

Indian Explosives Act (IV of 1884)
Indian Petroleum Act (VIII of 1899)

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TWENTY-SECOND ANNUAL REPORT

OF THE

Chief Inspector of Explosives in India

BEING HIS ANNUAL REPORT FOR THE YEAR ENDING
31ST MARCH 1921.



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CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
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Twenty-second Annual Report of the Chief Inspector of Explosives in India.

No. 2453.

FROM

DR. N. L. SHELDON, PH.D., F.I.C.,

Chief Inspector of Explosives in India,

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,

INDUSTRIES DEPARTMENT,

DELHI.

Calcutta, the 25th November 1921.

SIR,

I have the honour to submit herewith a report of the work of my department during the year ending 31st March 1921.

2. Mr. S. E. Bird, Personal Assistant to the Chief Inspector of Explosives, was granted 12 months' combined leave out of India with effect from the 23rd February 1921, and Mr. D. Mukerji, Head Clerk in this office, who was on deputation to the Board of Industries and Munitions and whose services were, at my request, replaced at the disposal of this Department, has been appointed to officiate for Mr. Bird.

3. During the year 1920, 186 licenses (three less than in the previous year) were granted in British India under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914. The number of magazines licensed was 245 or one less than in 1919, and is in excess of the number of licenses granted, because in a number of cases firms have two or more magazines in one place under one license. A statement showing the number and location of the magazines and also the number of licenses granted in British India during the year 1920 is given in Appendix A, and a statement showing the number of magazines and licenses granted during the past ten years is shown in Appendix B.

4. During the year, 177 inspections of magazines were made; a number of magazines being inspected two or three times. Those magazines are inspected most frequently which are situated in the neighbourhood of towns or in populous localities, or which contain large quantities of explosives, or any explosive which on account of its greater susceptibility to decomposition and possible ignition, it is considered advisable to examine and test more frequently than other explosives.

5. The magazines generally are in good order, and as usual magazine-owners have been found most willing to carry out recommendations even when involving considerable expense, and my thanks are due to them for making my duties easy in this respect.

Condition of magazines.

6. The physical condition of all the explosives in the different magazines during the year was found to be good with the following exceptions, which were found to have become defective and were destroyed:—

Condition of explosives in magazines.

- (a) 2,100 lbs. of fireworks from the magazine of Messrs. C. Abboye Chety and Sons.
- (b) 5 coils of safety fuse from the magazine of the Bengal-Nagpur Railway Company at Saranda.
- (c) 27½ coils from the magazine of Messrs. F. F. Christien and Company at Domchanch.
- (d) 40 lbs. ammonal from the magazine of Messrs. Best and Company at Saidapuram.
- (e) 20 lbs. dynamite from the magazine of the Hingir-Rampur Coal Company at Kotabaga.
- (f) 11½ lbs. gelignite, 111 coils safety fuse, and 80 detonators from the magazine of the Burma Corporation, Limited, at Namtu.
- (g) 7,465 lbs. of dynamite from the magazine of the Cape Copper Company at Matigara.

At the request of the Superintendent, Cape Copper Company, one of my inspectors inspected the Matigara magazine where there had been an accident sometime ago. The Company had in stock 14,685 lbs. dynamite, of which 7,465 lbs. were classed by their store-keeper as 'doubtful.' The Inspector of Explosives took two samples from this lot, which on analysis by the Chemical Examiner to the Government of Bengal showed much exudation consisting mainly of nitrate of soda mixed with traces of nitro-glycerine. As the use of dynamite from the doubtful stock was likely to lead to accidents, they were, at my suggestions and under my instructions, destroyed by the Company.

7. During the year under report no theft of explosives was reported to this office.

Thefts.

8. Two thousand one hundred and seventy-two tons of explosives were imported into British India during the year 1920, the value being Rs. 25,29,714.

Import of explosives.

Full details showing the different kinds of explosives imported, and the value of each are given in Appendix C. A comparative statement showing the quantity of explosives imported during the last ten years is given in Appendix D.

9. A list of explosives at present authorised for importation, manufacture, transport, possession, or sale in British India was published in the *Gazette of India* for information and is given in Appendix E.

Authorised explosives.

10. During the year I was consulted by the Commissioner, Northern India Salt Revenue, with regard to the chapter on Explosives in the draft of the Mining Rules and suggestions were made which will minimise the number of accidents.

Revision of Government Salt Mines Rules.

11. Two licenses granted by the Governor General in Council for the manufacture of 1,000 and 500 lbs. gunpowder respectively in the Central Provinces were renewed during the year.

Manufacture of explosives.

12. Both the Chief Inspector of Mines and the Additional Deputy Commissioner, Dhanbad, brought to my notice certain abuses and gross infringement of license rules on the part of certain license-holders for the manufacture of gunpowder in coal-fields resulting in a number of accidents. I replied that the best solution of the problem was in the establishment of efficient gunpowder factories near such coal-fields. As far as I am informed three firms have in contemplation the establishment of factories in India.

PETROLEUM.

14. During the year under report, 842 licenses for the storage of non-dangerous petroleum and 70 for the storage of partly non-dangerous and partly dangerous petroleum regarding which this department was concerned or consulted, were granted. This is an increase of 58 as compared with last year. A list of these installations, corrected up to 31st December 1920 and showing the districts in which they are located, is given in Appendix F, and a statement showing the number of licenses granted during the past ten years is given in Appendix G. In addition to the number of licenses shown in Appendix F, there are, of course, a very large number of storage godowns for the possession of non-dangerous petroleum in non-bulk, licensed by District officers, of which this Department has no cognizance.

15. There are also a very large number of godowns licensed for the storage of dangerous petroleum in non-bulk throughout the country, and Inspectors of Explosives and the Chief Inspector of Explosives have inspected these, when their existence has been brought to our notice or where they are near non-dangerous petroleum installations or contain 500 gallons of petrol or more.

16. Many installations are under construction for the storage of dangerous petroleum in bulk and licenses were issued in form P for those completed. A number of special licenses were also granted under Rule 6, Chapter IV, Part II of the rules for storage of dangerous petroleum in underground tanks under the Bowser or similar systems. A copy of the conditions recommended by me for those premises is given in Appendix L.

17. In all 793 inspections of non-dangerous and partly dangerous and partly non-dangerous petroleum premises were made. Two hundred and seventy nine inspections of dangerous petroleum premises were also made by this department during the year.

18. The large petroleum installations are usually under efficient European supervision and are in good order and well looked after.

19. The small or minor petroleum installations are installations in which not more than 50,000 gallons of kerosine oil in combined bulk and non-bulk are stored, and are looked after by Indian Agents, employed by the large oil firms. The oil for these installations is supplied from the major installations at the different ports, and the retail trade is carried out in them. A great deal of inspection of these minor installations has been done by this department with the result that their condition is very much improved and the generality of them are in very good order. As a matter of fact when an installation is found not up to the mark at an inspection, it is usually due to the fact that some new Agent has been recently appointed who has not realised what is required of him. The oil companies do not hesitate to change their Agents if several unsatisfactory reports are made of the installations under their charge.

ACCIDENTS.

20. A list of accidents, with a short account of each, that have occurred with explosives, inflammable substances, dangerous goods, etc., between the 1st January and 31st December 1920, and that have been reported to this department, is given in Appendix H. It will be seen from a perusal of the details that the accidents have practically all been caused by gross neglect of ordinary precautions. In all there were 42 accidents causing 26 deaths and injuries to 64 persons. Comparative statements given in Appendices J and K show the total number of accidents and the number of persons killed or injured by them during the last ten years. As stated in previous reports, it is very doubtful whether all accidents that occur are duly reported to this department and, therefore, it is very possible that the statistics given are underestimated.

As a rule, the only accidents that are entered in Appendix H are those which cause loss of life or injuries or are important from some point of view.

Gunpowder, Class I.

21. There were eight accidents from gunpowder during the year, causing four deaths and injuries to eleven persons.

Nitro-compounds, Class III.

22. No accidents from nitro-compound were reported during the year.

23. Three accidents from fulminates, causing nine deaths and injuries to twenty-one persons were reported during the year.

Fulminates, Class V.

24. There were six accidents from ammunition causing the death of one person and injuries to nine others.

Ammunition, Class VI.

25. Two accidents from fireworks caused the death of four persons and injury to one.

Fireworks, Class VII.

26. There were twenty-two accidents from petroleum during the year, which were responsible for seven deaths and injuries to fourteen persons. It will be seen from a perusal of the accidents in Appendix H that carelessness is a prominent feature in most of them. In India, the petroleum accidents are caused usually by lights being brought into proximity to oil vapour.

Petroleum.

27. A number of fires were reported to this office as having occurred this year at the oil wells and refineries in the Burma Oil Fields.

28. There was one accident from chemicals reported during the year, causing the death of one person and injuries to eight others.

Chemicals.

29. A copy of my report on an explosion* which occurred on 7th April 1920 at the Mathematical Instrument Office, Calcutta, is reproduced below.

