10th APRIL, 1919.

SOME NOTES ON WOOL-DUMPING.

By J. W. BELL.

Introduction.

In bringing forward these notes, the author has not gone into any theoretical problems, but merely presents some data and tests, together with a description of a few wool-dumping plants, including the handling of bales before and after dumping.

The wool-dumping question is an important one, as will be seen by Slide No. 1, which shows the enormous amount of wool exported from the Commonwealth during the past ten seasons—it being our most valuable product, and the pioneer of our prosperity. The slide also shows how the value per bale has risen the last few years, owing to the war and other demands.

Transport and Storage of Bales of Wool.

The number of sheep in the Commonwealth in 1918 was over 81,000,000.

The sheep is Australia's friend, and has made many a man wealthy. The merino wool produced in Australia is recognised as the finest wool in the world, and the low cost of production makes it much sought after by other countries, as it can be sold cheaper than most of the wool they themselves produce. Slide No. 2 shews a paddock of sheep ready for shearing. After the sheep are shorn, the clip is put into bales, and squeezed down by the station press, which is generally situated in the wool shed. Slide No. 3 shews a wool shed, and Slide No. 4 an empty press. No.

—TABLE SHEWING QUANTITY OF WOOL EXPORTED FROM THE— —COMMONWEALTH DURING THE PAST 10 SEASONS.—

SEASON	TOTAL Nº OF BALES FOR EACH STATE. N.S.W.	VIC.	Q.LAND.	S.A.	W.A.	TAS.	TOTAL Nº OF BALES FOR COM'WEALTH	AVERAGE WEIGHT PER BALE LBS.	AVERAGE VALUE PER BALE £-S-D	TOTAL VALUE FOR COM'WEALTH £
1908-09	973,136	289,089	288,945	152,050	59,293	33,834	1,796,347	330·6	11-6-10	20,373,568
1909-10	1,033,896	319,809	328,848	137,303	69,255	32,396	1,921,507	335·5	13-12-2	26,148,508
1910-11	1,023,750	325,000	360,000	152,000	80,250	34,378	1,975,378	332·1	12-10-4	24,725,148
1911-12	1,036,767	365,375	349,561	153,079	80,765	35,000	2,020,547	331·2	11-15-5	23,783,522
1912-13	851,000	301,000	320,000	140,486	72,000	34,000	1,718,486	321·2	13-13-1	23,464,494
1913-14	968,000	320,000	450,000	128,000	67,000	33,576	1,966,576	327·2	13-4-11	26,048,938
1914-15	896,000	272,000	416,000	93,000	66,000	32,000	1,775,000	329·1	12-15-7	22,683,021
1915-16	794,000	212,000	298,000	70,000	81,000	29,000	1,484,000	322·7	16-10-10	24,547,833
1916-17	844,000	358,000	295,000	116,000	73,000	36,000	1,722,000	327·3	21-12-8	37,252,600
1917-18	899,625	366,222	333,356	152,601	119,456	36,071	1,907,331	331·3	22-8-5	42,763,950

NOTE:-AVERAGE WEIGHT AND VALUE PER BALE IS FOR AUSTRALASIA.

THE FIGURES OF PRODUCTION IN ABOVE FOR 1916-17 AND 1917-18 INCLUDE WOOL FOR EXPORT AND MANUFACTURE, OTHER YEARS ARE FOR EXPORT ONLY.

Fig. 1 (Slide 1).

5 shews the wool in, ready for pressing. This particular make—a Ferrier press—is in general use; approximately over 2000 are installed in different parts of Australasia.

It is constructed of wood; the top box is hinged to side brackets, and turns down so that all filling is done from the floor. When boxes have been filled, the top box is raised by means of a hemp rope into position, working over a jib. A wire rope or chain (by means of pulleys and a fuzee) is used for applying the pressure to the ram, the ram being of timber, about 4in. square. and has a steel cap fitted to the end. About 30cwt. is the pressure applied to the average scoured bale, and one ton to a greasy bale. Height of ram elevated is 19ft; height of press is 11ft. 6in., and floor space occupied is about 5ft. square.

Special fasteners are provided for quickly securing pack into position. The locking and unlocking of doors is effected simultaneously by means of vertical bars, and the slide of the bottom box can be released instantly by the use of a catch, thus permitting the ready removal of the pressed bale.

