[*Issued with Army Circulars, October* 1872.]

6. 6

# REGULATIONS

FOR

# GUNPOWDER MAGAZINES



IN CHARGE OF

THE CONTROL DEPARTMENT;



INCLUDING

# RULES

FOR THE

RECEPTION, CONVEYANCE, STORAGE, CLASSIFICATION, AND EXAMINATION OF GUNPOWDER AND AMMUNITION.

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS,
*Printers in Ordinary to Her Majesty.*

1872.

# LIST OF CONTENTS.

# GUNPOWDER MAGAZINE REGULATIONS.—CONTROL DEPARTMENT.

## I. CHARGE OF MAGAZINES.

1. At home stations the premises in which Gunpowder is stored will be watched by a warder and guard by day, and by a military guard with civil watchmen during the night. At foreign stations the civilian warders and watchmen are not usually required, the watching being performed by military sentries.

2. The guard will be visited by an Officer by day, and also, when practicable, by night. A copy of the guard report will be furnished every morning to the Control Officer in charge by the Officer commanding the troops.

3. The Control Officer in charge at home stations will occasionally inspect the Police, Warders, or Watchmen, to see that they are on the alert and doing their duty.

4. The Police, Warders, Watchmen, and Sentries will not permit any persons but such as are employed in the service of the Department to enter the magazines or enclosures. All the outer gates will be kept shut, and no artificer, labourer, or other person will be allowed to pass during the working hours without leave from the Control Officer in charge.

5. The Police, Warders, Watchmen, and Sentries will not allow any smoking or fire near the magazine, laboratory, or shifting room, nor will they suffer any person to come within the outer gates who has the least appearance of intoxication. They will immediately secure anyone guilty of any of these offences, and report the circumstance to the Control Officer in charge.

6. Any person in the employ of the Department who may be detected smoking in any part of the gunpowder works, magazines, or laboratories, or bringing tobacco pipes, or lucifer matches, into the premises, will be immediately dismissed.

7. The night sentinels will strike on their respective bells every quarter of an hour; and every sentinel who does not hear the bell next to him struck will report the fact to his Non-Commissioned Officer, on being relieved.

8. No shrubs or cultivation whatever will be allowed in or near magazine yards, nor are any animals to have access to them.

9. The Control Officer in charge will not absent himself for a night from the Magazines without authority.

10. The Control Officer will superintend all operations which are being carried on by the foremen, labourers, and others under his orders, and see that the whole of the duties are properly conducted.

11. On no occasion will strangers have access to a magazine without the attendance of a Control Officer, or foreman, whose duty it will be to take care that all persons entering have attended to the necessary precautions, and that they have no articles of a combustible nature in their possession.

12. The foreman will be present when the labourers arrive in the morning. He will unlock the door of the magazine, open the shutters, and, when the weather permits, open the windows and air-holes for the purpose of ventilation.

13. The foreman will keep a regular daily entry of all receipts and issues, and make the necessary alterations in the tally-boards attached to the bays in the magazine.

14. The foreman will remain at the magazine during the working hours, and on no account leave it, unless ordered to do so by superior authority.

15. The foreman and labourers will always wear during the working hours, in place of their ordinary clothing, the dress prescribed and furnished by the War Department, viz., Jacket of Lasting Cloth, Trousers of Oxford Cloth, and Plain Blue Glengarry, to be supplied by the Director of Clothing on application. They will change their shoes in the shoe-house, and never appear at the magazine in any other than those prescribed by these regulations. [See §. 18.]

16. Particular care will be taken that the shutters to the windows or air-holes to the powder magazines and store-houses be opened every fine day; and, when they are open, a person will always be in charge on the spot. All the windows and doors of the magazines will be well secured every evening before the night guard is set.

17. The foreman will close and bar the shutters and air-holes; and on leaving work he will see that everything is secure, lock the doors, and make his report to the Control Officer in charge, with whom he is to deposit the keys.

18. The several persons whose duty obliges them to go into the magazines, will invariably exchange their shoes for magazine slippers before they enter, or else enter without shoes. Care will be taken to provide a sufficient supply of either goloshes or slippers of suitable sizes, fitted with straps and brass buckles to fasten over the instep, so as to prevent sliding or shuffling along the floors or platforms.

19. When there is an outer wall to the magazine, the door in it, on any person entering, will be shut before that of the magazine is opened; and the inner door of the magazine shut before the outer one is opened on his going out.

20. The floors of the magazines, shifting rooms, and passages, will be well swept, and kept free from all gravel, sand, or grit; and previously to the removal of powder, the rolling-ways and stages will also be carefully watered.

21. The following regulation contained in paragraph 4 of the enclosure to War Office Circular No. 198, dated 7th November, 1859, has been extended to Home Stations:—

"In order to secure the best mutual intelligence between "departments which in some respects are dependent on one "another, and a knowledge of each others wants and resources, it "is desirable that the Officer Commanding the Royal Artillery, "the Commanding Royal Engineer, and the Controller should, "once a year, or oftener if necessary, make a conjoint inspection "of the works, magazines, stores, workshops, &c., of all their "departments, not as a board or with any view to a joint report, "but that neither should have any excuse for not being personally "acquainted with anything that the interest of the Service requires "him to know in the Department of the other, and for the "opportunity that would thus be afforded to each of calling "attention on the spot to requirements which it may be the "departmental duty of the others to know."

22. Minutes recording these inspections, and any departmental action taken in consequence thereof, will be entered in books to be kept for that purpose by the Officer Commanding Royal Artillery, the Commanding Royal Engineer, and the Controller respectively. The Senior Inspecting Officer will report to the General Officer Commanding, previous to his making his Annual Inspection Report, that such inspections have been made, stating the dates thereof, and also the names of the Officers attending.

## II. PRECAUTIONS AGAINST FIRE.

23. The Police, Warders, Watchmen, and Sentries, will be particularly attentive to the least appearance of a storm, and on hearing the first clap of thunder or seeing a flash of lightning, though the storm may be at a great distance, they will immediately give an alarm by ringing the bells at their posts; and the Control Officer, or magazine keeper, as the case may be, on hearing such alarm, will immediately cause all the magazine doors and windows to be shut, and use every precaution necessary for the safety of the magazine.