Report on a small explosion which took place on the morning of the 7th April 1920 at the Mathematical Instrument Office, Calcutta.

"(a) Glass Mirrors are silvered in the Mathematical Instrument Office by several different processes.

Three of the recipes used were stated to be as follows:—

| | | |
|-----------------------|---------------------------|-----|
| No. 1. Silver nitrate | 480 grains. | } A |
| Distilled water | 10 ounces. | |
| Caustic potash | 480 grains. | } B |
| Distilled water | 10 ounces. | |
| Glucose | $\frac{1}{2}$ oz. (fluid) | } C |
| Distilled water | 10 ounces | |

Precipitate A by adding ammonia drop by drop then add B to A and again add ammonia drop by drop until precipitate not quite dissolved.

When the glass is ready for silvering add C to above mixture and immerse glass.

| | | |
|-----------------------|-------------------|-----|
| No. 2. Silver nitrate | 480 grains. | } A |
| Distilled water | 16 ounces (fluid) | |
| Caustic potash | 480 grains. | } B |
| Distilled water | 16 ounces (fluid) | |
| Sugar-candy | 5 ounces. | } C |
| Distilled water | 5 " | |
| Tartaric Acid | $\frac{1}{2}$ oz. | |

Carry out as in No. 1 above.

| | | |
|-----------------------|--------------------|-----|
| No. 3. Silver nitrate | 240 grains (appt.) | } A |
| Distilled water | 10 ounces (fluid) | |
| Formalin | 2 drams (fluid) | } B |
| Distilled water | 10 ounces. | |

Add ammonia drop by drop to A until precipitate not quite dissolved.

Add B to A when glass ready for silvering.

(b) Recipe No. 1 was being used on the 7th April. A mixture of A and B had been prepared and mixed on the evening of the 6th April and had been left standing over night in a glass cylinder. First thing on the morning of the

* This has not been included in the summary of accidents given in Appendix I.

7th April an operator approached the table on which the cylinder had been left standing to continue the manufacture of mirrors, but upon his lifting up the glass cylinder its contents exploded with some violence and the operator was badly hurt:—

(c) There have been several of these explosions during the past few years in the Mathematical Instrument Office and several more are recorded in the following papers on the silvering of mirrors:—

The Royal Astronomical Society, Vol. XLII, No. 2.

Zeitschrift für Instrumentenkunde, January 1895.

English Mechanic, 1883.

Silvered glass Reflecting Telescopes and Specula by J. A. Brashear; Best & Coy., Pittsburg, Pa.

The Observatory, A. A. Common, No. 193, October 1892.

(d) As far as can be seen from the records available it appears that the explosions occurred after mixed solutions of Silver-nitrate, Ammonia and Caustic potash had been left standing for some time. Probably the Caustic potash absorbs Carbon Dioxide from the air and so allows the formation of a fulminate. As silver fulminate is in the wet state not extremely sensitive it is probable that a silver-ammonium fulminate is formed which is very violently explosive and is extremely sensitive when either wet or dry.

(e) I recommend that if recipe No. 3 using formalin or the recipe using Rochelle salt, which is described in various papers, give the desired results that they be used instead of the caustic soda recipes. I also recommend that solutions are only made up on the same day as they are used. If the caustic soda recipe produces the best mirrors then it should be used but solutions only be made up immediately before use and all beakers, vessels, etc., should be washed out at once with thio-sulphate of soda solution made slightly acid with sulphuric acid. All waste silver residues should be with this solution in a glass vessel and reduced to silver in the usual way before the stock of residue becomes too great.

Provided these precautions are taken I do not think that there will be any further occurrence of these small explosions.

GENERAL REMARKS.

30. Fourteen reports of inspection of these magazines by civil officers have been received in this office, and I have brought to the notice of the officers concerned any irregularities or defects which required remedying. There is no doubt that the introduction of this system of sending these reports to this office has been desirable, as even from the short time it has been in existence, I have come across a good many instances of ignorance and want of expert knowledge, which might have caused disasters. High explosives in these magazines had previously never been tested, and I have, in dealing with these reports, always recommended that samples of these explosives should be sent at least once a year to Chemical Examiners for test.

Two State Railway magazines have been inspected by this Department during the year, as the Railway Board desired that this Department should undertake those inspections.

31. The license to manufacture and possess in a Factory, Toy Fireworks containing Fulminate of Silver granted to Messrs. Bonbonniere, Limited, Calcutta, was renewed during the year. The maximum quantity of free explosive allowed in the Factory at any one time was limited to 24 grains.

32 During the year fifteen hand grenades and bombs were forwarded to the Chief Inspector of Explosives for examination and report. These were opened by the Chief Inspector of Explosives and reported on to the various authorities concerned. A proper work bench and the necessary tools are required in this office if this type of work is to be undertaken as a regular thing.

33. The number of inspections done by this Department during the year were 1,251. To give some idea of the work and the ground covered, I give the following details of the work done by the Inspectors of Explosives.

Number of inspections made.

During the 12 months, 1st April 1920 to 31st March 1921, the two Inspectors at Calcutta and Bombay were away from head-quarters for 241 and 206 days and travelled 21,603 and 30,368 miles respectively.

The Chief Inspector of Explosives was on tour for 138 days, travelled 21,504 miles, and inspected 31 explosives magazines and 111 petroleum installations and godowns, and went on inspection duty to the Burma Oil Fields and visited the ports of Calcutta, Madras, Bombay, and Calicut, etc. He served also as a member of the Industrial Alcohol Committee which sat in Simla from the 26th August 1920 to the 25th September 1920.

34. This office is now permanently located in Calcutta at No. 1, Council House Street.

I have the honour to be,

SIR,

Your most obedient servant,

N. L. SHELDON,

Chief Inspector of Explosives in India.

APPENDIX A.

List of Magazines and Licenses granted under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914, for the year 1920.

| Presidency or Province. | District. | MAGAZINES. | | | LICENSES. | | |
|-------------------------|---------------------------|------------------------|--------------------|--------|-----------|------|--------|
| | | Under renewed license. | Under new license. | Total. | Renewed. | New. | Total. |
| Assam | Cachar | 2 | ... | 2 | 1 | ... | 1 |
| | Lakhimpur | 1 | ... | 1 | 1 | ... | 1 |
| | Nowgong | 1 | ... | 1 | 1 | ... | 1 |
| | Sylhet | ... | 1 | 1 | ... | 1 | 1 |
| | Total | 4 | 1 | 5 | 3 | 1 | 4 |
| Bengal | Burdwan | 13 | 1 | 14 | 10 | 1 | 11 |
| | Calcutta | 3 | ... | 3 | 1 | ... | 1 |
| | Darjeeling | 3 | ... | 3 | 3 | ... | 3 |
| | Hooghly | 4 | ... | 4 | 1 | ... | 1 |
| | Hôwrah | 1 | ... | 1 | 1 | ... | 1 |
| | 24-Parganas | 2 | ... | 2 | 1 | ... | 1 |
| Total | 26 | 1 | 27 | 17 | 1 | 18 | |
| Bihar and Orissa | Gaya | 2 | ... | 2 | 2 | ... | 2 |
| | Hazaribagh | 13 | ... | 13 | 10 | ... | 10 |
| | Manbhum | 16 | 2 | 18 | 14 | 2 | 16 |
| | Sambalpur | 1 | ... | 1 | 1 | ... | 1 |
| | Santal Parganas | ... | 1 | 1 | ... | 1 | 1 |
| | Singhbhum | 11 | ... | 11 | 6 | ... | 6 |
| Total | 43 | 3 | 46 | 33 | 3 | 36 | |
| Bombay | Ahmedabad | 4 | ... | 4 | 4 | ... | 4 |
| | Bombay | 17 | ... | 17 | 11 | ... | 11 |
| | Broach | 1 | ... | 1 | 1 | ... | 1 |
| | Karachi | 5 | ... | 5 | 3 | ... | 3 |
| | Kolaba | 2 | ... | 2 | 2 | ... | 2 |
| | Panch Mahals | 2 | ... | 2 | 2 | ... | 2 |
| | Poona | 4 | ... | 4 | 3 | ... | 3 |
| | Ratnagiri | 2 | ... | 2 | 2 | ... | 2 |
| | Surat | 2 | ... | 2 | 2 | ... | 2 |
| | Thana | 4 | ... | 4 | 3 | ... | 3 |
| Total | 43 | ... | 43 | 33 | ... | 33 | |

APPENDIX A—concl'd.