The ram is held in its place by a pawl, which drops automatically into position, and is released by pulling a cord, when ram is lowered or raised.

Some station presses are geared and driven by a belt from an engine; but the author was not able to secure a slide of one in time. Nearly half the weight of a greasy bale consists of grease and dirt. The difference between a greasy and a scoured bale is, that one has nearly all the dirt and grease taken out by scouring, and the other is just as it comes off the sheep's back. Some wool stations do their own scouring, but they are few in number. During the war station owners were urged to put up as much wool as practicable in a bale, so as to save freight (allowing not less than 350lbs. of greasy wool to a bale);

while a saving of twine was also made when sewing up the bales, by adopting a different method of making only six fastenings; this proved highly satisfactory. By putting more wool into a bale, it has had the result of saving wool packs, the shortage of which caused great concern during the last few years. This also reduced the number of wool-packs to be carried from India to Australia. On a 2,000,000 bale clip it means that about 1,000 tons of dead weight of packs, costing approximately £40,000, are dispensed with. Through more wool being packed in bales in 1916-1917, there was a saving of 8 per cent. on the packs.

In Sydney some of the scourers have been putting 10 per cent. less wool in the bale to suit some of the dumpers. This meant they have had to alter their presses, which was not appreciated at all. An average scoured bale undumped weighs 250lbs., and measures approximately 27 cubic feet, whereas a greasy bale undumped weighs 364lbs., and measures approximately 22 cubic feet. Of course, the sizes of bales are so irregular that there are seldom two alike.

The bales of wool are in some cases carried for miles from the station woolshed by bullock teams, lorries, etc., to the train, then hundreds of miles by rail or by coastal steamer to the city. The freight on a ton of greasy wool from Bourke to Sydney cost approximately £3 10s., and scoured £3 15s., or on an average a bale would cost approximately a pound from the wool station to the dumping plant in the city. Almost every bale is carted through the streets, which are in some cases very narrow; they are backed into wool stores, unloaded, and stored ready for appraisement; then again carted (sometimes 3, 4, and even 5 bales high) to the different dumping plants.

Before the war period, the wool came along in an even stream, and the storage of it was not such a vital question, as it was dumped and exported to English and foreign

ports at regular intervals, leaving at any time very little surplus in the stores, but when the 1917-18 season acquisition was announced it was apparent that the wool storage problem was to become of considerable importance. As the season advanced, owing to the shortage of tonnage for export purposes, a dearth of shipping prevented the wool acquired in the previous season and still stored from being exported. This resulted in a considerable proportion of old wool remaining in the stores (every available store was utilised for wool at this time), when the new clip of wool came forward in considerable quantity. This was partly responsible for the delay in the start of appraisements. Shearing was nearly over in early districts of New South Wales and Victoria, and by November the storage position was acute, as the amount of wool proved to be larger than the previous season, and came forward in the usual heavy volume, thus taxing the storage accommodation to such an extent that steps had to be taken to relieve it (some 450,000 bales had come to the stores since July), and the carriage of wool had to be temporarily suspended, but within a month it was carried again, and by December all was well. To guard against a repetition of this, the Wool Committee here set about to provide ample accommodation, and took out a lease of part of Wentworth Park for about 5 years (totalling 15 acres), and temporary wood buildings have been erected, the Committee undertaking to restore site on termination of lease. The site contains 14 sheds (see Slide No. 6), which have an average capacity of 20,000 bales in all, totalling approximately 280,000. The average size of sheds is approximately 220ft. x 140ft. The bales are handled (see Slide No. 7) with an electrically driven hoist and stacker combined, which is driven by a 2 H.P. motor, and will lift about 9 cwt. It travels up at the rate of about 40 feet per minute with a bale, and reverses by means of a clutch. It weighs about 12 cwt., and being portable and

easy to move from one part of shed to another, it has proved of great value on the site.