24. When such alarm has been given, it will be the duty of every person in the employ of the Department, whether on or off duty, immediately to repair to the office to render such services as may be required of him by the Control Officer in charge.

25. The same precautions will be adopted in the event of any fire breaking out in the neighbourhood of the magazines.

26. All the lights on the premises occupied by the foremen, artificers, and labourers attached to the station will be extinguished at half-past ten P.M.; except in cases of sickness, which are to be reported to the Control Officer in charge.

27. No percussion caps will be kept in any magazine, shifting house, or other building where any manipulation of gunpowder takes place; but all surplus caps, either loose or in zinc cylinders, will be placed in a secure store by themselves.

28. The fire-engines, engine hose, ladders, fire-hooks, &c., will be kept in perfect repair, and so lodged that they may at all times be ready and fit for use.

29. The person in charge of the magazine should know perfectly the arrangement and whereabouts af each article so as to be able to find it at once in the darkest night.

30. The Control Officer in charge will be held responsible that the cisterns are kept constantly full of water, for the security of the magazine, and that the several pumps and lightning conductors are kept in proper repair and the wells full. Should any of these things become defective, a requisition will immediately be made on the Royal Engineer Department for the repairs to be performed.

### III. VENTILATION OF MAGAZINES.

31. Filled cannon cartridges having been destroyed by mildew in a magazine which had been reported free from damp, the Secretary of State for War directs that particular attention may invariably be paid to the ventilation of all magazines.

32. A memorandum explanatory of the principles on which the ventilation of magazines is to be regulated is printed in the Appendix (*see* page 23). Local instructions based on these principles, will be prepared for the guidance of the subordinates in immediate charge of the buildings. Copies of any such instructions will, in each case, be forwarded to the War Office.

33. Each magazine used for the permanent storage of loose gunpowder to the extent of 100 barrels and over, will be provided with a common thermometer to indicate the temperature of the internal walls.

34. At each station the Control Officer in charge will be supplied with a pair of wet-and-dry-bulb thermometers, for the purpose of observing the dew-points. These thermometers should be placed, when used for observations, in some spot in the open air protected from the sun and wind, and not exposed to any exceptional influences. The scale attached to the dry bulb will indicate the temperature of the external air. The scale attached to the wet bulb will indicate a temperature more or less below that of the air, in proportion to the quantity of moisture which the air contains; except in the case of its being completely saturated, when both scales will give similar readings. It is necessary for the wet bulb to be always supplied with water, and its capillary threads and muslin covering kept in order.

35. By means of the annexed table the dew-point may be ascertained for various degrees of temperature, and when the air is in different conditions with regard to dampness.

36. Whenever, notwithstanding a careful attention to ventilation, magazines are found to be damp, their condition may be improved by the use of quick-lime, which has the property of absorbing from the air about one-third of its own weight of water.

37. The proper time for using lime is when the condition of the magazine would not be improved by ventilation, and when, consequently, the ventilators are closed. Lime would be of very little service while a rapid current of air was passing through the building.

38. Lime will be used during the seasons of the year least favourable for ventilation in all magazines that show signs of dampness.

39. The lime should be fresh from the kiln, broken into lumps not larger than about the size of a pigeon's egg, and exposed to the air of the interior of the magazine in shallow vessels. It should be kept in air-tight casks until spread out for use.

40. The best limes for absorbing moisture are fat limes (which are least valuable for building purposes), such as those produced from white chalk and the non-hydraulic limestones.

41. TABLE showing the Dew-point of the Air at different degrees of temperature, when the reading of the Wet Bulb of the Thermometer is from 1 to 10 degrees below that of the Dry Bulb.

| Temperature (Fahrenheit). | Dew-point when the Wet Bulb stands from 1° to 10° lower that the Dry Bulb. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1° Lower. | 2° Lower. | 3° Lower. | 4° Lower. | 5° Lower. | 6° Lower. | 7° Lower. | 8° Lower. | 9° Lower. | 10° Lower. |
| 34 | 31½ | 28½ | | | | | | | | |
| 36 | 33½ | 31 | 28½ | | | | | | | |
| 38 | 35½ | 33½ | 30½ | 28½ | | | | | | |
| 40 | 37½ | 35½ | 33½ | 30½ | 28½ | | | | | |
| 42 | 39½ | 37½ | 35½ | 33½ | 31 | 28½ | | | | |
| 44 | 41½ | 39½ | 37½ | 35½ | 33 | 30½ | 28½ | | | |
| 46 | 44 | 41½ | 39½ | 37½ | 35½ | 33½ | 31½ | 29½ | | |
| 48 | 46 | 43½ | 41½ | 39½ | 37½ | 35½ | 33½ | 31½ | 29 | |
| 50 | 48 | 45½ | 43½ | 41½ | 39½ | 37½ | 35½ | 33½ | 31 | 29 |
| 52 | 50 | 48 | 46 | 44 | 42 | 40 | 38 | 36 | 34 | 32 |
| 54 | 52 | 50 | 48 | 46 | 44 | 42 | 40 | 38 | 36 | 34 |
| 56 | 54 | 52 | 50 | 48 | 46 | 44 | 42 | 40 | 38 | 36 |
| 58 | 56 | 54½ | 52½ | 50½ | 48½ | 46½ | 44½ | 42½ | 41 | 39 |
| 60 | 58 | 56½ | 54½ | 52½ | 50½ | 48½ | 46½ | 44½ | 43 | 41 |
| 62 | 60 | 58½ | 56½ | 54½ | 52½ | 50½ | 48½ | 46½ | 45 | 43 |
| 64 | 62 | 60½ | 58½ | 56½ | 54½ | 52½ | 50½ | 48½ | 47 | 45 |
| 66 | 64½ | 62½ | 60½ | 58½ | 57 | 55½ | 53½ | 51½ | 49½ | 48 |
| 68 | 66½ | 64½ | 62½ | 60½ | 59 | 57½ | 55½ | 53½ | 51½ | 50 |
| 70 | 68½ | 66½ | 64½ | 62½ | 61 | 59½ | 57½ | 55½ | 53½ | 52 |
| 72 | 70½ | 68½ | 66½ | 64½ | 63 | 61½ | 59½ | 57½ | 55½ | 54 |
| 74 | 72½ | 70½ | 69½ | 67½ | 65½ | 63½ | 62 | 60½ | 58½ | 57 |
| 76 | 74½ | 72½ | 71 | 69½ | 67½ | 65½ | 64 | 62½ | 60½ | 59 |
| 78 | 76½ | 74½ | 73 | 71½ | 69½ | 67½ | 66 | 64½ | 62½ | 61 |
| 80 | 78½ | 76½ | 75 | 73½ | 71½ | 69½ | 68 | 66½ | 64½ | 63 |
| 82 | 80½ | 78½ | 77 | 75½ | 73½ | 71½ | 70 | 68½ | 66½ | 65 |
| 84 | 82½ | 80½ | 79 | 77½ | 75½ | 73½ | 72 | 70½ | 68½ | 67 |
| 86 | 84½ | 82½ | 81 | 79½ | 77½ | 75½ | 74 | 72½ | 70½ | 69 |
| 88 | 86½ | 84½ | 83½ | 81½ | 80 | 78½ | 76½ | 75½ | 73½ | 72 |
| 90 | 88½ | 86½ | 85½ | 83½ | 82 | 80½ | 78½ | 77½ | 75½ | 74 |