List of Magazines and Licenses granted under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914, for the year 1920—concl'd.

| Presidency or Province. | District. | MAGAZINES. | | | LICENSES. | | |
|-------------------------|--------------------------------|------------------------|--------------------|--------|-----------|------|--------|
| | | Under renewed license. | Under new license. | Total. | Renewed. | New. | Total. |
| Burma | Bassein | 1 | ... | 1 | 1 | ... | 1 |
| | Hanthawaddy | 4 | ... | 4 | 2 | ... | 2 |
| | Lower Chindwin | 1 | ... | 1 | 1 | ... | 1 |
| | Magwe | ... | 1 | 1 | ... | 1 | 1 |
| | Mergui | 1 | ... | 1 | 1 | ... | 1 |
| | Northern Shan States | 6 | 2 | 8 | 4 | 1 | 5 |
| | Pegu | 1 | ... | 1 | 1 | ... | 1 |
| | Ruby Mines | 1 | ... | 1 | 1 | ... | 1 |
| | Tavoy | 12 | ... | 12 | 9 | ... | 9 |
| | Thaton | 8 | ... | 8 | 6 | ... | 6 |
| | Total | 35 | 3 | 38 | 26 | 2 | 28 |
| Central Provinces | Balaghat | 3 | ... | 3 | 3 | ... | 3 |
| | Betul | 1 | ... | 1 | 1 | ... | 1 |
| | Bhandara | 2 | ... | 2 | 2 | ... | 2 |
| | Bilaspur | 1 | ... | 1 | 1 | ... | 1 |
| | Chanda | 3 | ... | 3 | 2 | ... | 2 |
| | Chhindwara | 3 | ... | 3 | 3 | ... | 3 |
| | Nagpur | 7 | ... | 7 | 7 | ... | 7 |
| | Narsinghpur | 2 | ... | 2 | 1 | ... | 1 |
| | Raipur | 3 | ... | 3 | 4 | ... | 4 |
| | Total | 25 | ... | 25 | 24 | ... | 24 |
| Madras | Anantapur | 3 | ... | 3 | 2 | ... | 2 |
| | Chingleput | 2 | ... | 2 | 2 | ... | 2 |
| | Madras | 17 | ... | 17 | 5 | ... | 5 |
| | Madura | 2 | ... | 2 | 2 | ... | 2 |
| | Nellore | 8 | ... | 8 | 3 | ... | 3 |
| | Northern Arcot | 2 | ... | 2 | 2 | ... | 2 |
| | Salem | 3 | ... | 3 | 2 | ... | 2 |
| | South Arcot | 2 | ... | 2 | 2 | ... | 2 |
| | Tanjore | 13 | ... | 13 | 13 | ... | 13 |
| | Tinnevely | 1 | ... | 1 | 1 | ... | 1 |
| Trichinopoly | 2 | ... | 2 | 2 | ... | 2 | |
| Vizagapatam | 2 | ... | 2 | 1 | ... | 1 | |
| | Total | 57 | ... | 57 | 37 | ... | 37 |
| Punjab | Rawalpindi | 1 | ... | 1 | 1 | ... | 1 |
| | Total | 1 | ... | 1 | 1 | ... | 1 |
| United Provinces | Lucknow | 1 | ... | 1 | 1 | ... | 1 |
| | Meerut | 1 | ... | 1 | 3 | ... | 3 |
| | Shahjahanpur | 1 | ... | 1 | 1 | ... | 1 |
| | Total | 3 | ... | 3 | 5 | ... | 5 |

SUMMARY.

| Presidency or Province. | MAGAZINES. | | | LICENSES. | | |
|-----------------------------|------------------------|--------------------|------------|------------|----------|------------|
| | Under renewed license. | Under new license. | Total. | Renewed. | New. | Total. |
| Assam | 4 | 1 | 5 | 3 | 1 | 4 |
| Bengal | 26 | 1 | 27 | 18 | ... | 18 |
| Bihar and Orissa | 43 | 3 | 46 | 33 | 3 | 36 |
| Bombay | 43 | ... | 43 | 33 | ... | 33 |
| Burma | 35 | 3 | 38 | 26 | 2 | 28 |
| Central Provinces | 25 | ... | 25 | 24 | ... | 24 |
| Madras | 57 | ... | 57 | 37 | ... | 37 |
| Punjab | 1 | ... | 1 | 1 | ... | 1 |
| United Provinces | 3 | ... | 3 | 5 | ... | 5 |
| TOTAL | 237 | 8 | 245 | 180 | 6 | 186 |

APPENDIX B.

Summary of magazines and licenses granted under Rule 46 and items 10 and 11 of Schedule II for the ten years ending 1920.

| Year. | MAGAZINES. | | | LICENSES. | | |
|----------------|------------------------|--------------------|--------|-----------|------|--------|
| | Under renewed license. | Under new license. | Total. | Renewed. | New. | Total. |
| 1911 | 190 | 27 | 217 | 139 | 19 | 158 |
| 1912 | 199 | 18 | 217 | 146 | 15 | 161 |
| 1913 | 210 | 25 | 235 | 151 | 21 | 172 |
| 1914 | 219 | 35 | 254 | 160 | 32 | 192 |
| 1915 | 238 | 13 | 251 | 179 | 12 | 191 |
| 1916 | 216 | 26 | 242 | 168 | 22 | 190 |
| 1917 | 226 | 26 | 252 | 175 | 23 | 198 |
| 1918 | 238 | 13 | 251 | 183 | 10 | 193 |
| 1919 | 232 | 14 | 246 | 180 | 9 | 189 |
| 1920 | 237 | 8 | 245 | 180 | 6 | 186 |

APPENDIX C.

Statement showing the imports of explosives by sea into British India from other countries in the year 1920.

| Explosives. | Bengal. | Bombay. | Sind. | Burma. | Madras. | Total. |
|---|---------|-----------|--------|----------|-----------|-----------|
| <i>Quantity.</i> | | | | | | |
| Gunpowder, black lbs. | 51,500 | 37,200 | 21,340 | 1,950 | 5,750 | 117,740 |
| „ smokeless „ | 1,075 | 3,075 | 850 | ... | 550 | 5,550 |
| Dynamite „ | 195,000 | 30,800 | ... | 40,000 | 37,500 | 303,300 |
| Blasting gelatine „ | ... | ... | ... | ... | 600,000 | 600,000 |
| Gelignite or gelatine dynamite „ | 45,000 | 7,500 | ... | 105,000 | 169,425 | 326,925 |
| Other nitro-compound explosives „ | 101,480 | 107,000 | ... | ... | ... | 208,480 |
| Detonators No. | 740,000 | 394,031 | ... | 500,185 | 1,118,750 | 2,752,966 |
| Fireworks lbs. | 65,242 | 2,289,740 | 35,762 | 296,086 | 95,558 | 2,782,388 |
| Total | 459,297 | 2,475,315 | 57,952 | 443,036 | 908,783 | 4,344,383 |
| Total . No. | 740,000 | 394,031 | ... | 500,185 | 1,118,750 | 2,752,966 |
| <i>Value in rupees.</i> | | | | | | |
| Gunpowder, black | 79,479 | 58,432 | 21,818 | 2,149 | 8,470 | 170,348 |
| „ smokeless | 3,724 | 11,380 | 3,120 | ... | 1,900 | 20,124 |
| Dynamite | 104,294 | 24,515 | ... | 49,850 | 17,805 | 195,964 |
| Blasting gelatine | ... | ... | ... | ... | 413,350 | 413,350 |
| Gelignite or gelatine dynamite | 23,696 | 5,200 | ... | 123,737 | 99,895 | 252,528 |
| Other nitro-compound explosives | 44,890 | 78,547 | ... | ... | ... | 123,437 |
| Detonators | 14,514 | 9,679 | ... | 21,316 | 20,280 | 65,789 |
| Fireworks | 147,781 | 950,099 | 29,225 | 101,541 | 59,528 | 1,288,174 |
| Total | 418,378 | 1,137,852 | 54,163 | 2 98,093 | 621,228 | 2,529,714 |

APPENDIX D.

Comparative statement showing the imports of explosives by sea into British India from other countries for the ten years ending 1920.

| Explosives. | 1911. | 1912. | 1913. | 1914. | 1915. | 1916. | 1917. | 1918. | 1919. | 1920. |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Gunpowder, black . . lbs. | 229,069 | 384,883 | 213,713 | 240,821 | 137,867 | 111,265 | 96,450 | 62,500 | 131,060 | 117,740 |
| „ smokeless . . „ | 29,611 | 17,625 | 21,470 | 11,865 | 13,325 | 33,585 | 7,116 | 26,965 | 57,485 | 5,550 |
| Ammonal | 7,800 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Dynamite | 389,577 | 280,900 | 431,306 | 517,076 | 214,782 | 323,328 | 152,060 | 248,404 | 414,068 | 303,300 |
| Blasting gelatine . . „ | 750,242 | 840,328 | 850,624 | 627,026 | 783,972 | 233,018 | ... | 21,952 | 380,752 | 600,000 |
| Gelignite or gelatine dynamite „ | 226,034 | 314,344 | 262,548 | 201,190 | 195,172 | 836,400 | 1,237,466 | 1,026,590 | 601,584 | 326,925 |
| Other nitro-compound explosives „ | 43,456 | 224,425 | 277,792 | 282,803 | 278,807 | 327,353 | 186,437 | 131,214 | 140,435 | 208,480 |
| Detonators No. | 3,216,789 | 3,649,010 | 5,928,850 | 4,328,900 | 4,258,500 | 6,366,000 | 4,867,000 | 4,780,612 | 5,970,204 | 2,752,966 |
| Fireworks lbs. | 3,540,825 | 3,181,411 | 2,270,869 | 2,651,861 | 2,839,527 | 2,676,592 | 2,135,170 | 1,192,657 | 1,291,131 | 2,782,378 |
| Total . lbs. | 5,216,614 | 5,243,916 | 4,328,322 | 4,532,642 | 4,463,452 | 4,541,601 | 3,814,699 | 2,710,282 | 3,016,515 | 4,344,383 |
| Total . No. | 3,216,789 | 3,649,010 | 5,928,850 | 4,328,900 | 4,258,500 | 6,366,000 | 4,867,000 | 4,780,612 | 5,970,204 | 2,752,966 |

APPENDIX E.

