

11

WEIGHTS AND MEASURES.

TROY WEIGHT.

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

AVOIRDUPOIS WEIGHT. Drams.

Drams. 16..., 1 Ounce. 256..., 16. 1 Pound. 25672.1,792. 112.4.1 Hundred. 378.490.3640.2,240.490.20.1 Ton. Bi Aite Act the stone weight is to bi Aite Act the stone weight is to be the stone to be the cw.; and no comts stone to be the cw.; otherwise made.

APOTHECARIES WEIGHT. Grains.

Grains. 20...3 Scruple. 60...3.1 Drøm. 480..24..8.1 Drøm. 5.780..283..96.12.1 Pound. Medical men use fais weight in Mixing medicines, but buy and sell mixing medicines, but buy and sell simple drugs by Avoirdupois weight.

CLOTH MEASURE.

Inches.	
24 1 Nail	
9 4. 1 000	nton of - TT - 1
3616 1	Vanda Yard.
27 19 0	rara.
45 90	Flemish Ell.
	English Ell.

LIQUID MEASURE.

Pints. 2 1 Quart. 21 Gular. 84. 1 Gallon. 504. 252.63.1..14 Hogshead. 672. 336.84.2.14-1 Puncheon. 1,008. 504 126.3.2.14-1 Pipe. 2,016-1,008 252.6.4.3-2.11 Tun.

Also,

Also, Quarts. Also, 4....1 Gallon. 36....9. 1 Firkin. 72.. 18.. 2.,1 Kilderkin. 144.. 36., 4..2.1 Barrel. 216.. 54.. 6..3..14..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	liton
50 feet hewn timber	ST ton
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. 5 feet 1 pace 6 feet 1 fm.	3 miles 69½ miles	1 leag. 1 deg.

SQUARE OR LAND MEASURE

144 inches1	square foot
9 feet1	square vard
2721 feet1	rod brickw.
100 feet1	sq. flooring
16 poles1	chain
40 poles1	rood
4 roods, or 4840 sq.	
vards1	acre
640 acres1	square mile
30 acres1	yard of land
100 acres1	hide of land
40 hides 1	harony

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

R. Jumpowder Factory Waltham Abby 20° October 1871 No. 138 BOOK, W. O.

RI Gunpowder Factory

Waltham Abbey

20th October 1871

[Vertically up left hand side]

W.O.BOOK, No. 138

Brimstone Dome! The Retort is charged with Scivts. 56. lbs. of Grough Julphur producing Scivts of Refined. On an average of working 22 cuts of Grough Suppur it produces 20 cuts of Refined 160 tos. of Reworks. Loss in Refining 48 tos, Refuse 16 th. The Time between charging The Retort and plugingin. is 4'2 to 52 hours, but you cannot plug in before all The gas has worked off. From The time you have pluged in to runing into The Receiver is about 2 an hour

Brimstone Dome

The Retort is charged with 5cwts 56 lbs. of Grough Sulphur producing 5cwts. of Refined. On an average of working 22 cwts. of Grough Sulphur, it produces 20 cwts. of Refined 160 lbs. of Reworks. Loss in Refining 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 runing the liquor into The receiver, about 22 to 3 hours, and it is generally an hour before fit for casting, It takes on an average 1 ton of Goal to I ton Sulphur. The way to test Refined Put a small portion of Refined into a vessel and set it on fire and when burnt out should leaves readure.

time of running the liquor into the receiver, about 2[1/2] to 3 hours, and it is generally an hour before fit for casting.

It takes 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 [superscripted no] residue.

Onlinder. House. The woods used are Alder and Willow for Common Powder. Buckthorn commonly called Dogwood for Rifle Powder. Great care should be used different sizes, all rotten and dirty wood should be carefully excluded In loading the Slips with wood alwards keep the but ends towards the mouth The flip going in mouth first the back hart of the Cullinders being hottest.

Cylinder House

_____0 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.

Always put the Imall wood at the bottom of the Slip, and The large wood at the top. A Gord of wood is 14 ft. long 3 ft. high. 3 ft. evide, average weight of a Gord of seconed wood about 10 cuts, it bakes 4 of a Gord of wood to load a set of Slip's, which will produce Icut of Charcoal! One Gord of wood well pro - duce 4 clots of Charcoal 10,000 cubic ft of gass, 50 gallons of acid, 12 Gallons of Tax

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 [1/4] of a Cord

of wood to load a set of

Slips, which will produce

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 I ton of which will produce subts of Charcoal. Average time of Chairing Common is 4 hours. Average time of Chairing Dogwood 33 hours producing 84 ths of Charcoal. Chack sort of wood taking on an average zewh of foal to each burning. All woods properly chaned should produce if its own When the gass begins to flow into the furnace, it is a disty yellow, gradually changing lits colour

Dogwood is purchased by

the ton 1 ton of which will

produce 5cwts of Charcoal.

Average time of Charring

Common is 4 hours.

Average time of Charring Dogwood 3[1/2] hours producing 84 lbs. of Charcoal.

Each sort of wood taking on an average [1/2]cwt of Coal to each burning.

All 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 its colour

to a Violet when it is denerally fit to draw, The burnermust use hisoun judgment knowing The size of The word and the heat of his bylinders. Length of Cylinde's 5ft. 3in. Diameter at Mouth 2 ft. bin. " Interior = 2 ft. 5 m Length of Slips - 3th. Tm. Diameter. " = 2ft. 2 m. Estinquishers = 4 ft. 5 m. in height. Diameter = 2 ft. 7m Small coolers = 2 ft. 6 in! height Diameter 2 ft. Im. The difference between the length of the Chilunder

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 Cylinders = 5ft. 3in.

Diameter at Mouth = 2ft. 6in.

" " Interior = 2ft. 5in.

Length of Slips = 3ft. 7in.

Diameter " " =2ft. 2in.

Extinguishers = 4ft. 5in. in

height. Diameter = 2ft. 7in.

Small coolers = 2ft. 6 in.

height. Diameter = 2ft. 1in.

The difference between

the length of the Cylinder

and flip, is 1ft. Sin. That is for brickwork for The bylinders to rest upon, unde The bylinders run 4. Sin flues 9 Slips, 6 Extingushers, 12 small borles are reguired to worked set of Cylinders, either 2. 3.4. or 5 burn Some Dogwood charcoal for special purposes has been burnt at a lower Temperature averaging Shours her burning.

and Slip is 1ft.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 req-

-uired to work a set of

Cylinders, either 2. 3. 4 or 5 burn

-ings per day.

