
to the mills.

Then the liquor that is left is drawn off and reduced down in the same way, and the Petre that is left is used to charge the coppers when enough. But there is always a certain quantity of salt at the bottom of these Pots, which is kept and the Petre extracted from it.

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when the liquor is put down the dirty liquor drain and the Petre left in the pans to help charge the copper.

The dirty liquor from there is pumped into the reduce pots, then it is boiled down to about half, then it is jeted off into the filtering bags and is caught into a tub below when full it is put into pans to crystalize for 24 hours.

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When the quantity of
Petre is got out, it is put
into the bins to be
cleans it, it is first
watered in, then about
1/4 hour after it is flooded
10. min. after it is let run
into the clean liquor
cistern to be pumped
into the coppers the next
morning, after this it is
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The liquor that remains
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When you see it is sufficiently thick enough the fire must be lessened and drawn forward to keep it at a regular heat it is allowed to stand about 2 hours to cool, when it is pumped off into the filtering bags, where all the dirt grit &c is caught and it passes then into the coolers where it is shaken about to get the Pekt and to keep it from crystalazing.

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crystalizing.

Pete is melted, then you can take off the scum and froth, then take out the false bottom, when it should be made to boil opposite to the furnace, this may be done by shoving the fire as far back as possible. then while boiling you may put plenty of water into it to whiten the Pete and to make the dirt rise to the top, then it should be skimmed off

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Saltpetre Refinery

The Coppers are about
3/4 filled with clean liquor
Then when ready for
charging there is a false
bottom put in for to
keep the Petre from the
bottom of the Copper.
They then charge it
with about 1/2 ton
of Grough Petre, when
there should be a
regular fire kept under
them till all the

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but you cannot plug in before all the gas has worked off, the time between plugging and running into the receiver is about ½ an hour, time of running the liquor into the receiver about 2½ to 3. hours, and is generally and hour before fit for casting.

It takes on an average 1 ton of coal to 1 ton of Sulphur

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Sulphur Dome

The Retort is charged with 5 cwt 56 lbs. of Grough Sulphur producing 5 cwt. of Refined Sulphur.

On an average of working 22 cwts of Grough Sulphur it produces 20 cwt. of Refined, 160 lbs. of Rework. Loss in Refining 48 lbs. Refuse 16 lbs.

The time between charging and plugging the Retort is 4 to 5 hours,

Sulphur Dome [underlined]

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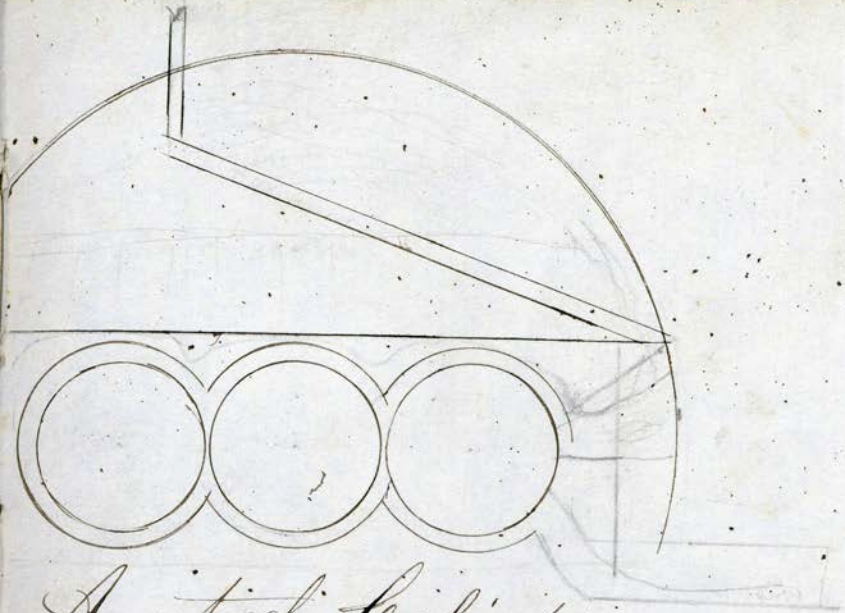

A set of Cylinder

Extinguishers or large Coolers. 4 ft. 6 in. in height.
2" 7" diameter
Small coolers 2 ft 6 in height.
2" 1" diameter.

9 Slips 6 Extinguishers &
12 Small Coolers are required
to work 1 Set of Cylinders.
either 2, 3, 4 or 5 burnings
per day.