DEPARTMENT OF EXPLOSIVES.

NOTIFICATION.

Calcutta, the 7th June 1921.

Nc. 1151.—With reference to the following Notifications publishing rules to regulate the manufacture, possession, sale, transport and importation of explosives, the following list of "Authorized Explosives" referred to in the rules mentioned against each Notification is published for general information:—

Rule 4 (3) of Notification No. 4013—33, dated the 6th June 1914, of the Government of India, Department of Commerce and Industry.

Rule 4 (3) of Notification No. 1183, dated the 11th November 1914, of the Chief Commissioner, Central Provinces, applicable to Berar.

Rule 4 (3) of Notification No. 14, dated the 23rd April 1915, of the Resident in Mysore applicable to the Civil and Military Station of Bangalore and on the Railways in Mysore under British Jurisdiction.

Rule 4 (3) of Notification No. 67-J., dated the 28th August 1914, of the Resident at Hyderabad applicable to the Cantonments of Secunderabad and Aurangabad, the Hyderabad Residency Bazars and the Railway lands in the Hyderabad State.

Rule 4 (3) of Notification No. 34-J., dated the 20th April 1915, of the Resident at Hyderabad applicable to the Cantonments of Secunderabad and Aurangabad, the Hyderabad Residency Bazars and the Railway lands in the Hyderabad State.

Rule 3 (3) of Notification No. 99, dated the 19th July 1916, of the Government of Burma applicable to the Northern Shan States.

Rule 3 (3) of Notification No. 5313, dated the 29th October 1918, of the Agent to the Governor General in Rajputana.

Rule 3 (3) of Notification No. 1812-B., dated the 10th November 1919, of the Agent to the Governor General in Central India applicable to Railway lands in Central India.

LIST OF AUTHORIZED EXPLOSIVES.

The following explosives are at present authorized for importation, manufacture, transport, possession or sale in British India in accordance with the conditions of licenses granted under the Indian Explosives Act (Act IV of 1884) and the rules framed thereunder:—

CLASS 1.—GUNPOWDER.

The term "gunpowder" means gunpowder ordinarily so called.

GUNPOWDER.

CLASS 2.—NITRATE MIXTURE.

The term "nitrate mixture" means any preparation, other than gunpowder ordinarily so called, formed by the mechanical mixture of a nitrate with any form of carbon or with any carbonaceous substance not possessed of explosive properties, whether sulphur be or be not added to such preparation, and whether such preparation be or be not mechanically mixed with any other non-explosive substance, and includes any explosive containing a perchlorate and not being a chlorate-mixture, fulminate or nitro-compound as defined in Rule 4 of the Indian Explosives Rules, 1914.

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

CHILWORTH SPECIAL POWDER.

CLASS 3.—NITRO-COMPOUND.

The term "nitro-compound" means any chemical compound possessed of explosive properties or capable of combining with metals to form an explosive compound, which is produced by the chemical action of nitric acid (whether mixed or not with sulphuric acid or of a nitrate mixed with sulphuric acid upon any carbonaceous substance, whether such compound is mechanically mixed with other substances or not.

The nitro-compound class has two divisions.

EVERY EXPLOSIVE IN THIS CLASS AND EVERY EXPLOSIVE INGREDIENT THEREOF SHALL BE SO THOROUGHLY PURIFIED AND OTHERWISE OF SUCH CHARACTER AS TO SATISFY A TEST KNOWN AS THE HEAT TEST, AND SPECIFIED IN THE RULE FOR TESTING EXPLOSIVES PUBLISHED WITH GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE AND INDUSTRY, NOTIFICATION No. 4013—33, DATED THE 6TH JUNE 1914, REFERRED TO ABOVE.

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

DIVISION 1.

Division 1 comprises the following explosives and any chemical compound or mechanically mixed preparation which consists either wholly or partly of nitro-glycerine or of some other liquid nitro-compound:—

Ardeer Gelignite.
 A. 1. Monobel. }
 Victor Powder. }
 A. 2. Monobel. }
 Viking Powder No. 1. }
 Viking Powder No. 2. }
 Ballistite.
 Blasting Gelatine.
 Cambrite No. 2.
 Chilworth Smokeless Powder, No. 2.
 Cordite.
 Cordite, M. D.

Dynamite.
 Dynobel No. 2.
 Dynobel (Export) No. 3 }
 Dynobel No. 3 }
 Dynobel No. 4 }
 Farmer's Dynamite.
 Gelatine Dynamite.
 Gelignite.
 Monobel, No. 1.
 Rexite.
 Samsonite.

PROVIDED THAT EVERY EXPLOSIVE IN THIS DIVISION SHALL BE OF SUCH CHARACTER AND CONSISTENCY AS NOT TO BE LIABLE TO LIQUEFACTION OR EXUDATION.

PROVIDED ALSO THAT AN EXPLOSIVE WHICH IS REQUIRED BY DEFINITION TO BE ISSUED IN WATERPROOF INNER PACKAGES MAY BE EXEMPTED FROM SUCH REQUIREMENT BY SPECIAL AUTHORITY WHEN AND SO LONG AS THE CONDITIONS OF SUCH AUTHORITY ARE OBSERVED.

DIVISION 2.

Division 2 comprises the following explosives and any nitro-compound as before defined which is not comprised in division I:—

Amberite, No. 2.
 Alumamol. }
 Ammonal. }
 Chilworth Smokeless Powder.
 Chilworth Smokeless Sporting Powder.
 Di-nitro-phenol.
 Economic Smokeless Sporting Powder. }
 E. C. Sporting Powder. }
 Eley Smokeless Sporting Powder. }
 Empire Powder. }
 Light Load Smokeless. }
 Frankite. }
 Fulmen Powder. }
 Imperial Schultze Gunpowder. }
 Lightning Powder. }
 Guncotton.
 Ideal Powder. }
 Nobel's Special Powder. }

Negro Powder No. 2.
 Neonite. }
 Remington Dense Powder. }
 N. S. Smokeless.
 Picric Acid.
 Picric Powder.
 Primrose Smokeless. }
 Stowmarket Smokeless. }
 Roburite.
 Ruby Powder.
 Schultze Cube Powder.
 Schultze Gunpowder.
 Smokeless Diamond.
 Tonite or Cotton Powder.
 Tri-nitro-toluol.

CLASS 4.—CHLORATE MIXTURE.

*The term "chlorate mixture" means any explosive containing a chlorate.
 The chlorate mixture class has two divisions.*

EVERY EXPLOSIVE IN THIS CLASS, AND EVERY EXPLOSIVE INGREDIENT THEREOF SHALL BE SO THOROUGHLY PURIFIED AND OTHERWISE OF SUCH A CHARACTER AS TO SATISFY A TEST KNOWN AS THE HEAT TEST, AND SPECIFIED IN THE RULE FOR TESTING EXPLOSIVES, PUBLISHED WITH GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE AND INDUSTRY, NOTIFICATION No. 4013—33, DATED THE 6TH JUNE 1914, REFERRED TO ABOVE.

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

DIVISION 1.

Division 1 comprises any chlorate preparation which consists partly of nitro-glycerine or of some other liquid nitro-compound.

Nel.

PROVIDED THAT EVERY EXPLOSIVE IN THIS DIVISION SHALL BE OF SUCH CHARACTER AND CONSISTENCY AS NOT TO BE LIABLE TO LIQUEFACTION OR EXUDATION.

DIVISION 2.

Division 2 comprises any chlorate mixture as hereinbefore defined, which is not comprised in Division 1.

Nil.

CLASS 5.—FULMINATE.

The term "fulminate" means any chemical compound or mechanical mixture, whether included in the foregoing classes or not, which, from its great susceptibility to detonation, is suitable for employment in percussion caps or any other appliances for developing detonation, or which from its extreme sensibility to explosion, and from its great instability (that is to say, readiness to undergo decomposition from very slight exciting causes) is especially dangerous. This class consists of two divisions.

DIVISION 1.