Some Dogwood charcoal for special purposes has been burnt at a lower temperature averaging 8 hours per burning. [flourish below last line]

Saltpetre Refinery The method of refining Sallpitre as now carried on at The Ros Gump - Factory is as follows. Mumber of The men employed mentemplat S are one Foreman one Stoker and four Labourers Thesemen are under The June intendance of the Master Refiner Vapacity of The Refiningcoppers are capable of con Refining Coppers Stevahorating taining 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 The method of refining Saltpetre as now carried on at the RI.[superscript] Gunp r.[superscript] Factory is as follows.

Number of men employ d[superscript]

The men employed are one Foreman one Stoker and four Labourers these men are under the Super intendance of the Master Refiner

Capacity of Refining Coppers & Evaporating Pots

The Refining coppers are capable of con taining 500 Galls each

The evaporating hots about 300 gall? each . The refining coppers are fitted with false bottomis to prevent The Salthetre ad hereing to The bottom of the Coppers. Hoker The Stoker lights the fires under The refin ing Coppers and evap orating Pots, between 5 and blelockea.m. They having been charged the previous day Foreman The foreman and Labourers Cabourers come to

the evaporating pots

about 300 galls each

The refining coppers

are fitted with false

bottoms to prevent

the Saltpetre ad-

hereing to the bottom

of the coppers.

Stoker-

The Stoker lights the

fires under the refin

ing Coppers and evap

orating Pots, between

5 and 6 Oclock a.m.

they having been

charged the previous

day

Foreman

&

Labourers

The foreman and

labourers come to

workeat Jam. about 2 hours after the fires have been lighted the greater part of Refining The Salthethe in the Coppers. refining coppers is disolved and The liquor begins to boil fust before boiling the Thick sum formed on the surface of the lequor is care fully skined off and the false bottom hulled out, the liquor Then boils.

work at 7 a.m. about

2 hours after the fires

have been lighted

the greater part of

Refining

Coppers

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 care-

fully skimed off

and the false bottom

pulled out, the liquor

then boils,

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

and cold water

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the surface

The liquor continues

boiling for half an

hour, or till the scum

no longer rises; the

coppers are then [inserted] filled up

with cold water

and the liquor is

again made to boil

briskly for a few

minutes when the

furnace doors are

opened and the fires allowed to go down. In about 2 hr. the liquor will be The proper temper. ature for pumping out (220) sp. gr. 1.53 Supply The Horeman &. pisterns labourersoncoming to work pump into The supply cistern Mater used about 800 galls of water in Refining for washing Satthethe Se This water is obtained from an artisian well of considerable depth.

opened and the

fires allowed to go

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the liquor will be

the proper temper-

ature for pumping

out (220°) sp. gro. 1.33

Supply

cisterns

The Foreman &

labourers on coming

to work pump into

the supply cistern

Water used

in Refining

about 800 galls. of water

for washing Saltpetre & c

This water is obtained

from an Artisian well

of considerable depth

and is as clear as can be obtained without distillation These min also humps into the evaporating Vapicity of the Pots, The liquor from The Goolers. previous days washing and run out by mean of plugholes the mother liquor from the four coolers amounting to about 300 galls. Sp. que 1:13 The also pour off the mother liquor from the Salthetre which has been set to crystalize in pains, the pains on the edge on The still

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be obtained without

distillation

Capacity

of the

Coolers

These men also pump

into the evaporating

Pots the liquor from the

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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

to drain the Satthetie as much as possible, after This the Salthetre in the Goolers (about Heat) is cleared out and placed in pans, and set on The stills to drain the Salthete. Washing The men then take out the Sallhete Gisterns about (47 cuts) from The washing cisterns leaving a depth offin. which contains a large amount of water, and place in one of the Hore Binsichere it remains till required for use.

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 (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 Sallhete has remained about 3 days it contains from 3 to 5 her cent Mosture arena, to The Season & The above workocces pies about 2, hus, then the Horman & labourers cut open The Bags contorining The Glough Sallfite fill 49 Barrels, each containing (112 ths) of the contents and weigh them sous to be ready for charging the refining coffpera 10

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

The above work occu-

pies about 2 hrs.

Then the Foreman &

labourers cut open

the Bags containing

the Grough Saltpetre.

fill 49 Barrels each

containing (112 lbs)

of the contents and

weigh them, so as

to be ready for

charging the refining

coppers.

Temperature The filtering process of Filtered occupies about thour The filtering process Folution reduces the temperature of the liquor, especially if it runs slowly 0 through the filters. When it reaches The Goolers it is about 180° to 190°. The boolers 4mi Goolers. number are each sise of 12 ft by Ift and about 11 in deep. The lequor from two refinding coppers fill them to a depith of 53 in a man attends to each cooler for thous or to.

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 use 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.
These men keep the Hormation liquor always on The of Grystats move with long handled woodlichoes and as it cools fine crititals, fall to the bottom of the loolers These crystals are from time to time drawn to the side of the coolers, and thrown out whow the draining reicks attach to the horishing cister this processes con timied tilla con siderable diantify has been collected on the racks, The Sallhete is left to drain for a few minutes

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

The cooler portion is then raked white the washing cistern, and a fush supply of crystals is Farmen but on the rack and so on the washing custering are about 10 ft long 4. A. Washing wide 8.3 ft. high and a false bottom of wood Visterns presed with holes each ustern is fitted with a plug hole. The crystals form more slowly in The Goolers as the liquor cools when the temperature is reduced to an " The shaking is discontinue The coolers are runsed

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 90° the

shaking is discontinued

the coolers are rinsed

with hot water and the liquor left to cool tell next morning all the fallpetre on the backs is now raked into The wash-First. ing cistern The plugs Marking of which are takel out and the bristals washed with by Aprinkling about 60. gall of water by mean of a rose over each washing istern: The liquor that passes through the. Salthetre is called the first washing it runs into a clean liquor tank and afterioards

with hot water and

the liquor left to cool

till next morning.