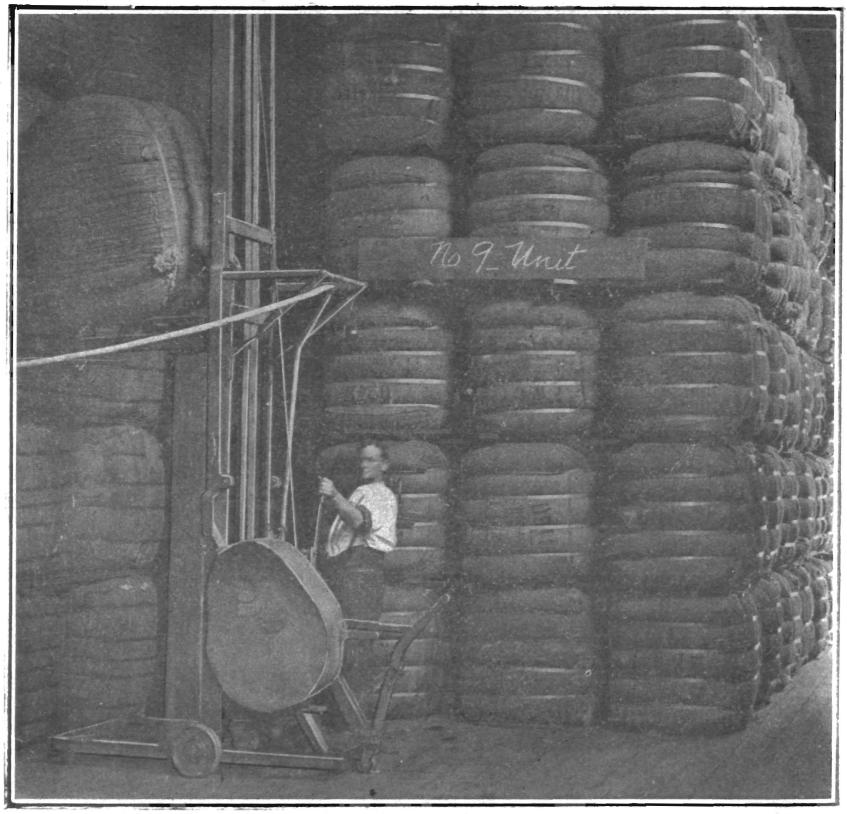


Fig. 2 (Slide 7).

In a shed there is about 60 tons of dunnage of 3in. x 1in. and 4in. x 1in. battens, some up to 15ft. long. These are placed between bales to keep them upright and to stop bulging, thereby preventing stacks from collapsing.

The wool is stacked in tiers 5 and 6 high. Towards the close of 1917-18 season, the Wool Committee arranged for storage of 2,315,000 bales of wool in interstate centres. The wool was dumped to increase capacity of stores, so

all the wool dumping plants were working at their full capacity, sometimes day and night.

Besides Wentworth Park, six acres of Military Reserve were acquired for storage of 200,000 bales in Victoria, 120,000 in stores around Sydney Harbour, 200,000 in Queensland, 120,000 in South Australia, and 120,000 in West Australia.

The storage capacity of one block of wharf sheds at Jones' Bay, Sydney, is equal to over 70,000 bales at present; allowing 17.5 cubic feet to a bale, of which 15 per cent. is for passageways. Slide No. 8 shews undumped bales going in and dumped bales coming out from these sheds.

General Dumping Notes.

Many members, no doubt, have but a vague idea of what dumping plants are like and the work they are capable of doing.

The science of wool-dumping, like every other invention, was the product of necessity, which is the mother of invention. In olden days, all our wool was exported, but of latter years, manufactories have sprung up throughout the Commonwealth; consequently less of our wool is exported.

On account of the great war, shipping facilities have so depreciated that we have been obliged to utilize every possible space, and will have to do so for some time yet, so wool-dumping must be availed of even more so than formerly. During the last few years, nearly every wool-dumping plant has either been added to or altered to suit present day requirements, which speaks for itself of the importance of dumping.

In some cases old cylinders have been lengthened and new rams fitted; in others, old cast iron cylinders have been replaced by cast steel ones, and new presses have

been added to existing plants with several improvements, such as side operating gear, etc., which makes dumping more efficient. It is worthy of mention here that a lot of the present day improvements in dumping plants are due to the genius of the late Mr. Norman Selfe, our esteemed late member, who was one of the pioneers in this particular line.

During the last two seasons bales have been sent to a fixed port, and then re-shipped. In pre-war times, bales for different ports were often put in the same steamer, and if bales were double-dumped, as some are now, a bale for Antwerp might be strapped with one for Liverpool—this is palpably wrong.

Double-dumping.