Division 1 comprises such compounds as the fulminates of silver and of mercury, and preparations of those substances, such as are used in percussion caps; and any preparation consisting of a mixture of a chlorate with phosphorus or certain descriptions of compounds of phosphorus, with or without the addition of carbonaceous matter, and any preparation consisting of a mixture of a chlorate with sulphur, or with a sulphuret, with or without carbonaceous matter.

Nil.

DIVISION 2.

Division 2 comprises such substances as the chloride and iodide of nitrogen, fulminating gold and silver, diazobenzol, and the nitrate of diazobenzol.

Nil.

CLASS 6.—AMMUNITION.

The term "ammunition" means any explosive of any of the foregoing classes when the same is enclosed in any case or contrivance, or is otherwise adapted or prepared so as to form a cartridge or charge for small-arms cannon or any other weapon, or for blasting or to form any safety or other fuze for blasting or for shells, or to form any tube for firing explosives or to form a percussion cap, detonator, fog-signal, shell, torpedo, war-rocket, or any other contrivance other than a firework.

*The term "percussion cap" does not include a detonator.**

The term "detonator" means a capsule or case which is of such strength and construction and contains fulminate in such quantity, that the explosion of one capsule or case would communicate the explosion to other like capsules or cases.

The term "safety fuze" means a fuze for blasting which burns and does not explode, and which does not contain its own means of ignition, and which is of such strength and construction and contains an explosive in such quantity that the burning of such fuze will not communicate laterally with other like fuzes.

The ammunition class has three divisions.

DIVISION 1.

Nobel's Safety Electric Time Fuze.
Percussion Caps.
Railway Fog Signals.

Safety Cartridges.
Safety Fuzes for blasting.
Safety Electric Fuzes.

DIVISION 2.

Division 2 comprises any ammunition as hereinbefore defined, which does not contain its own means of ignition, and is not included in Division 1.

Cartridges for Blasting or other like purposes.
Cartridges for Small Arms which are not Safety Cartridges.
Cordean Bickford.
Electric Fuzes.
Electric Primers.

* In consequence of the results of experiments carried out, it has been decided that a percussion cap can only be properly classed as such if it contains less than 0.6 grain, of a composition of the 1st Division of the fifth (Fulminate) class of which not more than 25 per cent. consists of fulminate of mercury or less than 0.5 grains, of any other explosive of the 1st Division of the 5th (Fulminate) Class; and it has been further decided that percussive caps shall not be classed as such when they contain anvils or have their composition unprotected by tin foil or other suitable substance, as under those circumstances they are liable to explode *en masse*.

Fuze Lighters.
 Instantaneous Fuze.
 Port Fires.
 Tubes for firing Explosives.
 Quick Match.

DIVISION 3.

Division 3 comprises any ammunition as hereinbefore defined which contains its own means of ignition, and is not included in Division 1.

Cartridges for Small Arms which are not Safety Cartridges.

Detonators.
 Electric Detonators.
 Friction Tubes.
 Nobel's Electric Detonator Time Fuze.
 Percussion Primers.
 Tubes for firing Explosives.

CLASS 7.—FIREWORK.

The term "firework" comprises firework composition and manufactured fireworks.

DIVISION 1.—FIREWORK COMPOSITION.

The term "firework composition" means any chemical compound or mechanically mixed preparation of an explosive or inflammable nature, which is used for the purpose of making manufactured fireworks, and is not included in the former classes of explosives, and also any star and any coloured fire composition, subject to the proviso to the definition of manufactured fireworks.

Nil.

DIVISION 2.—MANUFACTURED FIREWORKS.

MANUFACTURED FIREWORKS, consisting of any explosive of the classes 1, 2, 3, 4 and 6 and any firework composition, when such explosive or composition is enclosed in any case or contrivance or is otherwise manufactured so as to form a squib, cracker, toy cap or amorce, serpent, rocket (other than a war-rocket), maroon, lance, wheel, Chinese fire, Roman candle, or other article specially adapted for the production of pyrotechnic effects, or pyrotechnic signals, or sound signals:

Provided that a substantially constructed and hermetically closed metal case, containing not more than one pound of coloured fire composition of such a nature as not to be liable to spontaneous ignition shall be deemed to be a "manufactured firework" and not a "firework composition."

Aluminium or Magnesium Torches.
 Amores.
 Chinese Crackers.
 Light Signals.
 Magnesium or Aluminium Torches
 Manufactured Fireworks.
 Pyrotechnic Matches.
 Rockets.
 Sparklers.

N. L. SHELDON,
 Chief Inspector of Explosives, India.

APPENDIX F.

*List of non-dangerous petroleum installations licensed during the year 1920.

| Presidency or Province. | District. | No. | Presidency or Province. | District. | No. | |
|----------------------------|-----------------------|--------------------------------|-------------------------|----------------------------|-----------------------|---|
| Ajmer-Merwara | Ajmer | 3 | Bombay | Ahmedabad | 7 | |
| | Total | 3 | | Ahmednagar | 3 | |
| Assam | Cachar | 3 | | Belgaum | 8 | |
| | Darrang | 1 | | Bijapur | 6 | |
| | Goalpara | 6 | | Bombay | 14 | |
| | Kamrup | 2 | | Broach | 10 | |
| | Lakhimpur | 2 | | Dharwar | 12 | |
| | Nowgong | 2 | | Hyderabad (Sind) | 3 | |
| | Sibsagar | 7 | | Kaira | 1 | |
| Total | 23 | Karachi | | 12 | | |
| Baluchistan | Quetta | 3 | | East Khandesh | 4 | |
| | Total | 3 | | West Khandesh | 8 | |
| Bengal | Bankura | 1 | | Kolhapur | 3 | |
| | Bogra | 4 | | Nasik | 11 | |
| | Birbhum | 1 | | Poona | 8 | |
| | Burdwan | 9 | | Satara | 3 | |
| | Calcutta | 6 | | Sholapur | 3 | |
| | Chittagong | 3 | | Surat | 7 | |
| | Darjeeling | 3 | | Thana | 3 | |
| | Dinajpur | 3 | | Total | 126 | |
| | Howrah | 6 | | Burma | Bassein | 1 |
| | Jalpaiguri | 5 | | | Bhamo | 1 |
| | Khulna | 6 | | | Hanthawaddy | 1 |
| | Midnapur | 2 | Magwe | | 1 | |
| | Murshidabad | 2 | Mandalay | | 5 | |
| | Nadia | 6 | Maymyo | | 1 | |
| | Rajshahi | 3 | Mergui | | 1 | |
| Rangpur | 8 | Minbu | 1 | | | |
| 24-Parganas | 9 | Myingyan | 1 | | | |
| Total | 77 | Northern Shan States | 1 | | | |
| Bihar and Orissa | Balasore | 5 | Pakokku | | 1 | |
| | Bhagalpur | 6 | Prome | | 3 | |
| | Champaran | 5 | Rangoon | | 4 | |
| | Cuttack | 4 | Total | | 22 | |
| | Darbhanga | 3 | Central Provinces | | Akola | 7 |
| | Gaya | 6 | | Amraoti | 8 | |
| | Manbhum | 12 | | Bhandara | 7 | |
| | Monghyr | 3 | | Bilaspur | 4 | |
| | Muzaffarpur | 9 | | Buldana | 9 | |
| | Patna | 6 | | Chanda | 4 | |
| | Puri | 1 | | Chhindwara | 3 | |
| | Purnea | 9 | | Damoh | 4 | |
| | Ranchi | 2 | | Hoshangabad | 7 | |
| | Sambalpur | 7 | | Jubbulpore | 7 | |
| | Saran | 3 | | Nagpur | 8 | |
| Shahabad | 3 | Narsingpur | | 3 | | |
| Singhbhum | 3 | Nimar (Khandwa) | | 8 | | |
| Sonthal Parganas | 8 | Raipur | | 6 | | |
| Total | 95 | Sangor | | 4 | | |
| | | Wardha | 11 | | | |
| | | Total | 100 | | | |

* This list includes godowns for the storage of non-dangerous petroleum regarding which this Department has cognizance.

APPENDIX F—contd.