First Washing

All the Saltpetre

on the racks is now

raked into the wash-

ing cistern. The plugs

of which are taken

out and the Crystals

washed with by

sprinkling about 60

galls [abbreviation of gallons] of water by means

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

funded into the refining coppers The plugs are now put in and enough water difforved to un Gerond Mathing vito The cistern to enver The Palthete, Flood. about 130 gall! This water is allowed to stand half an hour when The plugs are withdrawn and The lequor runis unto the clean ligitor cistern. This lequor is allowed to run off for half an how and is called The second washing Third a Third and final Washing warhing is then

pumped into the

refining coppers

Second Washing or Flood

The plugs are now put in and enough water allowed to run into the cistern to cover the Saltpetre, about 130 galls 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

Third Washing

A third and final

washing is then

quen by sprinkling about to gall of water over the contents of each A each washing cistern as at the furt washing the plug holes remain open The falthetie is now left to drain all might. It is desirable when procurable That destilled water should be used Air This washing to avoid The impurtue 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 sist and second washing and isund The following day in The refining Appers instead of water. When all the lique has passed through filters The fitters they dre ring Warhed with hot water. This water is thrown with one of the evaporating pots. The fillers are Then washed first en hot water then in cold and affer wards hring up to 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 eleaned out about 260 gall of lique from The three washing Washings of the Jalthete Refined finnfed The previous day are into Harto humped into Poppers. each coffer, fires whig propably are not quite out are made up with ashes in order to dissolve so of the Salthethe during The night. Reducity. The ligun evaporated Lequois 8) or reduced consists of Mature of The mother legun from The Gooley. The most fee Leguors Reduced! liquor from the Salthete

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 [the previous word is corrected] 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.

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

erystalized in hans. This lequor is hept buskly boiling all the morning by The Stoker Impune about lam he begins Satts to feel The bottom of the for with a long un spud of the empuse south have begun to fail he stackouts the the fires a little for casionly uses The spired to prevent the salt from caking Hiltering. When the liquor is reduced reduced to about 4 of Liquiors 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 Pm. The solution just simmering is ready for filtering it is filtered in the manner already described the filtered prystatting legior is crystattised Sans. in cohper hans which contain about 1 de lach When the liquio has been laddled out of the reduce pots The salts are found. at The bottom the Salt Taken out and but with baskets lined with Salthete Bags to drain The leguer from The salt In the following day the contents of the Baska

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]

liquor is crystallised

in copper pans which

contain about 17 gls. each

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 but into the return salt store & the Backets are afferwards washed By time the ligur from the reduce hots is filtered it will be about 3 h.m. The men then begin charding The Refining Poppers. The false bottoms are Charging first put in Them the Refining cakes of Salthetic from Coppels. reduced liquors which have been set up to drain a day or two weight about licent. and The bystals from the loolers which have been set up to drain weight about 11 with

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 3p.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. [abbreviation of hundredweight]

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 levts of Grough Salthute all This together with the Salthetre in the 280 gall of the first. second third washing which have already been pumped into the Goppers, will make about Soluts of Saltpete mi 2 Cofipers. When the boppers 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.

Testot a hortion about so gu Southete of the falthetie to be as to its tested is hut into a test Perity tube with about half an ounce of distilled water on the applicat of heat the Sallfietre is disolved a dropor two of Mitrate of Lilver 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 cheloudes present: a fair sample of the Southite is wughed

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 ever the useighed tample is Then careful Determination firsed over a lamp of the amount the cover of the chuiceble Water in being nearly but not Salthete. quite closed atter funion it is set aside to coil when cold the crucible and contents are weight the loss in wight represents The amount of water in the fall hite weiched from which ' The her centage may be calculated. A

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.

Musing Mouse. The Machine! Se drum revolu - ind in an enclosed howher in the drum run flyers working in opposite deise tions to the dream, it making 40 revolutions her minute and the fliters 132, and The water wheel 15 per men. Then employed Four misers and a Master Muxer. On them coming to work at jo clock. They wheel to The meaning house the quantity of Salthete Brin stone and Charcoal require 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 directions 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 sit The Charges, and fitch if wanted more Charcoal. Julthetie &. To this a so this Charge. U man weight 73 this of Tharcoal 3 the of Brimstone 38 tos of Sattiche with the weight of the Montine added tothe it is then put anto The mixing bays and taken ich into the mainine and run for 3 min when sufficiently mixed it is let out through The hoppin into a tharge ful. and setted through an one rive into the bags for to be

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 Salthetre gellowing Toper cent for Powder. Tor Sotto the tos .. 031. per yent moisture 39-" 3 3.1 3.9 " 4 3.2 39 " 3 3.3 39 . 5 3.4 34 " 6 3.5 39 ... 6 3.6 39 " 7 3.7 39. 4 0 3.8 39 " 9 3.9

Continued. ttos. " 031. 4. per Gent Moisture 39 . 10 39 " 10. 4.1 ____ 39 " 11 4.2 -39 . 12 4.3 _____ " ___ 39 " 12 4.4 _____ 11 ____ 39 1 13 4,5 _____ 11 ____ . 39 " 14 4,6 ____ " ____ 3.9 " 14 4.7 _____ " ____ 39 . 15 4.0 _____ 11 _____ 40 . 0. 4.9 _____ 11. ____ 40 . 0 5. _____ "

Continued tos ... 035 5.1 per bent Moisture 40 . 1 5.2 . .. 40 . 2 5.3 40 " 3 5.4 ____ 11 40 " 3 5. 5 11 40 " 4 5.6 11 40 11 5 5.7 -40 ... 5 40 . 6 5.9 - 11 40 "7 6. 40 " 7

Sulphin is ground in quantities of 2'z cents. at a time under a pair of son runners fitted with scrapers and sifted in a slope reel coverd with 32 mish 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. Wills. Maight of the Rumers. Stone. 7 .. 0 Sion. 24. 374 Diameter of Beds. Stone 2th. 3 in Pron. 82 perm. Revolutionsper min. } tone T'z pur on. Time of Ryinging the Charges under the grow runners. Dogword. -4 hrs. Shed Wooword . 2 8. his. With 40 minutes Common . Dust 2 2 hrs. -40 minutes = Time of Running the Charges under the Stone hunners. Dogwood -52 has Dust 40 minutes Common. 32 /2 Dust. 40 minutes
Incorporating Mills.

	t	on	lbs
	Iron	8	10
Weight of the Runners	Stone	7	0
[waight - original correction]			

Diameter of Beds	{ Iron 2ft. 3 1/2i	n
	{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 the Charge when sent from The mixing house contain about 2 pints of liquor and requires from 5 toty pts of ligues The dust requires from 3 to 12/2 On The Charge being properly distributed on the Abled the howder should be brushed clean away where the out side plough works and norm The cheese and if the howder adheres to the curle when? starting on a green bhauge it may be scalded off with boiling water, then it may easily be shudded off and sweht in land started. When the mill has been at work about 20. a. 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 outside 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 burb that sticks to The outside of the runners. The millmen of he Thinks That the charge has not got sufficient liquor torun it up to its proper time 8. moisture he will hut some more on through The rose of his watering pot, and should then be mixed up with the thover, if not when the charge isready it might be shotted. When the charge is got to its proper moisture, it is spud. ded up, and put into a Charge tub! to go to Break. ing 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 & 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 speed -ded up, and put into a Charge tub, to go to Breaking Down House.