Some Dogwood Charcoal
for special purposes has
been burnt at a lower
temperature averaging
8 hours per burning.

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when it is generally set to draw, the burner must use his own judgment having the size of the wood and the heat of his Cylinders

"

Length of Retort 3 ft. 3 in
Diameter at Mouth 2 " 6 "
" " Interior 2 " 5 "

"

Length of Slip 3 ft. 7 in
Diameter " " 2 " 2 "

"

The difference between the length of Retort and Slip is 1 ft. 5 in. that is for brickwork for Retorts to rest upon, under the retorts run four flues of 8 in. wide each.

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the retorts run four flues of
8 in wide each.

Average time of Charring common is 4 hours, producing 1 cwt of Charcoal.

Average time of Charring dogwood 3½ hours, producing 84 lbs. of Charcoal

Each sort of wood taking on an average 1 cwt of Coal to each burning, all seasoned woods properly Charred should produce ¼ of its own weight

When the Sap begins to flow into the furnace it is a dirty yellow gradually changing its colour to a Violete.

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Average time of Charring
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Each sort of wood taking
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to each burning, all seasoned
woods properly Charred should
produce 1/4 of its own weight

When the Gass begins to flow
into the furnace it is a
dirty yellow gradually changing
in colour to a Violet.

Small wood at the bottom and large wood at the top.

A Cord of wood is 14 ft. long 3 ft. high and 3 ft. wide, average weight of a Cord of seasoned wood about 1 Ton, it take 1/4 Cord of wood to load a set of Slips, which will produce 1 Cut of Charcoal

One Cord of wood will produce 4 Cut of Charcoal 10,000 Cubic ft. of Gas. 30 Gallons of Acid, 12 Gallons of Tar.

Dogwood is purchased by the Ton. 1 Ton of which will produce 5 Cuts. of Charcoal.

Small wood at the bottom
and large wood at the top.

A Cord of wood is 14 ft long
3 ft high and 3 ft wide, average
weight of a Cord of seasoned
wood about 16 Cwts, it takes 1/4
Cord of wood to load a set
of Slips, which will produce
1 cwt of Charcoal

One Cord of wood will
produce 4 Cwt of Charcoal
10,000 Cubic ft. of Gass. 50 Gallons
of Acid, 12 Gallons of Tar.

Dogwood is purchased by
the Ton. 1 Ton of which will
produce 5 Cwts. of Charcoal.

Charcoal.

The woods used are Alder & Willow for Common Powder.

Buckthorn commonly called Dog-wood for Rifle Powder.

Great care should be used in sorting the Wood into different sizes, all rotten or dirty wood should be carefully excluded.

In loading the Slips with wood always keep the butt ends towards the mouth, the Slip going in mouth first. the back part of the Cylinder being hottest. Always put the

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Royal Gunpowder.
Factory.
Waltham Abbey

Royal Gunpowder

Factory

Waltham Abbey

(ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY) MANUSCRIPT NOTEBOOK, obl 180 x 110 mm, orig brown skiver, with metal clasp at fore-edge, the opening leaf with penned inscription 'RI. Gunpowder Factory, Waltham Abbey, 20th October 1871'. 74 leaves, (148) pp., of which 121 pages are filled with continuous notes, with three drawings. Cvrs worn but sound: contents intermittently lightly yellowed, with trivial spotting and occasional thumbing or light soiling or grubbiness: a single leaf, or possibly two. removed in isolation from a short section of blank leaves, the remaining stub of one of them with fragmentary edge of a drawing, but as the leaves either side are blank there is no interruption of the manuscript as it stands. VG.

All the notes, on an attractive pale blue-grey cartridge paper, are in the same clearly legible neatly penned contemporary copperplate cursive hand, except for those in two leaves, which are in a different but equally legible penned hand, probably contemporary with the principal one.

The notes describe 'Brimstone Dome'; 'Cylinder House'; different woods used for making charcoal, and notes on processing them, and on their products; 'Saltpetre Refinery', and notes on the current procedures for refining and testing saltpetre at Waltham Abbey, number and function of men employed thereon, and their individual duties; 'Mixing House'; 'Incorporating Mills'; 'Brimstone Refinery'; notes on the work performed by water and steam mills; notes on R.L.G. and R.F.G. powders; the granulating process; 'Memo of Rocket Composition'; method of pressing gunpowder at Waltham Abbey, etc. There are also various tables. Two full-page drawings show transverse and longitudinal sections of a retort, while another depicts a densimeter.

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