## IV. CARE AND STOWAGE OF GUNPOWDER.

42. On the arrival of powder the Control Officer will look to the distinguishing marks on the heads of the barrels, and will arrange them in the magazines so as to keep the barrels of the several lots together as far as practicable.

43. Every barrel, box, or case will be carefully examined, in order to discover whether it be perfectly closed, so that no powder can escape, and whether any of the hoops be fastened with iron nails, or there be any iron or anything objectionable on any part of the barrel, &c. Should any barrel, box, or case be discovered so circumstanced, it will not be received into the magazines, but the powder will be immediately shifted into another barrel or case, and a report made to the Controller. These precautions must never be dispensed with, as fatal accidents have happened from their being neglected. A record of the examination will be made on every arrival of powder.

44. No barrel, box, or case will on any account be opened in the magazine, but, when required, will be taken to a shifting room, which ought always to be provided for that purpose.

45. No barrels containing powder or ammunition will be suffered to lie open in the magazine, and no powder will be shifted from one bay to another, or otherwise, without a sufficient number of tanned hides or wadmiltilts being placed under the barrels, in order to keep the powder as much as possible from the floors; any loose powder will be carefully swept up, and not suffered to remain. Care must also be taken that all powder barrels are properly and securely stacked in the several bays; and, in case any of the heads of the barrels start, they will immediately be removed, and the powder shifted into serviceable barrels.

46. In the event of the issue of a less quantity than a whole barrel, the package containing it will be marked like the barrel from which it is taken. In the journal of issue, the marks, dates, &c., will be noted as a matter of record.

47. In stacking barrels or cases of powder and ammunition, a space will be left between them and the wall of the magazine, to allow of a free circulation of air and prevent injury from damp.

48. Occasional opportunities will be taken at all stations, (especially where the magazines are liable to damp,) of shifting powder from one bay to another, and opening and re-coopering a few barrels, in order to ascertain if the powder is free from lumps, and to keep the barrels in a serviceable and good state. If in performing this work the powder should be found in any way *lumpy* or *set*, it will be shifted from one barrel to another, the lumps being broken down with the hand as the powder is passed from the barrel to which it belongs, to the new one.

49. The practice of periodically rolling about barrels must not be resorted to, as it breaks the grains of powder into dust.

50. Ammunition for breech-loading small-arms, which contains its own means of ignition must not be stowed within the same masonry compartments of magazines as gunpowder, whether the latter is loose or in the shape of filled gun cartridges.

51. Control Officers will accordingly take the necessary steps for placing ammunition of this class in separate masonry compartments.

52. Powder, the produce of broken-up breech-loading small-arm ammunition, will not be stored in magazines or used for any purpose, on account of the danger which might arise from a mixture of the detonating composition with it.

53. Such powder will be carefully kept separate, wetted and reserved for extraction of the saltpetre.

54. Breech-loading small-arm ammunition should not however be broken up without the special order of the Surveyor-General, obtained through the Controller, Royal Arsenal.

55. Powder from Palliser shells will be treated in a similar manner to that obtained from B.L. ammunition.

56. Powder from shells, unless it can be sold on the spot, will be stored in a magazine separate from other powder, or wetted and reserved for extraction. Powder, although called "Shell" in the returns, is not to be condemned unless it actually came out of shells. A great portion of the powder in R.A. charge for filling shells was never in shells at all, while the remainder was issued in flannel bags as bursters.

57. The powder which has been longest in store will always be issued first, except by special order to the contrary. All new powder barrels, when properly seasoned, will be correctly tared, and the weight of the tare marked on the barrel.

58. When any of Her Majesty's ships are returning home from foreign stations, Control Officers will apply to the Senior Naval Officer for permission to land such serviceable powder and ammunition as may be required at the station, and to send home any unserviceable powder and ammunition in exchange.

59. Upon no account whatever are friction tubes, percussion fuzes, or fuzes of any kind that contain their own means of ignition, within themselves, to be placed inside any magazine.

### V. COOPERAGE.

60. All tools, instruments, or other articles used in the magazines are to be made of wood or copper, and nothing containing iron, or liable to cause ignition, will be admitted.

61. The use of iron rivets to copper hoops of the description used for powder barrels, whether loose or otherwise, is forbidden, even if those hoops should be intended to be applied in the first instance to barrels not containing powder, as they are liable to be afterwards transferred to such as may contain it.