In pre-war times, bales were dumped single with three (3) bands, then two single dumps strapped together with three or four more, and when placed in the ship's hold the second lot of bands were cut so as to wedge the bales in tightly, the dumpers having the right to have the bands returned. Since the war, some firms make a double-dump outright and others dump one bale first, then hang it up to allow another bale to be put in the press, and dumped. Both bales then are strapped together, and the bands which hold the first bale up are drawn out.

In another case, one bale is dumped, bound with three wire strands and taken out, then another bale is dumped and bound and hung up to top of gap, then first bale is put in the press again, and the two are strapped together, making a double. (See Slide No. 9, which shows two double dumps.)

The following is the approximate average capacity and weights of dumped bales during war-time, taken from an authentic source:—

Single	dumped,	scoured,	19	cubic feet,	weight	250	lbs.
Double	,,	,,	30·5	,,	,,	485	,,
Single	,.	greasy	19	,,	,,	360	,,
Double	,,	,,	27	,,	,,	740	,,

The author has seen in pre-war times, cross-bred bales doubled dumped which weighed approximately 11cwt. and measured 3ft. 10ins. x 2ft. 9in., or 28½ cubic feet and taking 11ft. bands. Average weight of a single dump before the war was from 340 to 400 lbs.

From investigations made, double-dumping will not pertain to any great extent when shipping is plentiful again, unless each bale is dumped first and banded and then strapped again, as buyers will require their bales to be turned out as "singles" on the other side of the world. Double-dumping is dearer to the shipping firm who pays approximately 6s. 10d. for a double as against 2s. 4d. for a single.

Very few firms, before the war, made double-dumps; single bales were the prevailing rule, but, owing to the limited tonnage, the Wool Committee called for the bales to be double-dumped. This method meant a saving in space. Through dumping and double-dumping in 1916-17, from 10 to 15 per cent. of space was saved. If, say, on a clip of 2,000,000 bales, 10 per cent. could be saved, it would mean approximately 200,000 bales, equivalent to 10 average size steamers, and also a saving in steel for bands, which was a very important item, as steel was almost unprocurable for bands, caused through the great demand for war purposes.

Steel Bands.

In pre-war times, three bands, approximately 7ft. 9ins. long, on each single bale were used, and then three or even four more 10ft. long when double-dumped, totalling approximately 86.5 steel, as against war-time of four bands, approximately 10ft. long, totalling 40ft. resulting in a saving of 46ft. of steel on one double-dump, which means a lot to dumping firms. Some of the materials for bands and studs have been very inferior, and have caused

accidents through the studs breaking and flying off. Nettleford's steel seems to be recognised as the best. Some firms were lucky to have had large stocks of bands and studs, others had to use up old bands which otherwise would have been put on the scrap heap, and in some cases short pieces have had to be riveted together. Most of the dumping firms now stamp their own bands ready for the studs. Steel wire of No. 8 gauge has also been used by many of the firms, using three, four and five strands on a double dump.

A Melbourne gentleman has patented a screw fastener for wool bands which, he claims, will enable bales to be made tighter, while stamping bands will not be necessary, thus enabling the use of thinner and narrower bands and the saving of much steel. Members of the Wool Advisory Committee, London, have severely tested the invention which answered all the tests satisfactorily.

Different Kinds of Wool-presses.

There are four kinds, viz.:—

No. 1 is called a single press, and holds one bale, see Slide No. 10, which shews this type of press with its intensifier, weighing approximately 2½ tons, with operating valves. This press weighs about 9 tons complete, the table is 3ft. square. It is to be found in most of the dumping plants. Slide No. 11 shews the arrangement of similar presses in one of the Sydney Harbour Trust sheds; the size of this shed is 570ft. long x 120ft. wide.

No. 2 is called a vertical two-bale press, and holds two bales, one on top of the other (see Slide No. 12). This press is a very quick dumper, and has side operating gear, the press weighing about 8 tons complete; it has a cast steel cylinder. The table is the same size as a "single," namely 3ft. square. There are very few of this type in Sydney.