*List of non-dangerous petroleum installations licensed during the year 1920—contd.

| Presidency or Province. | District. | No. | Presidency or Province. | District. | No. |
|-------------------------------|--------------|-----------|-------------------------|-----------|-----|
| Delhi | Delhi | 7 | | Ambala | 12 |
| | Total | 7 | | Amritsar | 5 |
| Hyderabad | Hyderabad | 17 | Panjab | Attock | 1 |
| | Secunderabad | 3 | | Ferozepur | 2 |
| | Total | 20 | Gujranwala | 1 | |
| Madras | Anantapur | 5 | Gurdaspur | 2 | |
| | Bellary | 6 | Hoshiarpur | 3 | |
| | Chingleput | 8 | Jullundur | 3 | |
| | Chittoor | 3 | Lahore | 4 | |
| | Coimbatore | 7 | Ludhiana | 6 | |
| | Cuddapah | 2 | Lyalpur | 2 | |
| | Ganjam | 7 | Multan | 2 | |
| | Godavari | 6 | Rawalpindi | 3 | |
| | Guntur | 12 | Shahpur | 4 | |
| | Kistna | 17 | Sialkot | 4 | |
| | Kurnool | 4 | Total | 54 | |
| | Madras | 6 | Agra | 5 | |
| | Madura | 7 | Aligarh | 2 | |
| | Malabar | 13 | Allahabad | 6 | |
| | Nellore | 3 | Azamgarh | 3 | |
| | North Arcot | 13 | Bahraich | 3 | |
| | Ramnad | 10 | Ballia | 1 | |
| | Salem | 3 | Bara Banki | 1 | |
| | South Arcot | 16 | Bareilly | 4 | |
| | South Canara | 5 | Basti | 7 | |
| Tanjore | 24 | Benares | 5 | | |
| Tinnevelly | 6 | Bijnor | 5 | | |
| Trichinopoly | 8 | Cawnpore | 3 | | |
| Vizagapatam | 8 | Dehra Dun | 1 | | |
| Total | 199 | Etawah | 3 | | |
| Mysore | Bangalore | 13 | Fyzabad | 5 | |
| | Total | 13 | Ghazipur | 2 | |
| North-West Frontier Province. | Hazara | 2 | Gonda | 2 | |
| | Peshawar | 10 | Gorakhpur | 4 | |
| | Total | 12 | Jaunpur | 1 | |
| | | | Jhansi | 3 | |
| | | | Lucknow | 2 | |
| | | | Meerut | 4 | |
| | | | Moradabad | 3 | |
| | | | Muttra | 3 | |
| | | | Partabgarh | 2 | |
| | | | Saharanpur | 5 | |
| | | | Shahjahanpur | 3 | |
| | | | Total | 88 | |

* This list includes godowns for the storage of non-dangerous petroleum regarding which this Department has cognizance.

| | SUMMARY. | No. |
|------------------------------|----------|-----|
| Ajmer-Merwara | | 3 |
| Assam | | 23 |
| Baluchistan | | 3 |
| Bengal | | 77 |
| Bihar and Orissa | | 95 |
| Bombay | | 126 |
| Burma | | 23 |
| Central Provinces | | 7 |
| Delhi | | 20 |
| Hyderabad | | 199 |
| Madras | | 13 |
| Mysore | | 12 |
| North-West Frontier Province | | 54 |
| Punjab | | 88 |
| United Provinces | | 1 |
| Total | | 842 |

APPENDIX G.

Summary of non-dangerous petroleum installations and godowns licensed for the ten years ending 1920.

| Presidency or Province. | 1911. | 1912. | 1913. | 1914. | 1915. | 1916 | 1917. | 1918. | 1919. | 1920. |
|--|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| Ajmer-Merwara | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Assam | ... | 3 | 5 | 5 | 5 | 6 | 13 | 16 | 17 | 23 |
| Baluchistain | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Bengal | 101 | 69 | 73 | 71 | 69 | 74 | 77 | 79 | 77 | 77 |
| Bihar and Orissa | ... | 67 | 67 | 68 | 70 | 73 | 79 | 83 | 87 | 95 |
| Bombay | 83 | 86 | 88 | 94 | 99 | 102 | 106 | 111 | 114 | 126 |
| Burma | 35 | 41 | 46 | 53 | 58 | 64 | 70 | 77 | 81 | 22 |
| Central Provinces | 74 | 81 | 80 | 83 | 84 | 88 | 86 | 90 | 89 | 100 |
| Delhi | ... | ... | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Eastern Bengal and Assam | 28 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Hyderabad | 11 | 12 | 14 | 14 | 17 | 18 | 20 | 20 | 20 | 20 |
| Madras | 129 | 138 | 151 | 167 | 173 | 179 | 190 | 194 | 191 | 199 |
| Mysore | 10 | 10 | 11 | 11 | 12 | 12 | 12 | 13 | 13 | 13 |
| North-West Frontier Province | 6 | 7 | 7 | 6 | 6 | 6 | 11 | 12 | 12 | 12 |
| Punjab | 35 | 39 | 34 | 35 | 36 | 39 | 45 | 50 | 52 | 54 |
| United Provinces | 65 | 71 | 79 | 82 | 87 | 90 | 89 | 87 | 87 | 83 |
| Total | 583 | 630 | 668 | 703 | 730 | 765 | 812 | 846 | 854 | 842 |

APPENDIX H.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January to 31st December 1920.

PETROLEUM.

| No. | Date of accident. | Nature of oil. | Where accident occurred. | Circumstances of accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|-------------------|----------------|--------------------------|--|--------------------|----------|
| | | | | | Killed. | Injured. |
| 1 | 30th January 1920 | Petrol | Coonoor | 19 out of 500 drums of petrol loaded in a bogie covered goods wagon attached to a mail train caught fire and exploded at Coonoor station yard. Three employees of the railway were slightly injured while unloading the drums. The accident is attributed to the leakage of the petrol drums and a spark from the train or some other engine igniting the petrol vapour. The staff responsible for attaching the wagon next to the engine were punished. | ... | |

APPENDIX H—*contd.*

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January to 31st December 1920.

PETROLEUM.

| No. | Date of accident. | Nature of oil. | Where accident occurred. | Circumstances of accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|-------------------|----------------|--------------------------|---|--------------------|----------|
| | | | | | Killed. | Injured. |
| 2 | 4th March 1920 | Petrol | Meiktila | Two petrol lamps in the billiard room of the Meiktila Club were pumped up and lit as usual when the last member left the club the servants proceeded to shut up. One lamp suddenly exploded, though no one was touching it at the time. Three servants who were standing near the billiard table were injured. These lamps are worked by air pressure and the petrol is contained in a round bowl which is separated from the burner by a tube of about 2 feet long. The bowl is of copper or alloy and electro or tin plated and is made in two halves the lower half and the upper being joined by soft solder only and not as in many petrol lamps rivetted together. It seems possible that the solder was gradually melted by the heat of the lamp until the two halves fell a part and the petrol falling on the burner caused the explosion. As the explosion did not take place for at least 3 hours after the lamps were pumped up, it does not seem probable that too much air was pumped in. | ... | 3 |
| 3 | 26th April 1920 | Petroleum | Bombay | A Hindu woman was lighting a fire with kerosine oil when her frock accidentally caught fire. A neighbour hearing her cry out, rushed to her assistance and put out the flames by pouring water over her. She was removed to a dispensary for treatment. | ... | 1 |
| 4 | 7th May 1920 | Do. | Do. | While an Indian woman was lighting a fire by the use of kerosine oil, the oil suddenly burst into flames and she being in close proximity to the same, her clothes were set fire to. The neighbours ran to the woman's assistance and put out the flames. She was, however, badly burnt and died shortly after. | 1 | ... |
| 5 | 11th May 1920 | Do. | Do. | An Indian woman was lighting a coal fire on which she had poured kerosine oil, when her clothes caught fire and she was badly burnt. The flames were put out by her husband and a neighbour. She was taken to hospital where she died from the effects of the burns. | 1 | ... |
| 6 | 10th July 1920 | Petrol | Rangoon | The engine driver of the motor launch "Dora" was ordered to have the launch in readiness by 5 A.M. on the 11th July. He commenced working about 6-30 P.M. on the 10th and was tightening up a nut on the shaft behind the engine and was making use of a common tin lamp with a naked light to see what he was doing. At about 8-30 or 9 P.M. an explosion took place resulting in the flooring taking fire and the engine driver receiving burns about the face, forearms and legs. The cause of the explosion could not be ascertained. | ... | 1 |
| 7 | 5th August 1920 | Kerosine | Bombay | An Indian girl 16 years old was lighting a stove when her sari caught fire. She was removed to hospital where she died the same night from the burns received. | 1 | ... |
| 8 | 26th July 1920 | Petrol | Bezwada | A wagon loaded with 180 tins and 385 drums of petrol at Royapuram was found to be on fire at 5-20 A.M. It was at once isolated and the fire was finally extinguished at 13-45 hours. 199 drums and 4 tins of petrol were saved. The cause of the fire is unknown. | ... | ... |

APPENDIX H—continued.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1920 to 31st December 1920.