62. To prevent any inconvenience to the service that might arise from the want of proper rivets necessary to replace those which may break, Control Officers at all stations will keep a small store of copper rivets sufficient for that purpose, and make timely demands for such as they may require.

63. The pieces of wood forming the heads of powder barrels will be put together with wooden pins, and in no case will iron be used.

64. In heading and unheading powder barrels, the persons employed will never use the bare adze against the copper hoops, but will invariably apply a wooden setter.

65. Whenever it may be necessary to shift gunpowder from one barrel to another, the barrel intended to receive such powder will first have all the marks, except the tare on it, carefully obliterated, and will then be re-marked with precisely the same marks as the barrel from whence the powder is transferred, with the exception of the tare marks.

66. Nails will on no account be used to fasten on the hoops in re-heading powder barrels.

67. Powder barrels, either for stowage or issue, will contain 100 lbs. each, except in the case of "P" powder, of which each barrel contains 125 lbs. The quantity of powder in cannon and small-arm cartridges will be calculated accordingly.

### VI. EXAMINATION AND CLASSIFICATION OF GUNPOWDER.

68. The examination of gunpowder in store will be conducted by Inspectors of Warlike Stores and other Proof Officers, in the following manner:—

69. About one-fifth part of the whole quantity in store will be tested annually; of this fifth, one in every 20 barrels, selected indiscriminately, will be examined. In the second year the same course will be pursued with reference to another fifth of the store, and so on until the whole shall have been examined, when the process will be repeated.

70. The barrels actually examined will in each case be marked, and other barrels will be selected when the same lot again comes under examination.

71. The examination of powder will be confined to an inspection by sight and hand, for the purpose of testing its qualities in the following points:—

1st. As respects the condition of the grain, which should be firm, crisp, and bright in colour.

2nd. As regards freedom from dust and foreign matters.

This latter point will be ascertained by pouring the powder from a bowl held 2 or 3 feet above the barrel.

72. The firing proof, by means of the Eprouvette Mortar, will cease.

73. If the examination be in all respects satisfactory, and there be no sign of deterioration, the powder may be placed in Class I.

74. Any portion of *Service* powder found on inspection to be unmistakeably dusty or broken in the grain, may at once be reduced to an inferior class.

75. Exceptions to this rule will, however, be made in the case of R.F.G. and R.L.G. powders, which, if only dusty, will be redusted and restored to the 1st Class.

76. *In cases that admit of doubt, the report* of the examination will be transmitted through the local Controller, to the Superintendent, Royal Gunpowder Factory, before the powder is reduced from the Service Class; but if urgently required for service it may be issued.

77. *Service* powders include all descriptions used for firing projectiles, whether from cannon or small arms. *Serviceable* powders include service, blank, and shell powders.

78. After examination, Gunpowder will be classified and marked according to the following Table; and if repaired, the barrels will be specially distinguished (*see* §. 87), in order to ensure their being issued before gunpowder in a less deteriorated condition. Re-examination will be noted in like manner with date.

| Class. | Designation. | Description. |
|---|---|---|
| I. | Service .. | 1. All new powder.<br>2. All returned powder (including cannon cartridges) which on examination may be found uninjured. |
| II. | Blank .. | 1. *Powder from broken-up cannon cartridges*, unless specially placed in Class I.<br>2. Powder from broken up S. A. Ammunition.*<br>3. Service powder found dusty or broken in the grain at periodical inspections, or on return; except in the cases of R. L. G. and R. F. G. powders, which if only dusty will be re-dusted for service. |
| III. | Shell . .. | 1. Powder found too dusty for Class II.<br>2. *Powder emptied from shells.* |
| IV. | Doubtful .. | All powder whatever (except new powder) returned into store, and awaiting examination. |
| V. | Condemned for Sale | Powder found on examination to be too much deteriorated to be placed in any of the above classes. |
| VI. | Condemned for extraction | Powder found to be too much damaged and unfit for anything but extraction of saltpetre. |

79. Powders found on examination to be repairable, will at once be marked with the class to which they are capable of being converted; but will be crossed in white chalk, in order to indicate that they are only equivalent to a *doubtful powder* in an issuing point of view.

---

* Powder obtained by breaking up breech-loading small-arm ammunition should be at once thoroughly wetted, as it may contain small particles of detonating composition. In this state it is useless except for extraction of saltpetre, and will therefore be placed in Class VI.

80. At home stations all powder returned into store will, in the first instance, be placed in Class IV.; it will be removed to one of the other five classes on the result of the inspection being determined. At stations where conveniences for local examination may exist, a requisition will be made by the Controller to have this inspection made without delay. If circumstances should render such a course impracticable, the gunpowder will be retained as "*doubtful*," and a report of the circumstances made to the Controller, Royal Arsenal, Woolwich, who will convey the orders of the Surveyor-General in the matter.

81. At foreign stations the examination of powder will be conducted by the Proof Officer, on the requisition of the Control Officer. The examination will be made as soon as possible after delivery into store, in order to enable the Commissary to assume charge of the gunpowder in accordance with its existing state and condition.

82. At stations where no Artillery are located, the Commissary will personally examine all powder contained in the original packages as soon as received into store. If no sign of deterioration present itself, he may assume charge of the powder under its original classification, and may re-issue it accordingly; but should there be any reason for doubt, the powder will be taken in charge and marked as under Class IV, and the circumstances reported to the Controller, Royal Arsenal, Woolwich, who will communicate the orders of the Surveyor General.

83. Powder from broken up cartridges, and powder emptied from shells, will in all cases be sifted *before* being returned into store, so that all extraneous articles may be detected. Barrels of powder "emptied from shells" are to be distinguished as such.