Temperature at 40° add 3 on The density from 40° and under 45° add 2 on, over 45° and under 55° add I on to The density from 55° up to To register The densities accor ding to the tables at 60 & at yo For every 3 degrees the temperature rises take 10 the weight of the mercury. mercury. 5

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 D. - Specefic gravety of mercury P. = Weight of globe full of Powder I mercury P' = weight of globe full of mercury, 100 = weight of Powder used.

: Density -

D × 100 P¹_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 growth of menury is at 50° F. = 13.57 60°. = 13.56 " 70° = 13.54 " 80° = 13.53 " 90° = 13.52

Receipt for making Cement 5 Parts Beenvax 1 Part of Red ochre or Vermilion Red 1 part of Black Romin! Placedin an Carthenware Saucer and heated until it melts into a Liquid The from mountings to be made bot with a piece of Hot from so as to make the cement run well.

Receipt for Making Cement 5 Parts Beeswax 1 Part of Red ochre or Vermilon 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.

The LG. from Granulating Machine is put into Howgontal Reel clothed with 28 Merth canvas and is hun 1's hours which duts it, and it is then fit for the store. F. G. when brought from the Granulating machine in its faul state is sun through a sloped reel clothed with 56 migh filk at an angle of 4° to take out the dust before put into the Glazing Barels for 3'z 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.

Bumstone Refinery At 170° Fahrenheit it begins to evaporate and increase of 15 to 20 causes it to met and at 229° it becomes a fluid if the heat be suddenly increased to 250° it loccomes firm and of deeper colour. And at boo it sublimes and may be collected in the form of flowers of Sulphun

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 Stoped Reel set an angle of 11° and clothed with 32 much were if used for the ruling of Sattfrethe Brinstone 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.

Descriptions of Charcoal Description of Towder Charco al Density Pelouty at 105 th R.L. 26 April 1870 W. A black. 1.684 1001. 8 " 30" 14 44 97 14 44 97 " stoved 4" feb. 1869 1.690 987.0 " " 12¹⁴" " " " " " " " " 12¹⁴" " " " " " " " " 18¹⁴" " " " " " " " " " Reworld. PY 10. 6¹⁴ fume 1870 P Y. W. Reddich! 1.60 93d.4 1.69 959.0 1.69 960.3 1.69 942.7 1.698 1031. 6 1.679 1037.5 = 11 1041.4 " 1. 694 01 1040.6 ** 1.601 " " I to fleme " " " 1030.7 11 1.691 99 1026.4

Density of Refined Sulphun = 2.018 """ " Saltpite = 2.076 " " Saltpite = 2.089 R.L.G. 1.697 Glazed Density 1.672 Finished "

1. Wata mill working 50 the Charges working The Green 3 hours will produce 4.700 the per week. 1 Water mile working both Charges working the green 3 hours. will produce 5640 the for week. 1 Water mill working 50th, Ch. working the green 3's hours. will produce 11200the puweek. I Water Mull working bo to Ch. working the green 3' hours well produce 5040 tos per Week 1 Steam quill Working 50 the Ch. working the green 2 hours. will produce 6300 the week

 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 Muile working both C. working the green De hours will produce 7560th per week 1 Steam mill working soft Ch. working the green 22 hours will produce 5300 per week 1 Steam hull working bo tothe working the green 2'z hours well produce 6360ths per week.

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 Salpetie Brimstone & Charcoal allowing 15 per cent for 100 to Charge D: for a botto bharge with an addition of 20 the or 20 percent of Charcoal in place of 15 per cent 75 Salthetie 10 Brimstone 20 Charcoal 105 Saltpete 106 75 50 104 60 : ! 76 10 6 50 } Bunitone 10 • • 10 6 60 10 10 6 15 50 } Charcoal 106 60 15 • •

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)

44. 4. Merh for R L. ls to pass and to be retained on an 8 merh. 12 Thesh for Separates 8. Merh for L. G. to passand to be retained on 16 merh 10 Merh _ For Separating Chuck from R. F. Gafter Glazing 12. Merlo For separating bucks from Als after Glazing and for R. F. li to pass to be retained on a 20 merte 16 merlo = To retain L. G and for separaters de

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. Merk. To retain R. F. Gand for Separaters. 24. Mush. For Separaters 2.8. Mesh. For relling dry ground 32. Mush. For Charcoal &. Brunstone Reels and for Sep. 36. Mush. For Separater. 24. Much banvas. Reels for R. L. G. and for slope Reels for Foul Rife F. G. 28 Merto banvas Reels for L.G. and for Finishing R. F. G. and slope Reel for R. F. l. 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 Merte Stuff Reds for finishing F.l. and stope reds for fourt 56 merto- Stope Reel for F.G. 72 merh Finishing Reel for J. 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.

1 to I A R. L G. worked to about 3/2 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.

Febble. Common hull bake worked at 3's per cent of moisture pressed at 14/2 inches should be set at 1.78 and when finished would be about Pebble. When worked at 4 to 5 per cent of mousture should be 1. yyo. Pebble When worked at 5 to 6 per cent of mousture should be 1. 780 set at 1.820 Pressed from 15 to 15 1/2 in. worked at 3'4 per cent 1et at 1.820. when timished 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. ? Mile bake worked at 23/4 per cent of mouture Pressed at 11's inches set at 1. 735 well give a density of about 1. 727 This is very good and well give about 1315 feet Delocity n bube when blaged. 56.9 " " Finished 55.3 the size grain 12 to 20 the settings should be of 16 the the og . du 16 . 20 = 2. 3.0 . this Powder is run 12 hours in the Glazing Barrels which makes a difference of . I. and worked at the meorporating mills 8 Hours. (.7/4 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 RL 4 and R. F. G. powders undergo after leaving The Granulating machine. R. L. G. R. F. G. Rem through a stope 1th In a hour ontal Dustong reel covered with reel covered with 24 meste canoas 24 mert canvas mak making Horeying 40 rev. per min. dutions for half Glazing In wooden bar In wooden bar-rels making 34 rels making 34 revolutions her revolutions ther min. minute with 200 for 5 2 hours. of graphite few barrel 2nd In a hourontal, Run through a Dusting reel covered with slope reel covered 24 merte canvas with 28 merh canvas making 40 rev making 40 revolution, o lutions for men per minute Stovenia 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	In a horizontal	Run through a slope
Dusting.	reel covered with	reel covered with
	24 Mesh canvas	24 Mesh canvas mak-
	making 40 rev-	ing 40 rev. per min.
	olutions for half -	
	an hour.	
Glazing.	In wooden bar-	In wooden bar-
	rels making 34	rels making 34
	revolutions per	revolutions per min.
	minute with 2 oz	for 5 1/2 hours.
	of graphite per	
	barrel	
2nd	In a horizontal	Run through a
Dusting.	reel covered with	slope reel covered
	24 Mesh canvas	with 28 Mesh canvas
	making 40 rev-	making 40 revolutions
	olutions per min	per minute
	for half - an hour.	
Stoving	Same fo	or both