PETROLEUM.

| No. | Date of accident. | Nature of oil. | Where accident occurred. | Circumstances of a accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|----------------------|----------------|--------------------------|--|--------------------|----------|
| | | | | | Killed. | Injured. |
| 9 | 17th July 1920 | Petrol | Calicut | At 5-50 while a Guard was checking a covered goods wagon loaded with 50 tins of petrol and sundries, 6 tins were found leaking and the petrol took fire causing slight damage to the sundries. The contents of the 6 tins were completely burnt due presumably to defective soldering. The Chief Tranship and Assistant Goods Clerk were punished. | ... | ... |
| 10 | 10th August 1920 | Kerosine | Bombay | An Indian was lighting a primus stove when the oil spouted out and flames shot up and her clothes caught fire. A tin of oil close to her also caught fire and burst. She received burns over her body and limbs and her son who was sitting near by also received burns on the legs. | ... | 2 |
| 11 | 20th August 1920 | Petrol | Calicut | The petrol godown of Messrs. Best & Co., Agents, The Asiatic Petroleum Co., caught fire at about 1-45 A.M. and lasted till about 5 A.M. the next day. The cause of the fire could not be ascertained, but it is presumed the watchman might have opened the godown by some means probably to steal petrol with a naked light and the petrol took fire. He was found lying at some distance from the godown having his back, etc., burnt. He was removed to hospital and died there. The godown is said to have contained about 1,000 gallons petrol. | 1 | ... |
| 12 | 17th September 1920. | Kerosine | Bombay | A Mohammedan woman was lighting a fire in a chulla. As the wood was damp and would not light properly she poured some kerosine oil on it. The oil at once blazed up and set her clothes on fire. The neighbours threw water on her and put the fire out but not before she had received severe burns all over the body. She was taken to hospital where she died the same day. | 1 | ... |
| 13 | 30th September 1920. | Do. | Do. | An Indian woman aged 17 years was heard screaming in her kitchen. On her relatives running in they found her enveloped in flames and unconscious. The flames were extinguished and a doctor called in, but he pronounced life extinct. It appears that the woman had not been right in her head lately and had been ailing. Her appearance suggested that she had thrown kerosine oil over herself and then set it alight. | 1 | ... |
| 14 | 4th October 1920 | Petrol | Do. | A Mehta, in the employ of the Co-operative Motor Stores under instructions removed 468 tins of petrol from Carnac Bunder in carts and took them to a godown off Kalachowkey Road at about 6 P.M. At about 8-30 P.M. he finished his work and told the Bhaya to put out the burning candle which was placed on an empty petrol drum. The Bhaya went to the candle but before he put it out, it fell down on to the ground and the petrol which had leaked from the tins caught fire. Almost all the petrol tins which were outside the godown were burnt. The damage caused by the fire was estimated at Rs. 5,500. | ... | ... |

APPENDIX H—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January to 31st December 1920.

PETROLEUM.

| No. | Date of accident. | Nature of oil. | Where accident occurred. | Circumstances of accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|----------------------|----------------|------------------------------|--|--------------------|----------|
| | | | | | Killed. | Injured. |
| 15 | 20th September 1920 | Petrol | Guntakal | At 10-15 P.M. a wagon loaded with 200 drums of petrol was found to be on fire in Guntakal broad gauge yard of the Madras and Southern Mahratta Railway Company. The watchmen tried to extinguish the fire by throwing on sand but without success. All efforts to extinguish the fire proved fruitless and the fire was allowed to burn itself out. The entire contents of the wagon were burnt and the wagon damaged. The 3 watchmen were all slightly burnt. The cause of the fire is not known. | ... | 3 |
| 16 | 21st September 1920. | Do. | Arkonam | A wagon containing 500 drums of petrol arrived at Arkonam at 3-25 P.M. on 21st September 1921 and at about 7-40 P.M. the wagon was found to be on fire in the North West line marshalling yard of the Madras and Southern Mahratta Railway Company. The wagon was separated from others and attempts made to put out the fire but without success. The contents and the body of the wagon were completely destroyed. The cause of the fire is not known. | ... | ... |
| 17 | 9th August 1920 | Do. | Satara Road Railway Station. | While parcels were being unloaded from a train, some petrol drums booked to Satara Road were noticed to be on fire. They were removed from the wagon and the fire extinguished. The other parcels that were in the wagon were either partially or fully burnt. The fire was attributed to the ignition of vapour arising from a leak in the petrol drums by the flame of a hand signal lamp which were taken by the staff into the wagon. The staff at fault were suitably dealt with. | ... | ... |
| 18 | 11th October 1920. | Do. | Raichur Junction | At about 10-15 P.M. an explosion was heard at Raichur Junction and flames were seen issuing from the roof of a wagon loaded with 600 drums petrol. The wagon was immediately isolated and the fire was extinguished with help of the Fire Engine. On unloading the contents it was found that 6 drums were empty. The cause of the fire was not known. | ... | ... |
| 19 | 17th December 1920 | Kerosine | Pombay | At 10-10 P.M. a lighted kerosine lamp which had been placed on a tent situated in the Byculla Club compound, suddenly burst and set fire to the furniture in the tent. In a few minutes the tents was completely destroyed and furniture, etc., seriously damaged. | 1 | ... |
| 20 | 15th December 1920 | Do. | Do. | A Bania woman was filling a lamp with Kerosine oil while the lamp was burning with the result that the oil caught fire and set her clothes on fire. She was so severely injured that she died from the effects. | 1 | ... |
| 21 | 10th September 1920 | Petrol | Do. | In a stable at Gunpowder Road Mazagon, a motor car driver while blowing out the rear-tail lamp, the flame caught the fumes from the petrol tank underneath and set a fire which spread to another car. The driver in trying to extinguish the fire was badly burnt. | ... | 1 |
| 22 | 12th December 1920 | Do. | Calcutta | A cart carrying twenty-four gallons drums of petrol was found to be on fire in Nebutola Lane. The exact cause of the fire could not be ascertained as the driver left the place with his buffaloes. It is believed that the fire was due to petrol vapour coming in contact with a naked light. | ... | ... |

APPENDIX H—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1920 to 31st December 1920.

EXPLOSIVES.

| No. | Date of accident. | Nature of explosive. | Where accident occurred. | Circumstances of accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|--------------------|------------------------|---------------------------|--|--------------------|----------|
| | | | | | Killed. | Injured. |
| 23 | 14th January 1920 | Shell fuse cap | Calcutta | Three men were engaged in hacking off the different metal parts of an aluminium shell fuse cap when it exploded and injured them. The caps were purchased as mixed metal scrap from a firm in Calcutta and this firm admitted having taken delivery of a large quantity of aluminium and brass fuse caps and other metals from the Ichapur Shell factory which had been auctioned on 15th March 1919. | ... | 3 |
| 24 | 24th February 1920 | Gunpowder | Khaur, Pindigheb, Attock. | An explosion occurred at the Attock Oil Company's oilfield mine while 2 seers of blasting powder were being handled by a Sub-overseer and mate in charge of building operations. The powder was used for blasting rocks for building purposes. The cause of this accident could not be ascertained, but it is presumed that either of these two men must have been smoking or applied a light to the powder. | ... | 4 |
| 25 | 1st February 1920. | Fulminate composition. | Madras | An Indian lad picked up a bottle containing some red powder. He wanted to see what it contained and in the presence of some of his friends he shook the bottle when it exploded injuring him and his friends. The boy received severe injuries and his hands were blown off. He died on 10th February 1920 from the injuries. As no trace of the powder was left, it could not be ascertained what it was, but it is thought it might have been a mixture of Realgar and Chlorate of Potash. | 1 | 4 |
| 26 | 1st January 1920. | Gunpowder | Pounani Malabar | An Indian purchased 30 lbs. of gunpowder for manufacturing fireworks to be used at a festival in a mosque. Three others were making fireworks with the powders in a thatched building at night when the powder caught fire and exploded. It was reported that one of the men had a naked light with him which set fire to the powder. Two workmen escaped, but the man with the light could not escape as he was lame and was burnt to death. The building in which they worked was burnt down. | 1 | ... |
| 27 | 27th January 1920. | Detonator | Calicut | A student in the Malabar Christian College found 3 detonators on the bank of a canal and took them to his class room not knowing that they were explosives. He showed them to his friends who told him that they would serve as good pencil caps. A carpenter boy tried one for his pencil and finding that it did not fit in, inserted the point of his compass to remove the composition, when the detonator exploded injuring the boy's fingers. The two other boys who had taken the remaining two threw them away somewhere out of fear and they were not afterwards recovered. | ... | 1 |
| 28 | 8th February 1920. | Gunpowder | Salem | Two men were sinking a well by blasting with country gunpowder and while loading the blast hole an explosion occurred fatally injuring one man and caused injuries to the other. | 1 | 1 |
| 29 | 4th June 1920 | Gunpowder | Bombay | Some men were employed in removing some unexploded charges of gunpowder which had been placed in an excavation on some ground off Warden Road when one of the charges exploded slightly injuring one of the men. | ... | 1 |

APPENDIX H—concl'd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1920 to 31st December 1920.

CHEMICALS.

| No. | Date of accident. | Nature of chemical. | Where accident occurred. | Circumstances of accident so far as ascertained. | NUMBER OF PERSONS. | |
|-----|-------------------|---------------------|--------------------------|---|--------------------|----------|
| | | | | | Killed. | Injured. |
| 42 | 17th May 1920 | Nitric acid | Bombay | A chemist and druggist was removing Nitric acid bottles from a box in front of his godown when one of the bottles accidentally burst and the acid fell on him and he received scalds on the body. There were eight other persons near him and they also received burns. The chemist eventually died from the injuries received. | 1 | 8 |

APPENDIX I.