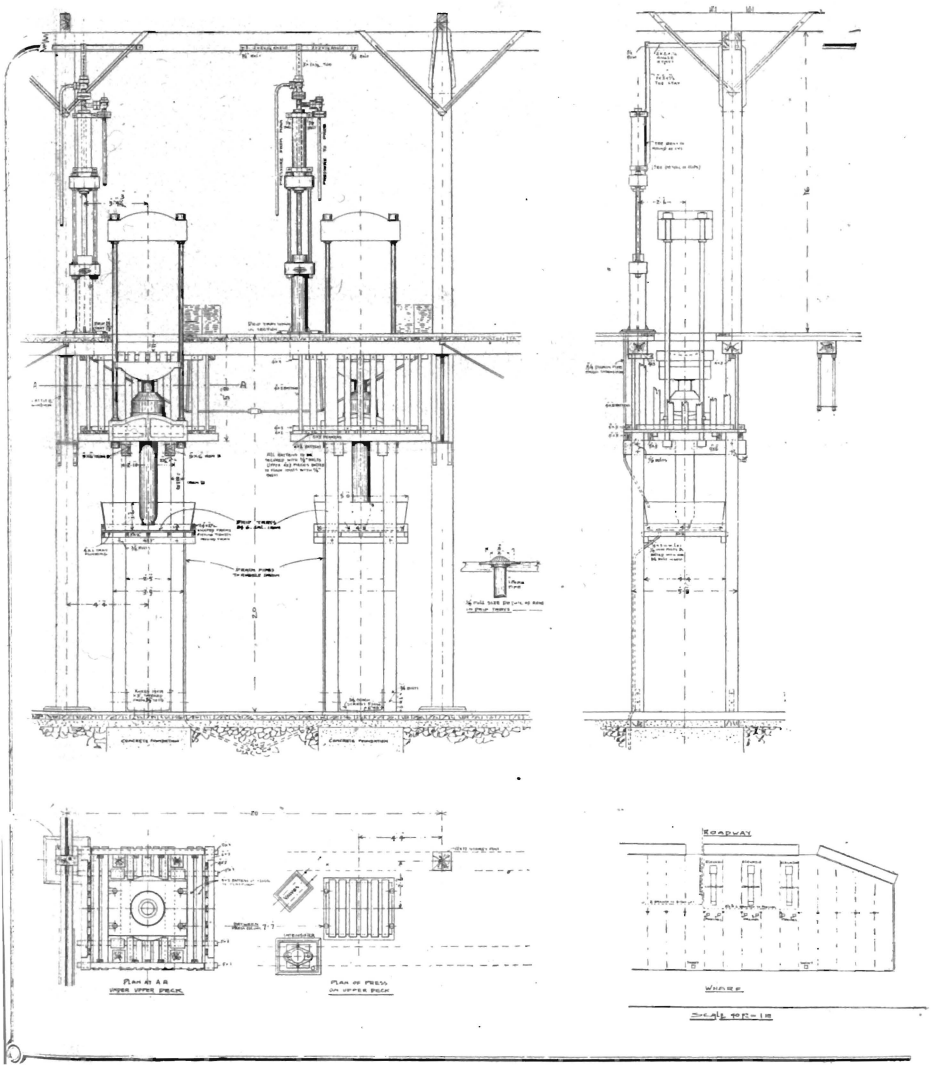