Je Durting Not Required In a hourontat 28 mich camas making 40 rev. a minute for 22 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 RLG. The top pair of rollers have pyramidal teeth in high, the second pay undar teeth zin head : The two lower pairs have chusel shaped teeth formed by cutting longitudinal V shaped groves and circumferential rectangular ones. The top short screenes would be a 4 mert & also The upper long one and the bottom long screene of 8 mish.

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 chiselshaped 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 re placed with plain ones. The top short screens. would be a 12 mert and The bottom long one 20 mesh. The rollers make 30 rev. per mind.

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.

19th Jany. 1875. memo: of R. F. G. ? worked with 4 per cent of moisture and pressed at 11 inches. 300 the reeled in 18 mesh reil produced 216 of gran. 4.84 of dust. bube 57. 0. Denuty 1. 731 Siftings 16 20 Pass 20 13.4 2.8 -4 300 reeled in 28 mertirel produced 260 grain. 9 40 dust. Cube 56.8. Densety - 1. 731 Settings = 16 26 Pors. 20 1.2 3.12 1.2 This Powder was marked A. 13.

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 21/2 per cent of moisture. Pressed at 10 1/4 miches I set at 1.649. will give a Finished density of 1.620 and will give about 1264 feet Delocity Cube when Glazed 53. 6 The Size of grain 12 to 20 the setting of 16ths. 12 to 16 = 13 " T " O 16 " 20 = 2 " 10 " Pars 1. 20 = 5 " 0 the 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]

Merno:-R.7. G. Mull Cake worked at about 2 per cent of moisture pressed at 10 miches and set at well give a timshed Density of 1.59 and well, give about feet belocity Cube when Glazed = 53. 13 " " thished = 52 " 3 The siftings are as follows. 12 to 16 13 ... 9 ... O 16 to 20 2. 3.0 Par 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 Sattpetre allowing 76% to 4.6 per lent = 4.7 " " = 4/1 13 ent 46. 5 3.3 per lent 47. 3 2.0 per 47" 14 ··· 46.9 3.4 ·· ·· 4.7.4 47 " 15 4.8 " 2.1 " " 3.5 " " 4.7.4 " 4.6.10 " 2.2 " = 47 " 15 4.9 " 3.6 " " 47.5 = 148 " 0 5.0 " 2.3 " " 46...11 . 11 " 4.7.0 46.12 3.7 " = 40 " 2.4 " 5.1 " " " 46 .. 12 3.8 " " 47"7 2.5 " = 40 . 2 5.2 " " 47.8 " 46 . 13 3.9 " 2.6 " - 40 - 3 5.3 " " 46 114 4.0 " " 4/"0 2.7 " = 48 . 4 5.4 " " " 47"9 " 46 " 15 4.1 " 2:0 " = 48 " 4 5.5 " " 4.7.10 " 4.4.15 4.2 " 2.9 " = 48 . 5 5.6 " " 47"11 " 47" 0 H.3 " " 3.0 " " 4/"11 5.7 " = 40 .. 6 " 47" 4.4 " 3.1 " = 40 " 7. 5.8 " " 47.2 4.5 " " 4/"/2 3.2 "

Table of Weights of Wet Saltpetre allowing 76%

in a 60lbs Charge.

			lbs. ozs.			lk	os. ozs.			lbs.	OZS.
ا 2.0	per C	Cent	46 - 8	3.3 p	er Cei	nt 4	17 - 3	4.6 pe	er Ce	nt 4	7 - 13
2.1	п	п	46 - 9	3.4	п	п	47 - 4	4.7	п	п	47 - 14
2.2	н	п	46-10	3.5		"	47 - 4	4.8	"	"	47 - 15
2.3	н	п	46 - 11	3.6	"	п	47 - 5	4.9	п	II	47 - 15
2.4	"	"	46 - 12	3.7	II	п	47 - 6	5.0	11	п	48 - 0
2.5	н	"	46 - 12	3.8	"	"	47 - 7	5.1	II	"	48 - 1
2.6	"	"	46 - 13	3.9		"	47 - 8	5.2	"	"	48 - 2
2.7	н	n	46 - 14	4.0		п	47 - 8	5.3	п	п	48 - 3
2.8	п	п	46 - 15	4.1	"	II	47 - 9	5.4	"	"	48 - 4
2.9	п	"	46 - 15	4.2	"	"	47 - 10	5.5	"	"	48 - 4
3.0	н	"	47 - 0	4.3	п	"	47 - 11	5.6	п	"	48 - 5
3.1	"	,	47 - 1	4.4	"	"	47 - 1	1 5.	7 "	ı	' 48 - 6
3.2	п	ı	47 - 2	4.5	п	"	47 - 12	2 5.8	8 "	"	48 - 7

Continued.

5.9 per cent. -6.0 " 11 6.1 " " 6.2 " 11 -6.3 11 " 6.4 1 " 5 6.5 " 11 = 6.6 " " 6.7 " " -6.0 " 6.9 " 4 # 7.0 n 7.1 " " 7.2 1. 11 7.3 "

the ogi 48 . 8 48 " 9 48 . 9 48 . 10 48 .. 11 48.12 48 . 13 40 - 14 48 . 14 40.15 49.0 49.1 49.2 49.2 49.3

Continued

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

Memo, of Rocket Composition. Reportions Saltpetre = 68.75 Charcoal = 18.75 Sulphur = 12.5. to 100.0

Memo. of Rocket Composition.