Summary of accidents during the year 1920.

| Explosives or dangerous and inflammable substances. | ACCIDENTS CAUSING LOSS OF LIFE AND BODILY INJURY. | | | Accidents not causing loss of life or bodily injury. | Total number of accidents. |
|---|---|--------------------|----------|--|----------------------------|
| | Number of accidents. | NUMBER OF PERSONS. | | | |
| | | Killed. | Injured. | | |
| EXPLOSIVES. | | | | | |
| Gunpowder | 8 | 4 | 11 | ... | 6 |
| Nitro-compounds | ... | ... | ... | ... | ... |
| Fulminates | 3 | 9 | 21 | ... | 3 |
| Ammunition | 6 | 1 | 9 | ... | 6 |
| Fireworks | 1 | 4 | 1 | 1 | 2 |
| TOTAL | 18 | 18 | 42 | 1 | 19 |
| PETROLEUM. | | | | | |
| Petroleum generally | 13 | 7 | 14 | 9 | 22 |
| TOTAL | 13 | 7 | 14 | 9 | 22 |
| Chemicals | | | | | |
| Chemicals | 1 | 1 | 8 | ... | 1 |
| TOTAL | 1 | 1 | 8 | ... | 1 |
| Miscellaneous | | | | | |
| Miscellaneous | ... | ... | ... | ... | ... |
| TOTAL | ... | ... | ... | ... | ... |
| GRAND TOTAL | 32 | 26 | 64 | 10 | 42 |

APPENDIX J.

Detailed statement showing the number of accidents and persons killed and injured during the ten years ending 1920.

| YEAR. | GUNPOWDER. | | | DYNAMITE AND OTHER NITRO-COMPOUND BLASTING EXPLOSIVES. | | | FULMINATES. | | | AMMUNITION. | | | FIREWORKS. | | |
|------------------|----------------------|-----------------|------------------|--|-----------------|------------------|----------------------|-----------------|------------------|----------------------|-----------------|------------------|----------------------|-----------------|------------------|
| | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. |
| 1911 . | 9 | 14 | 8 | 4 | 4 | 29 | ... | ... | ... | ... | ... | ... | 17 | 13 | 24 |
| 1912 . | 10 | 13 | 6 | 5 | 5 | 35 | ... | ... | ... | 1 | ... | 1 | 12 | 4 | 16 |
| 1913 . | 15 | 13 | 25 | 3 | 2 | 1 | ... | ... | ... | 1 | ... | 1 | 14 | 14 | 26 |
| 1914 . | 8 | 6 | 7 | 3 | ... | 5 | ... | ... | ... | ... | ... | ... | 6 | 5 | 21 |
| 1915 . | 2 | 2 | 3 | 2 | 2 | ... | 1 | ... | 1 | 1 | ... | 1 | 4 | 2 | 3 |
| 1916 . | 3 | 2 | 3 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 1 | ... | 1 |
| 1917 . | 6 | 9 | 7 | 1 | ... | 1 | ... | ... | ... | 5 | ... | 5 | 1 | 1 | ... |
| 1918 . | 4 | 12 | 5 | 4 | 1 | 8 | ... | ... | ... | 4 | 4 | 3 | 1 | 1 | ... |
| 1919 . | 5 | 8 | 16 | 4 | 1 | 9 | ... | ... | ... | ... | ... | ... | 4 | 1 | 18 |
| 1920 . | 8 | 4 | 11 | ... | ... | ... | 3 | 9 | 21 | 6 | 1 | 9 | 2 | 4 | 1 |
| TOTAL | 70 | 82 | 91 | 26 | 15 | 88 | 5 | 9 | 23 | 18 | 5 | 20 | 62 | 45 | 110 |
| AVER-AGE. | 7 | 8 | 9 | 3 | 2 | 9 | 1 | 1 | 2 | 2 | 1 | 2 | 6 | 5 | 11 |

APPENDIX J—concl'd.

Detailed statement showing the number of accidents and persons killed and injured during the ten years ending 1920.

| YEAR. | PETROLEUM. | | | CHEMICALS. | | | MISCELLANEOUS. | | |
|---------|----------------------|-----------------|------------------|----------------------|-----------------|------------------|----------------------|-----------------|------------------|
| | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. | Number of accidents. | Persons killed. | Persons injured. |
| 1911 | 30 | 21 | 35 | 2 | 1 | 1 | 6 | 299 | 27 |
| 1912 | 17 | 25 | 12 | 2 | ... | 1 | 1 | 1 | 1 |
| 1913 | 12 | 19 | 19 | ... | ... | ... | 2 | ... | 3 |
| 1914 | 9 | 11 | 9 | ... | ... | ... | 1 | 1 | ... |
| 1915 | 15 | 17 | 32 | ... | ... | ... | ... | ... | ... |
| 1916 | 11 | 21 | 9 | 2 | 1 | 3 | 1 | 2 | ... |
| 1917 | 8 | 4 | 7 | ... | ... | ... | 6 | 5 | 20 |
| 1918 | 13 | 26 | 17 | 2 | 1 | 5 | 4 | 1 | 1 |
| 1919 | 12 | 15 | 50 | 1 | 5 | ... | 3 | 2 | 2 |
| 1920 | 22 | 7 | 14 | 1 | 1 | 8 | ... | ... | ... |
| TOTAL | 149 | 166 | 204 | 10 | 9 | 18 | 24 | 311 | 54 |
| AVERAGE | 15 | 17 | 20 | 1 | 1 | 2 | 2 | 31 | 5 |

APPENDIX K.

Comparative statement showing the number of accidents and persons killed and injured during the ten years ending 1920.

| YEAR. | ACCIDENTS CAUSING LOSS OF LIFE OR BODILY INJURY. | | | | Accidents not causing loss of life or bodily injury. | Total number of accidents. |
|---------|--|--------------------|----------|-----|--|----------------------------|
| | Number of accidents. | NUMBER OF PERSONS. | | | | |
| | | Killed. | Injured. | | | |
| 1911 | 64 | 352 | 124 | 4 | 68 | |
| 1912 | 44 | 48 | 72 | 4 | 48 | |
| 1913 | 46 | 47 | 75 | 1 | 47 | |
| 1914 | 27 | 23 | 42 | ... | 27 | |
| 1915 | 25 | 23 | 40 | 2 | 27 | |
| 1916 | 19 | 26 | 17 | 2 | 21 | |
| 1917 | 27 | 19 | 40 | ... | 27 | |
| 1918 | 29 | 46 | 39 | 3 | 32 | |
| 1919 | 23 | 32 | 95 | 6 | 29 | |
| 1920 | 32 | 26 | 64 | 10 | 42 | |
| TOTAL | 336 | 642 | 608 | 32 | 368 | |
| AVERAGE | 34 | 64 | 61 | 3 | 37 | |

APPENDIX L.

CONDITIONS OF LICENSE.

1. If the licensing officer call upon the holder of a license by a notice in writing, to execute any repairs to the storage premises, which may in the opinion of such officer be necessary for the safety of the said premises, the holder of the license shall execute the repairs within such period, not being less than one month from the date of receipt of the notice, as may be fixed by the notice.

2. The license-holder is prohibited from delivering any quantity of dangerous petroleum exceeding three gallons to any one who has not a license under section 5 or section 6 of the Act or any less quantity of such petroleum, except in accordance with the conditions of the proviso to section 6 of the Act, as to the vessels in which the petroleum must be contained.

3. The dangerous petroleum shall be stored in—gas tight steel tank of a capacity not greater than gallons which will be sunk completely underground and placed in a pit lined with brick in cement, the tank then being packed round with sand so that no air space is left below ground level. The dangerous petroleum shall enter the tank “under seal” and the tank shall be fitted with a vent pipe leading up the side of the nearest building for 20 feet and fitted with a blow out and a suck in valve.

4. An air-space of at least one-tenth of its capacity shall be left in the receptacles at the time of filling.

5. The receptacle shall be so substantially constructed and secured as not to be liable except, under circumstances of grave negligence or extraordinary accident, to be broken or become defective, leaky or insecure.

6. The tank, before being repaired, shall be cleared of all dangerous petroleum and of all dangerous vapours arising from the same.

7. A pump or pumps shall be placed outside the licensed premises and shall not be more than 12 feet above the level of the bottom of the tank and the pipe connection between the tank and the pump or pumps shall be placed underground and all joints, valves and cocks shall be gas tight.

8. All due precautions shall be taken for the prevention of unauthorised persons having access to any dangerous petroleum kept and to the vessels containing or having actually contained the same.

9. Every person managing or employed on or in connection with the storage premises shall abstain from any act whatever which tends to cause fire or explosion and which is not reasonably necessary, and shall prevent any other person from doing such act.

10. The storage premises shall be liable to inspection by an officer not being of lower rank than a Sub-Inspector of Police authorised by the Local Government in this behalf.