84. The sizes of sieves used in sifting powder before returning it into store, will be as follows:—

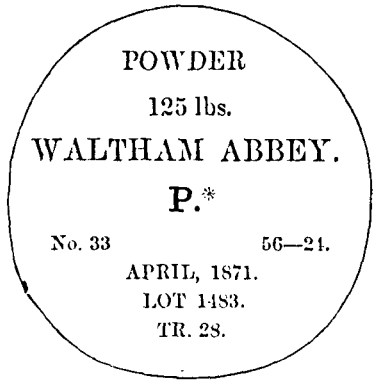
| | | | | | |
|---|---|---|---|---|---|
| For R. L. G. | powder, | a sieve | of 3 | meshes | to the inch. |
| L. G. | ,, | ,, | 6 | ,, | ,, |
| R. F. G. | ,, | ,, | 8 | ,, | ,, |
| F. G. | ,, | ,, | 12 | ,, | ,, |
| Pistol | ,, | ,, | 16 | ,, | ,, |

85. On receiving powder, Commissaries will look to the distinguishing marks, showing the description of powder, maker's name, and dates of stoving; and will arrange the barrels in the magazine accordingly, carefully keeping the powder of each date of stoving together as far as practicable.

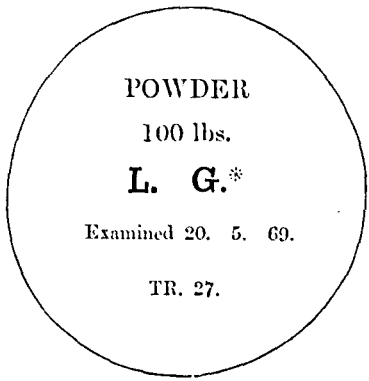
86. In issuing service powder, care will be taken to issue as far as possible, the powder of the same maker, and of the same date of stoving.

87. The annexed examples will show the manner in which the heads of barrels will be marked in future.

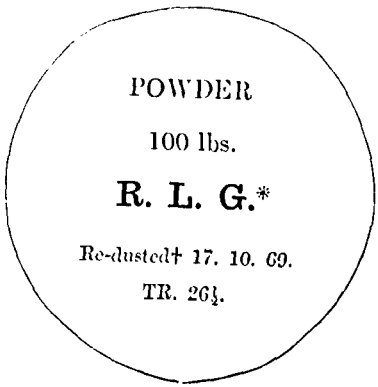
No. 1.




No. 2.



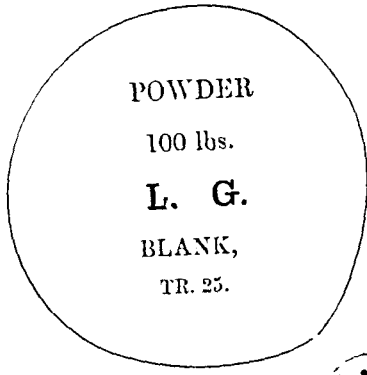

No. 3.




---

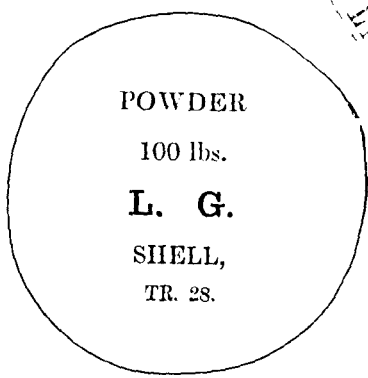
* These letters will be in red paint. † Or "Repaired," as the case may be.

No. 4.






No. 5.




88. No. 1 applies to new powder.
No. 2 applies to returned powder, which, after examination, has been classed for service.
No. 3 applies to returned powder, which, after examination, has been re-dusted or otherwise repaired for service.
No. 4 applies to blank or exercise powder.
No. 5 applies to shell powder.

The 5th line in No. 1 contains :—

1. The brand of powder (No. 33).
2. The number of barrels in the brand (56).
3. The number of the barrel itself in the brand (24).

89. Gunpowder is divided into lots for convenience of storing; each of the 100 barrels composing a lot is marked with the same number, and the numbers of the lots run consecutively for each manufacturer, as powder is supplied.

90. The following list shows the purposes for which powders of the several descriptions are to be used; and demands and issues will be regulated in accordance therewith.

*P.* For the *battering* charges of all rifled guns of 7-inch calibre and upwards, and for all service charges of 40 lb. and upwards. When no *P* powder is available, *R. L. G.* will be used.

*Service R. L. G.* For service charges, up to 40 lb., of all M. L. R. guns above the 64-pr.; and likewise for battering charges of all guns when *P.* powder is not available.

*Service L. G.* For all S. B. ordnance and B. L. R. guns, for M. L. R. guns up to the 64-pr. inclusive (except the 7-pr. with which F. G. is used), and may be used in cases of necessity with M. L. R. guns up to the 9-inch of 12 tons inclusive.

*Service R. F. G.* For rifled small-arms of every description except Martini-Henry musket and pistols.

*Service F. G.* For 7-pr. M. L. R. guns, for all smooth-bore small-arms, and for the bursting charges of shrapnel shells.

*Service Pistol.* For Colt's, and Dean and Adam's cartridges, and for bursting charges of all shrapnel shells.

*Blank, or Exercise R. L. G. and L. G.* For blank charges of all descriptions of rifled and smooth-bored ordnance.

*Blank, or Exercise R. F. G. and F. G.* For blank small-arm cartridges of every description. These powders may, if it be considered advisable, be used for blank charges for ordnance when there is a surplus store.

*Shell Powder.* L. G. for the bursting charges of all shells, rifled, or smooth-bore, except shrapnel (see above), and 6, 9, 12, and 20-pr. segment shells, for which F. G. is to be used. F. G. or L. G. in Class II. may be taken if no F. G. or L. G. in Class III. be available, and service F. G. or L. G. if no blank F. G. or L. G. be available.

91. *Service* powder will never be issued for *blank* or *exercise* cartridges, when any powder classed under the latter head is available. This rule is intended to apply strictly to the non-issue of Service R. L. G. and R. F. G. powders for blank charges. Exercise powder will not be issued for filling shells, when shell powder is available.

92. The Proof Officer will be careful to note at his issuing and receiving examinations, the numbers of the lots, as also the marks and dates that have been placed on the various barrels of powder submitted for his inspection, before being issued to, or on being received from Her Majesty's Land or Naval Forces. All these particulars will be entered in the report made to the Commissary, in order that they may be available for future reference in case of necessity.