{ Saltpetre = 68.75

Proportions { Charcoal = 18.75

{Sulphur = 12.5 [underline 12.5]

100.0 [double underline 100.0]

Common Charcoal Require Chancoal Require Cords of Wood Barrels of Powder " " 10 .035714 1 1 20 .35714 10 14 1 4 3.5714 100 1000 7, 2 3, 12 10000 71 8 2. 8 35.714 10000 357.14 A lord of Wood is 14' long; 3' high 9. 3' wide.

Common Charcoal

[section below is in a tabular format]

Barrels of	Requ	uire Cl	harc	oal	Require Cords of Wood
Powder	Tons (Cwt C	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

[end of tabluar form]

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

Common Charcoal Produce Charcoal Make barrels of Powder Gords o Wood " 4 . 20 10 2 -200 2,800 100 20 . 1,000 200 . 28,000 10,000 2,000 280.000 average weight of a lord of wood = 18. Cents.

Common Charcoal

[section below is in a tabular format]

Cords of	Produce Cha	rcoal	Make Barrels of Powder
Wood	Tons Cwt Qı	rs Lbs	
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 Require Charcoal Require Tons of Dogwood mannels o Powder as Purchased Tons Curto Des tos 16 . 031746 10 20 :31746 100 14 3.1746 4 3 1.000 2 12 31.746 10,000 2 P 317.46

Dogwood Charcoal

[section below is in a tabular format]

Barrels of	Require Charcoal				Require Tons of Dogwood
Powder	Tons C	Cwt C	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 Tonio Dogword Priduce Charcoal Make bareliof Powder. as purchased Tous Cents In the 31.5 A 2 10 2 315. 5 " 100 22 3150: 1,000 225 31.500. " 10,000 2250 315000 .

Dogwood Charcoal

[section below is in a tabular format]

Tons of Dogwood	Produce Charcoal	Make Barrels of Powder
as purchased	Tons Cwt Qrs Lbs	
1	- 4 2 -	31.5
10	25	315
100	22 10	3150
1,000	225	31500
1,0000	2250	315000

[end of tabluar form]

Brimstone Require Refined Brimstone Bainels of Require tons of Powder. Grough. Burnstone Tons curts que the. 10/4 .0041018 10 .04/018 18 12 100 4 11 1/2 .47010 1,000 4.7010 10,000 45 15 0. 20 17.018 Une ton of Refined Brimstone will make 218.5 barrels of Powder The extra 14 tos is allowed for loss in Grinding 9:

Brimstone

[text below is in tabular form]

Barrels of	Re	quire	Refined	Require tons of
Powder		Brim	stone	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.

remstone Produce, Refined Make barrels of Pourder Tons of Grough Brimstone Bunstone thi. Jons cuts 212.6829 24 2126.829 16 2 10 21268.20 20 6 100 212682.4 4 4 1,000 13 2126829. 3 2 12 9732 10,000

Brimstone

[text below is in tabular form]

Tons of Grough		Produce Refined			Make barrels of Powder
Brimstone		В	rims	tone	
	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 Require Barrels of Require Barrels a Barrelson Require Barrels of Refined Satthetre Refined Sallpetre Refined Saltsetie Pourder. each 3/4 cut. 14 each 3/4 cut allowing. 77.5 the allowing 75 the allowing. 16 the. . 892857 .904761 .922619 10 8.92857 9.04761 9.22619. 100 89.2857 90.4761 92.2619 892.854 1.000 922.619 904.7.61 10,000 8928.57 9047.001 922.6.19

Refined Saltpetre

[text below is in tabular form]

Barrels of	Require Barrels of	Require Barrels of	Require Barrels of
Powder	Refined Saltpetre	Refined Saltpetre	Refined Saltpetre
	each 3/4 cwt	each 3/4 cwt	each 3/4 cwt
	allowing 75 lbs	allowing 76 lbs.	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. Sattpetre Require Tons of Require Tons of Referred Salipetre Referred Saltper Require Tons of Refined Sattpetie Barrels of Refined Sattpetre Powder. allowing. He the allowing 11.5. the. allowing 75. the. .0345982 .0334821 .0839285 10 .334821 .339205 .345982 100 3.34821 3. 39285 3.4.5982 34.5982 33.9285 1.000 33.4821 10,000 334.021 339.285 345.982

Refined Saltpetre

[text below is in tabular form]

Barrels of	Require Barrels of	Require Barrels of	Require Barrels of
Powder	Refined Saltpetre	Refined Saltpetre	Refined Saltpetre
	each 3/4 cwt	each 3/4 cwt	each 3/4 cwt
	allowing 75 lbs	allowing 76 lbs.	allowing 77.5 lbs
1	.0334821	.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 Salthetre Jons, of make number of make number of Barrels of Powder Barrels of Powder Thake number of Barrels of Powder Refined . allowing 77. 5 ths. allowing 15 the allowing 16 the Saltpetre. 29.47360 29.86666 28.90 322 10 294.7360 289.0322 298.6666 100 2890.322 2986.666 2947.360 28903.22 1,000 298.66.66 29473.60 10,000. 298666.6 294736.8 289032.2

Refined Saltpetre

[text below is in tabular form]

Ions of	Make number of	Make number of	Make number of
Refined	Barrels of Powder	Barrels of Powder	Barrels of Powder
Saltpetre	allowing 75 lbs	allowing 76 lbs.	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 Sattpetie make number of Barrel of Powder make number of make number of Barreliof Barrels of Powder Barrels of Powder Refined Gatthetie allowing 77.5 the. allowing. 75 the. allowing 16 the rch. O. " 3 " O. 1.08387 1.105263 1.12 11.05263 10.8387 10 .2. 110.5263 108.387 112. 100 1105.263 . 1083.87 1,000 1120. 11052.63 10838.7 10,000 11200.

Refined Saltpetre

[text below is in tabular form]

Barrels of	Make number of	Make number of	Make number of
Refined Saltpetre	Barrels of Powder	Barrels of Powder	Barrels of Powder
each cwts qrs lbs	allowing 75 lbs	allowing 76 lbs.	allowing 77.5 lbs
0 3 0			
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]			

menno. of 1.5. Inch bubes. Common Mill bake worked at 4 to 4 1/2 per cent of moisture Pressed at 15 5/8 miches. ques a density of about 1. 996. 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 Sallpetre, Charge al & Sulphin. for n +2 the Charge. mg. As on m. the of an 31 .. 8 .. 0 Saltpetie : 6 " 4 " 13 charcoal : 2+ 11 3 11 3. Sulphur.