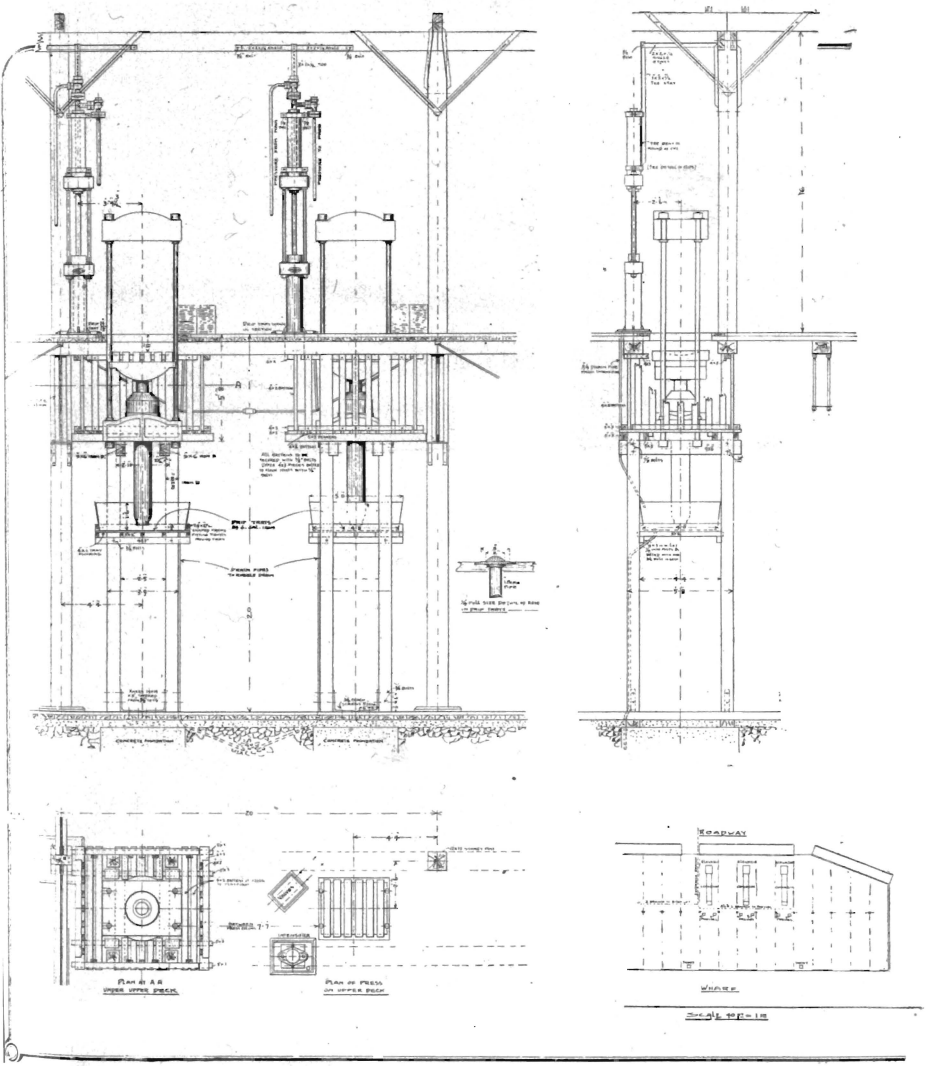