### VII. LABORATORY OPERATIONS.

93. The following instructions will be strictly observed by all persons engaged in work connected with Combustible Stores.

94. When any laboratory operation, such as making up ammunition, removing fuzes and filling or emptying shells, is required to be performed, the Commissary in charge will inform the Controller. The Controller will then report the same to the General Officer Commanding, who will direct the Commanding Officer of the Royal Artillery to take steps for the performance of this duty.

95. These operations will be carried on in accordance with the following extract from the Queen's Regulations 1868 (Para. 664). The detailed application of these instructions must depend upon the means available at each station.

"(*a.*) No laboratory operation which involves risk of an explosion is to be carried on within a distance of 400 yards from a magazine in which large quantities of gunpowder are stored.

"(*b.*) No accumulation of gunpowder or other explosive material is to be allowed on any account in the workshops, or in close proximity to the laboratory buildings. A small expense magazine in a safe position is to be provided, the stores are to be drawn from this magazine in small quantities as required, and the finished work is to be returned to the magazine in the same way. This is a most important point, for notwithstanding every precaution an accident may occur.

"(*c.*) All the arrangements should therefore be made with a view to reduce as far as practicable the amount of explosive or combustible material in a building at any one time, where laboratory operations are being carried on.

"(*d.*) The destruction of combustible stores by fire, or by breaking up, is on no account to be effected within the precincts of a laboratory.

"(*e.*) All persons engaged in work connected with combustible stores are to change their outer clothes, viz., coat, waistcoat, trousers, cap, and shoes, and to wear suits specially provided for this purpose.

"(*f.*) The change of clothes to be effected in a shifting house, where the ordinary clothing is to be deposited.

"(*g.*) Only steady and intelligent men are to be employed on laboratory work, and the preference is to be given to those who have passed through a course at Woolwich."

96. In removing fuzes from shells only such tools as are provided for this purpose will be used, and with respect to the pillar fuze especial care will be taken not to press unduly upon the head on account of its very close proximity to the detonating composition.

97. To reduce the risk in extracting pillar fuzes as far as possible, a special extractor will be supplied.

98. In cases in which the fuze will not yield to the authorized means of extraction, the shell, if not provided with an unloading hole, will be placed under water, *and in this condition*, namely *under water*, a small hole will be bored through the side for the admission of water. The powder will be thoroughly saturated before any further steps are taken to remove the fuze.

99. When this operation cannot be conveniently performed, the shell will be thrown into the sea, or otherwise safely disposed of.

100. If the shell has an unloading hole, the unloading hole plug will be unscrewed, the papier mâché wad forced into the interior, and water poured in until the powder is thoroughly saturated.

101. The operation of removing the fuze from the shell will be performed in a separate building, and in the absence of special reasons to the contrary, only one shell will be operated upon at a time.

102. When the fuze is removed a service metal fuze hole plug will be screwed in to secure the powder, and the shell then conveyed to another building to be emptied.

103. To empty the shell a wooden frame or cradle will be used to rest the shell upon, and the greatest care will be taken that every portion of the bursting charge is removed before the shell is returned into store as empty, water being used to wash out any trace of powder which it may be difficult to remove with the copper scraper.

104. Shells thus emptied will be marked on the head with an **E** in white paint at Woolwich, and red paint at other stations, also with a letter to denote the stations. The powder obtained will be treated as directed in paragraph 56, and in general any powder which, during laboratory operation, has been spilt on the floor, or otherwise exposed to admixture with iron filings, grit, or dirt of any description, will be at once swept up, wetted and reserved for extraction.

### VIII. CONVEYANCE OF AMMUNITION AND GUNPOWDER BY LAND.

105. No ammunition or gunpowder will be sent to any station at home, until the officer who has to receive it has been communicated with by the officer who has to make the supply, and the consignee has replied that he is pepared to receive it.

106. At the time the issue is made a proper invoice will be sent to the consignee.

107. When small-arm ammunition or gunpowder has to be removed by the troops, in their own wagons, or in the wagons belonging to the War Department, a requisition will be made on the General or other Officer Commanding the District or Garrison, by the Officer in charge of the Depôt, stating the number of wagons required, and the day on which the ammunition or powder will be ready for removal. It will be left to the Officer Commanding the Troops to fix the day and hour on which the ammunition or gunpowder shall be removed.

108. At the time and place appointed, a Control Officer or a Serjeant Conductor will be in attendance to hand the packages over to the Officer Commanding the party. Should wadmiltilts be required for the security of the ammunition they will be lent to the military party, and the Control Officer will take care they are

duly returned when the service has been completed. In order, however, that there may be no divided responsibility, it is to be clearly understood that the Officer in Command will be responsible for the due delivery of the packages, as well as for the wagons being in all respects suitable, properly stowed, and not overladen.

109. When large quantities have to be forwarded, otherwise than by military conveyance, the Control Officer making the issue will take care that the contractor by whom the packages are forwarded, provides proper conveyance for the same; that the carts or wagons are not overladen; and that they are properly secured both from danger and damp, and for this object wadmiltilts and hides may be lent to the contractor on the terms laid down in § 108.

110. As all ammunition and gunpowder sent by railway is placed in properly constructed powder vans (except when secured in iron safety cases, as alluded to in § 113), no further precautions against danger are necessary, the railway authorities and contract carrier being responsible; but the contract carriers will have to see that the packages are handed over to the railway officials in proper order and condition. They will have also to make all arrangements with each railway company for the due forwarding of the ammunition or gunpowder, without delay, after receipt at the station, and will, therefore, have to give due notice to such company of the day and hour on which it is to be forwarded. The contract carriers will further be responsible, that, when the ammunition reaches the railway station, proper conveyances are at hand to convey it to its final destination.

111. Volunteers and other corps may draw their own ammunition and convey it to their own magazines, the Officer in charge of the Depôt taking care that the conveyances are in all respects suitable, and are not overladen. Wadmiltilts may also be lent on the terms laid down in § 108.