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 four of chargod, me

In Grinding one Ton of charcoal, we

loose 6 per cent.

The Siftings of 16 the of R.S. G.

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

should be as follows

[There is no text after this statement]



[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



[Diagram of horizontal Section of Retorts]

Longitudinal Section

of Retort

Scale 1/26

Pressing Gemprovder is generally firessed in layers of between plates of coffee or Gummetal in Hydraulie. Tresses. The details of the apparatus require little eschlanation. The frees. box is made of gim metal lened. inside and out withink rate boards the bottom ? one side are forma winty attacted 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 bottion to they can be opened out to facilitate un loading this closed They are secured with string, course threaded sours. of gun metat The broc has two for Jecting gumental claws which lunge on to a fixed invigorital rod of the same metal so shat the box can be turned on it on to the table of the by draubi press. when filled and ready An forening or outeroudt

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 projecting 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 en braded. It is braded as follows Being fuit twined down on its side the open top is closed temporarily with aprice of brand which is fitted to it. What is wir the informat side is incruered and raused and the other two sides are fastende to their places your mutal raches to hold the forus plates having perfundicular growes is them tinds afait

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 fastened to their placed Gun metal racks to hold the press plates having perpendicular grooves in them 1/2 apart

we then stid is an each side and the flates being put m the meal from the breatting drive und chine is shrulled in and readily falls. between the folates tilly The box is full, the rachs are then, drawn out leaving the plates fre with layers of foroder between them the excess of provder being carefully sheft 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 lowera and screwed to the other three, I overhead block and tactile is made fast To the Gun - metal age on the side of the brow and the box is then turned over on to the prestable in its bottom and The terriformy brand with which the top has been dried during charging being lifted Af the plates will be frind to have stilled 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

unches with sturower weight the vacant fore is then filled inf by shraelling in a few more layer of much placing a flate by hand on each in succession till The bos is filled As the bose now stands on the table of the room all that remains to be drive is to firm the overhead block with 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 bru and affly the pressure untill the box use to a sufficient height The amount of pressure to be queen to the contents of the box. is always estempated at to altham Abbey by the distance what The overhead black) enter the box. This is a rough but Totorably exact method Arequilating prisson for if the same amound of preserve

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

The qualities of the porter by means of it . The cube bra is no longer in use being entirely replaced by the densens The densimilar consists eter. of a barometer tube supported on shout mital stands, and having a crite at the bottom by which it can be of end 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 mans of which the our can be exhausted from the tube A glass globe fitted with metal collars on which again are sourced other collars provided with stip crites, can be attached to the bare meter table by meant of a closely fitting sour The lower collar of This globe is provided with a mygle which dif 1 mito an viris brok filled with manury

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
If then the lower code be haft closed and the other ones opened the die can be exhausted from the barometer tube and globe, and the lower crek being then opened the mercury rushes in rusis up till it fills the globe and continues to rice in the tube till it has attained the same height from the sur Acra of the mercury left in the bowl as

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 surface of the mercury left in the bowl at

as the column in an ordinary baroweter stands at the time The process of taking The density of a fample The air is first etc. hausted from the globe and tube and The mercury allowed to file them the uffour and lower cretes of the globe are then closed the mongel i taken off and the globe insoured 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 barreneter tube. It The weight of the globe filled with merervy is registered The globe is then emptud & a definite wight of the proder (generally 100 grammes) is introduced into The globe, The globe is then attached to The tube as before The air, exchanated and the mercury al. lowed to nice I 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 allowed to rise & fill

The globe as before The stop - cretes of the globe are provided with diafshragens the upper one of chammis littles and the bottom A fine wie gauge to prevent any pointete of powder being car rud out of the globe As soon as the murenony has reser to the proper height The stop crette attached to the globe are 1 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

mygle underewed & The globe taken the weight flus the weight of the poroder and less the weight of the volume of mereway displaced by it is also registered The density of the fowder is then cal. culated by the following formula Density= _____ 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

Density = D x 100 [D x 100 is underlined]

(P1 - P) + 100

where D. = Aucific gravity of mercury at The time of experiment. P. = Weight of globe full of Powder Many P' = weight of globe full of mercury 100. = weight of Towder employed The of grad of mercury at 50°F - - 13. 5% ... 60 ... _ 13.56 - 13.54 " " " " " " 13.53 .. 80 -- 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

"	u	u	u	60°13.56
"	"	"	"	70°13.54
"	"	"	"	80°13.53
"	u	"	u	90°13.52

an actual example worked out is subjoined Weight of globe filled with mercury 4,038 = P " " + Powder 3434 = P Temp. at time of escheristicut 60: 704 13.56 = P. Consequent of grav. of meravy Then D x 100 = 1356.000 (P-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.



The Dogwood is worked 4 hours because this wanted much drifer Than the Corrow. To rework a Dust Chas Stis distributed on the bed in the same way how common greencharge but will not take near to much liquor has it only runs between 30 or 40 minutes When the Charges is prop erly worked this spudded - its and taken to the magazine

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

[this is] distributed on the

bed in the same way

has common green charge

but will not take near

so much liquor has

it only runs between

30 or 40 minutes.

When the Charges is prop-

erly worked it is spudded

up and taken to the magazine

After the Bed is covered then it is brushed clean round The curb where The outside ploug comes and round the cheese where The inside plough works. Ofter the I hadge is bein properly putton. The Runners are moved about Grevolution, Then The cake That is left under The runders is broken ich and some composition laid over it Then The Mill is started and allowed torim 3 2 hours. The hon run ners 2: 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 broken up and some composition laid over it. Then the Mill is started and allowed to run 3 1/2 hours. The iron runners 2 1/2 hours.

and it turns out re very hot day, the Charge must be watered frery moderatty for the Run ners, and Beds will be unning with water and william The charge over for thous or thoday, after this Mixed well with the water it is distributed over The bed with the rake talling care to cover The whole of The bed. and always put plenty of composition under The hunners That is com. ing forward

and it turns out on verry hot day, the Charge must be watered very moderately for the Run--ners, and Beds will be running with water and will run the charge over for 1/2 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 of composition under the runners that is com--ing forward

Sincorporating Mills 1 7 0 ... To work a Green to harge The charge is shoton The bed half at each opening, then this liquor according to The atroposhi if it be a very hot day it would take you Spints of distilled water How the stone Runners. for The from Aumers will take much more. Treat care should be taken, if there should be a frostin The night

Incorporating Mills

To work a Green Charge

The charge is shot on

the bed, half at each

opening, then it is liquor

according to the atmosphere

if it be a verry 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

taken if there should

be a frost in the night

The Machine is drum running moride a case in The drum one flyers working vi opposite direction to the drum.