Fig. 3 (Slide 11).

No. 3 is called a horizontal two-bale press, holding two bales side by side.

No. 4 is called a four-bale press, holding two bales on top of two others. Slide No. 9 shews the latter which



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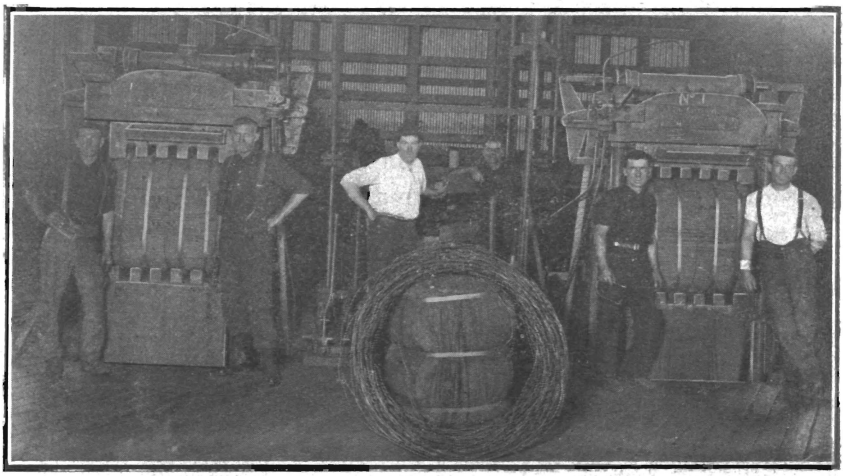
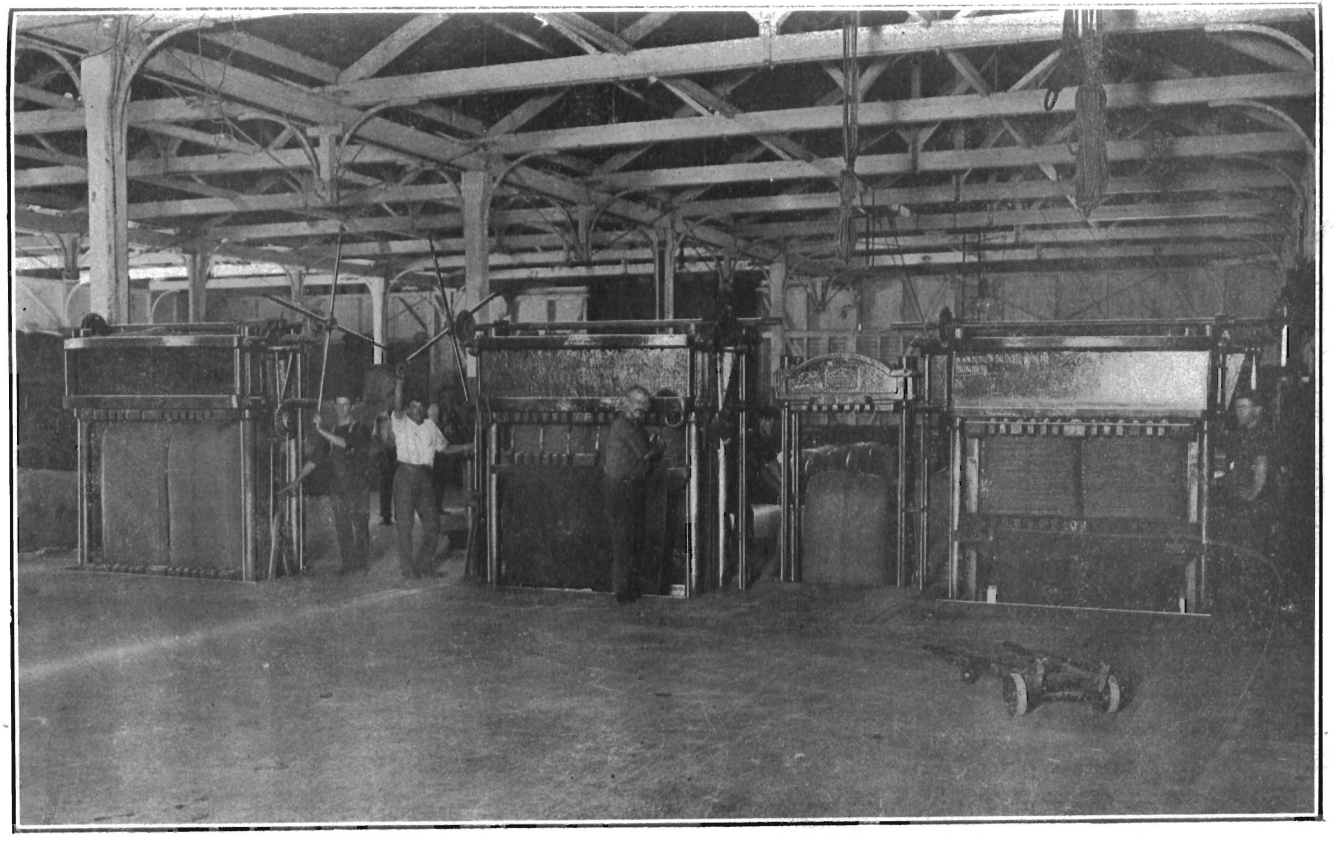


Fig. 4 (Slide 12).

differs only from No. 3 in this respect, that No. 4 has a longer ram and a greater space between the gap. The tables of both are approximately 6ft. long x 3ft. wide, and they both have side operating gear. No. 3 weighs about 14 tons, and No. 4 16 tons complete. These presses are very old but still do splendid work.

Some of these oldest dumping presses in Sydney are to be seen at No. 9 plant. They have been altered to suit present day requirements, and hold their own with a lot of the more recently built ones. Slide No. 13 shews these presses which get their pressure from a duplicate set of three throw pumps direct (See Slide No. 14). Slide No. 15 shews bales dumped by these presses in the shed. The presses in question have side pressing gear operating by hand and came from the old dumping plant of Talbotts & Co. and date back to about 1870. This firm occupied portion of the Blackwall Stores, on the East side of the Quay, near Macquarie Street Steps. The wool was received ex-drays in the Macquarie Street entrance, and after being dumped the bales were rolled across the street to the vessels, which in these days were mostly sailers.