112. In the absence of special orders from the War Office, escorts will not be required to accompany ammunition or gunpowder, unless the General or other Officer commanding the District or Garrison considers it necessary, and in the event of such being the case, he will duly inform the Control Officer, who will in such a case, invariably apply to such officer for the proper escort, stating in his application the quantities of ammunition or gunpowder to be forwarded, by what conveyance to be sent, as also the day and hour fixed for its departure. It will be for the Officer Commanding the troops to determine the strength and description of the escort required.

113. In the conveyance of small quantities of small-arm ammunition by railways in the United Kingdom, in order to expedite issues to regiments and also to reduce the expense of the employment of powder vans, *metal cylinders* adapted for containing half and quarter barrels will be used.

114. These cylinders will be conspicuously marked with the name of the station to which they belong, and with the letters W $\frac{\wedge}{|}$ D, and will be held on charge as articles in use, notwithstanding their being sent away from time to time with ammunition.

115. Commanding Officers and others will, immediately on receiving these cylinders, empty and return them, with the spanners and bags, to the Control Officer at the station from which they are sent, by the same mode of conveyance by which they arrived.

116. Every instance of unnecessary delay in the return of the cylinders, &c., will be immediately reported by the Commissary in charge to the Controller.

### IX. CONVEYANCE OF AMMUNITION AND GUNPOWDER BY DEPARTMENTAL VESSELS.

117. On arrival at any Control Station, the Master of the vessel will immediately report himself to the Control Officer, and, if any stores are on board, deliver the bills of lading.

118. The Master will keep a log book, inserting the daily occurrences, and also the receipts and deliveries. The tally of all stores passing into or out of the vessel will be taken by the Master or Mate, who will be held strictly accountable for the delivery of all the stores according to the receipt tally, and any deficiency must be immediately reported by the Control Officer to whom the stores are consigned.

119. The Master will attend daily at the Control Office at the station where the vessel may be lying, to receive such orders as the Control Officer may find it necessary to give. The Master will receive his instructions from the Control Officer only.

120. The Master will frequently examine the hold, and be particularly careful that all iron bolts, nails, &c., are covered with sheet lead or tanned hide, and that any defects in the vessel or stores are immediately reported, in writing, to the Control Officer at the Station.

121. Previously to receiving any gunpowder, ammunition, &c., the Master or Mate will take especial care to examine the hold, and see that it is clean swept, free from grit or dust, and in a fit state to receive the stores. He will report the fact to the Controller.

122. As a general rule no combustible stores will be conveyed in the same hoy with powder and ammunition. In special cases, however, where combustible stores of an unexceptionable description are forwarded with proper precaution as to their stowage and security, this restriction may be omitted.

123. On receiving gunpowder, ammunition, &c., the Master will see that the platform in the vessel's hold, the gangways and comings of the hatchways are covered with tanned hides, that the barrels or boxes are carefully stowed, the hatches properly secured and locked, and that the key remains in his own possession.

124. A cushion (stuffed with white oakum) covered with leather, will be used for landing all powder barrels or cases upon, whether in the hold of the vessel or on the wharf, when loading or discharging powder.

125. In stowing powder in the hold of the vessel the barrels will be carried, and on no account rolled over each other, unless tanned hides are laid down for the purpose of protection.

126. No leaky or badly coopered barrel will be received on board, and should such be offered, the Master will refuse to receive it, and will report the circumstance to the Control Officer in charge at the station immediately.

127. After the vessel has been discharged, the hides, hair-cloths, &c., will be removed, and the hold carefully cleaned out.

128. On delivery of the above mentioned stores the same caution will be used as in loading, and if any barrels or boxes should have been unavoidably broken, any powder which may have become loose will be carefully swept up, and the circumstances reported by the Master to the Controller before delivery to the Magazine.

129. No fires, other than the engine-room fire, will be lighted on board any vessel, barge, or craft conveying gunpowder, or combustible stores, to any place in the River Thames within one mile below Gravesend, or in either of the canals leading to Aldershot or Weedon; nor between the Nore and Chatham in the River Medway; nor within two miles of the Spit, or outer Buoy, leading to Harwich Harbour.

130. When gunpowder or ammunition is shipped, and the vessel is within the limits of *any* port, neither fires, lights, nor smoking will, under any circumstances, be permitted on board.

131. Fires will be provided in the cook houses at the several stations when requisite, for cooking the provisions.

132. When at anchor at night, in a roadstead, or in the track of shipping, a masthead light will be shown, and, when under weigh the side lights, according to Admiralty Regulation.

133. When the vessel, barge, or other craft is one mile below Gravesend, and not nearer than half-a-mile of any inhabited place or magazine, a fire may be lighted on board for cooking purposes only, and the Master will see it carefully extinguished at sunset, and one hour previously to going alongside any ship or magazine. The engine-room fires in the steamers must also be put out one hour previously to going alongside any ship or magazine.

134. Smoking below is strictly prohibited.

135. When a vessel has received gunpowder, ammunition, or combustible stores on board, a red flag will be hoisted at the mast-head, and kept flying until the cargo is discharged. The master or mate and all the crew will remain on board until all the stores are discharged, unless it may be necessary to procure water or provisions, in which case notice will be given to the Control Officer, but the vessel is not to be left without either the master or mate and one seaman.

136. No lucifer matches will at any time be used on board any of the War Department Vessels, and any person found to be in possession of the same, will be immediately dismissed. The usual tinder-box, &c., will be kept by the Master, and used for the purpose of striking a light when actually necessary.

137. At Priddy's Hard, Purfleet, and Tipner, when in consequence of want of water, a vessel laden with powder or combustible stores is unable to be unloaded on the day of arrival, she will be moored in the safest position at the wharf, and the hatchways secured and covered with tarpaulins; and no other vessel will be allowed alongside of her. At all other Stations the vessel not unloaded will haul into the stream a distance of 900 yards from the Magazine Wharf, but if empty a distance of 400 yards is sufficient.