The Machine is a drum running inside a case in the drum are flyers working in opposite

direction to the drum.

Mixing House to mix a soll's Charge. It takes 72lbs of Charcoal 5lbs of Julphur, and The weight afithe Salthethe 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 lequor that is left is drawnoff. and reduced down in the same way; and the Setre That is left is used to charge The coppers has grough, But There is always a certain quantity of Salt. at the bottom of these Pots, which is Kept and The Petre exhacted from it

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 has grough,

But there is always a

certain quantity of Salt

at the bottom of these

Pots, which is kept and

the Petre extracted from

it.

when the lequor is put down the dirty lightor drain and the Petre left in The frans to help charge the topper. The dirty liquor from These is furnhed into The reduce poto, Then it is boded down to about halfe, there it is jeted off with the filtung bags and is caughtento a tub below when full it is put into pano to origstalize for 21 hours.

When the liquor is put down the dirty liquor drain and the Petre left in the pans to help charge the Coppers. The dirty liquor from these 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.

When the quantity of Petre is got out, it is put into the bins to be cleans it, it is first watered in, the about 4 hour after it is flooded 10. min after it is letrens into The clean lequor erstern to be prernfred into the coppers the next morning ofter This it is watered again. The liquor That remains in The coolers is drawn off ento pans, and put on the racks to drain

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 watered again. The liquor that remains in the coolers is drawn off into pans, and put on the racks to drain

When you se it is seef ficiently thick enough The fire must be lessend and drawn forward to keep it at a regular heat it is allowed to stand about 2 hour to cool, when it is prinfied off into the filtering bags, where all the dist grit be is caughtand it passes then into the coolers where it is shaken about to get the Sete and to theep it from crystalizing.

When you se it is suf--ficiently thick enough the fire must be lessened and drawn forward to keep it at a regular heat it is allowed to stand about 1/2 hour 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 Petre and to keep it from crystalizing.

Setre is melted, then you can take off the seem and firth, they take out the fulse botbe made to boil opposite to the furnace, This may be done by showing the fire bias for back has possible. Then while boiling you may put plenty of water with the whiten the Detre and To make the distance to the top, then it should be skined off
Petre is melted, then you can take off the scum and froth, then take out the false bot--tom, when it should be made to boil opposite to the furnace, this may be done by shoving the fire [bras] far back has possible, then while boiling you may put plenty of water into it to whiten the Petre and to make the dirt rise to the top, then it should be skimmed off.

Saltpetre Hefinery The Coppers are about 3 filled with chan lequa Then when ready for charging there is a false bottom put infor to Rep The Setre from The bottom of the Gopper. They Then charge it with about 13 ton of Trough Letter, when There should be a regular fire keptende them till all the

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 1/2 ton

of Grough Petre, when

there should be a

regular fire kept under

them till all the

but you cannot plug in before all the gas has worked off, The time between pluging and runking Into the receiver is about zan hour, time of running the lequor into The receiver about 22 to 3. hours, and is generally and hour before fit for casting. It takes on an average Thong coal to Thong Sulphun

but you cannot plug in

before all the gas has

worked off, the time

between pluging and

running into the receiver

is about 1/2 an hour, time

of runing the liquor into

the receiver about 2 1/2 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

Julphen Dome The Retort is charged with Scut 56lbs. of Trough Sulphur producing scut. of Refined Sulphur. Un an average of working 22 work of grough Sulphier it produces 2000t. of Refined, 160 lbs. of Revork. Loss in Refining 48lbs. Refuse 16 lbs. The time between charg-ing and pluging the Rebet is 4 to 5 hours,

Sulphur Dome [underlined]

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 pluging the Retort is 4 to 5 hours,



Estinguisher or large got ers. 4ft. sin in height. 2. 7. Chameter Amall cooles 2 ft bin hugh. 2" 9 Slips & Getinguisties & 12. Sindelle booles. cyre require to work 1 Set of Pylinders. either 2, 3, 4:00 5 burnings per day. Some Dogwood & hancoal for spicial purposes has been burnt at a lower remperature overeignes Shows per binning ?

Extinguisher or large Cool-

ers. 4 ft. 5 in. in height

2 "" 7 "" diameter

Small cooler 2 ft. 6 in high

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

when it is generally fit to draw, The humer Anutrese his own judgment the wing the size of The wood and The heat of his bylinders Length of Rebort 3 fr. 3 in Diameter at Mouth 2. 6. Length of Ship 3ft. 7m The difference between the length of hebort, and Hep is 1fl. din, That is for buckwork for heborts to rest upon, under the retorts run four flues of Sin wide couch.

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

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

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

Unerage time of Charing common is thours, producing sent of Charcoal. Average time of tharring dogwood 3th hours, producing 84lbs of Charcoal Cleach sort of wood taking on an average leut of Goal to each burning, all seasoned woods properly Charved should produce 4 of its own weight When the Jap begins to flow into the furnace this a dirty yellow gradually changing its colour toa Violete. A

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

Average time of Charring dogwood 3 1/2 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 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 word at the bottom and large wood at The top. le ford of wood is 14 ft long 3 It highand 3 ft wide, average weight of a bord of seasoned word bebout iplust, it take " bord of wood to loud a set of Hips, which will produce Hertof Charcoal One ford of wood will produce 4 but of Chancod 10,000 Qubie ft. of Safs. 50 Jallons of acid, 12. Gallons of Far. hogwood is purchased by The Son. 1 Toh of which will produce 5 puts of Charcool.

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 for formon Powder Buckthin commonly called Dog-wood for Rifle Bucher. Great care should used in sorting the Hood into deferant sizes, all rotten or derty wood should be carefully excluedo In loading the Slips with wood always keep the but ends towards The mouth, the Hip going in mouth first. The back part of The Oylinder being hothert. always but the

Charcoal

The woods used are Alder & 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 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

Royal Sunpowder. Pactory. Matham Abber

Royal Gunpowder

Factory

Waltham Abbey



(ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY) MANUSCRIPT NOTEBOOK, obi 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

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.

There is no clue as to the identity of the owner of this notebook.

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