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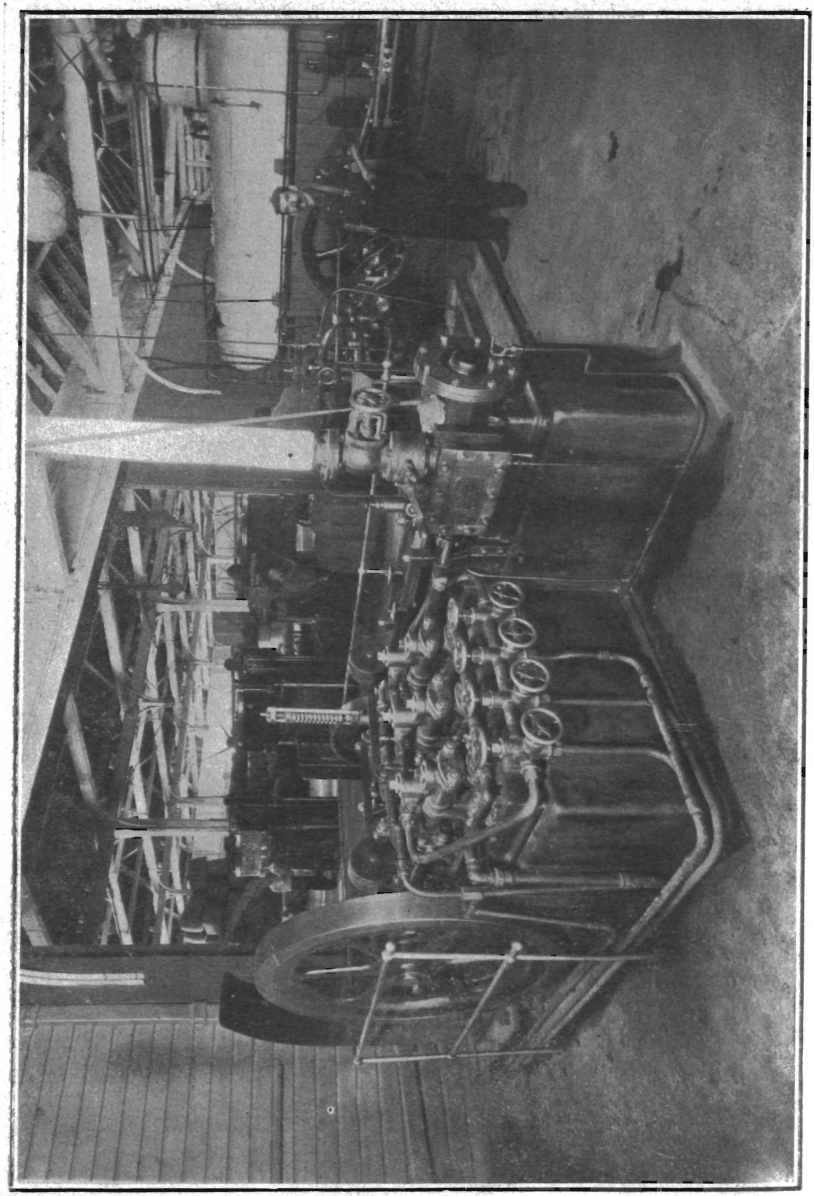

Various Types of Apparatus for Operating Side Guides in the Dumping of Wool Bales.

1. Hand-power, by means of a rope wheel, operating Guides by a system of bevel gearing and screws. This type is very old.

2. Hydraulic rams fixed to sides, working vertically and operating the Guides after the fashion of parallel motion. Counter-weights being on top of ram extensions, which are rigidly guided to prevent **lateral** movement, while the guides themselves are rigidly kept from **vertical** movement. This type has been working for over 20 years.

3. Hydraulic rams horizontally fixed on top of press, operataing the Guides by means of **levers** and **links**. The release being also by hydraulic power.

4. Same as in No. 3, but the release being by means of counter-weights on bottom.

5. Hand-power, by means of levers and cams operating directly on Guide, which fulcrum in sockets at bottom. While with types 1 to 4 the Guides remain **vertical** in all positions, in this type they do not.

Method of Handling Wool Bales, Before and After Being Dumped By One of the Leading Sydney Dumping Firms.

The bales are unloaded from the lorry on to an adjustable platform and picked up by the tines of a finger tray elevator. (See Slide No. 16, shewing a lorry being unloaded and also a bale during transit to the second floor.) The travel being a little over 40ft. After the bale has reached the second floor, the elevator tips it off on to an inclined platform which lands the bale on the floor. (See Slide No. 17 which shews the bales leaving the elevator, and other bales ready to be trucked to dumping presses some few feet away.) Slide No. 18 shews four bales in a press