138. No vessel having powder or ammunition on board will be left without a responsible Watchman in charge.

### X. GUNPOWDER VESSELS.

139. The following regulations for receiving Powder and Ammunition, are for the guidance of persons employed on board the Store Department Vessels and in the Laboratory Craft used for the conveyance of the same to and from the Receiving Vessels, &c.

140. All persons employed in the receiving vessels, barges, boats and magazines, will change their outer clothes, viz., coat, waistcoat, trousers, cap and shoes, and wear the suits specially provided for them.

141. The change of clothes will be effected in a shifting house, where the ordinary clothing will be deposited.

142. Smoking is strictly prohibited, and any man found with a lucifer match in his possession will be immediately dismissed.

143. No fire is on any account to be allowed either in the receiving vessels, barges, or boats.

144. The receiving vessels, barges, and boats, will be kept scrupulously clean, and free from loose gunpowder.

145. In shipping or unshipping ammunition or gunpowder, tanned hides or wadmiltilts will be laid over that portion of the vessel over which the cases or barrels pass.

146. A red flag will be kept flying when there is any gunpowder or ammunition on board the receiving vessel.

147. At Woolwich the gunpowder will be received daily from the receiving vessel at the lower causeway, and transported in railway trucks to the Royal Laboratory; the made-up ammunition will be transported in railway trucks from the East Laboratory, to No. 1 Magazine, each truck being laden by the Laboratory and handed over to the Control Department for removal.

148. Gunpowder or ammunition required to be sent from the Arsenal, by land carriage, will be brought from No. 1 Magazine in trucks to within the walls of the Arsenal, or if immediately required, will be handed over by the Royal Laboratory to the Control Department on the bank of the canal.

149. The suits of clothing provided for and required to be worn by the persons employed in the receiving vessel and laboratory barges are as follows:—

| In Summer. | In Winter. |
|---|---|
| Cap | Cap |
| Lasting jacket | Lasting jacket |
| Cloth trousers | Cloth trousers |
| Woollen shirts | Woollen shirts |
| Shoes, Magazine. | Woollen drawers |
| | Great coat |
| | Shoes, Magazine. |

The persons employed must provide themselves with woollen shirts and drawers.

---

The following Regulations and Instructions are hereby cancelled, viz.:

| | | |
|---|---|---|
| Clause | 102, | Army Circulars 1868. |
| ,, | 57 | ,, 1869. |
| ,, | *143 | ,, 1869. |
| ,, | 59 | ,, 1870. |
| ,, | 104 | ,, 1870. |
| ,, | 130 | ,, 1870. |
| ,, | 91 | ,, 1871. |
| ,, | 122 | ,, 1871. |
| ,, | 177 | ,, 1871. |

* §§. 20-31.

# APPENDIX.

*Memorandum respecting the Ventilation of Magazines.*

1. The dampness complained of in buildings will frequently be found to arise from condensation of the watery vapour of the air which enters the building. Buildings with thick walls and vaulted roofs, and especially those covered with earth, are particularly liable to dampness from this cause.

2. Air always contains some proportion of watery vapour. When the proportion is small the air is said to be dry, and when large the air is said to be damp; when the proportion is the greatest that can be diffused through air at a given temperature, the air is said to be saturated at that temperature.

3. The proportion of watery vapour which saturated air contains varies with the temperature, being greater for high than for low temperatures. Air containing a particular proportion of moisture is rendered less capable of depositing moisture by its temperature being raised, and the reverse when it is lowered.

4. Air may be brought to a state of saturation by reducing its temperature. If the air contain but little moisture, the reduction of temperature must be considerable; but if it contain much a slight reduction will bring it to a state of saturation.

5. If air be cooled below the degree of temperature at which it will be in a state of saturation, a portion of the watery vapour contained therein will be deposited on any cold substance with which it may come in contact. The degree of temperature at which air will thus begin to deposit moisture is called its *dew-point*.

6. When warm air enters a comparatively cold building the temperature of the air is reduced by coming in contact with the interior walls and other cold surfaces; and if its temperature be thus reduced below the *dew-point*, condensation will take place. In the latter case it is obvious that the admission of fresh air will not tend to dry a building, but to render it damp.

7. If a magazine 40 feet by 24 feet by 12 feet, the temperature of whose internal walls, &c. is 45 degrees, were to be filled with saturated air having a temperature of 50 degrees, and the magazine were then closed, nearly a pint of moisture would be deposited during the cooling of the fresh air to the temperature of the walls. The pint of moisture would result from the quantity of air sufficient merely to fill the magazine; but if the ventilators were open, the air might be renewed many times in the course of a day, and very much more than a pint of moisture be deposited.

8. Air entering a building whose temperature is higher than its own, becomes capable of absorbing moisture from damp surfaces.

9. The efficiency of the ventilation of a magazine will depend upon the degree of dryness which the fresh air admitted into it possesses, and the rapidity of the current of dry air passing through the building.

10. The dryness of air is indicated by the number of degrees by which its temperature exceeds its dew-point.

Appendix—*continued.*

11. The ventilators of magazines should, in all cases, be constructed so as to exclude or admit the external air at discretion, *and the instructions for their use should be framed with a view to the exclusion of the external air, when the temperature of its dew-point is above that of the interior of the building, and the admission of the air when its dew-point is below the temperature of the interior of the building.*

12. For the foregoing reasons, the common practice by which, under Art. 491, Ordnance Regulations, 1855, magazines are open for purpose of ventilation on "every *fine* day," is considerably modified.

13. The interior of a bombproof magazine with thick walls and a vaulted roof, is commonly colder than the outside air in summer and warmer in winter. Winter is therefore the more favourable season for ventilation; but in the climate of England the exceptions to this rule are numerous, owing to the prevalence during winter of warm damp winds from the south and west, and during summer of cold dry winds from the north and east.



LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS,
PRINTERS IN ORDINARY TO HER MAJESTY.
[F. 1834. 350. 11 | 72—8404]