VII.—*Description of the Drops used by the Stanhope and Tyne Railroad Company for the Shipment of Coals at South Shields. By THOMAS E. HARRISON, M.Inst.C.E.*

THE mode of shipping coals shewn by the drawings, (Plates V. and VI.,) was made the subject of a patent by the late William Chapman, of Newcastle upon Tyne, in the year 1807, and it is one of those instances in which the patentee, either from prejudice or some other cause, received little remuneration for an invention which has been the means of saving thousands to the coal owners on both the rivers Tyne and Wear; for although it was almost entirely neglected during the continuance of the patent, it shortly afterwards came rapidly into extensive general use.

Previous to the introduction of the plan now generally adopted, coals were chiefly transferred by waggons from the various collieries to the river, where they were put into keels or barges, the bottom of the waggon being let out, and the coals running down a spout or guide to the keel; in these keels they were conveyed down the river to the vessels, and cast by the keelmen into the hold of the vessel.

From these various operations and transhipments the coals received much damage by breakage, and the attendant expense was also considerable. The same system is, however, in use in some collieries at the present day; but from the various railways now in progress, which will bring all the coal to parts of the rivers at which they can be shipped at once into the vessels, there is little doubt but that in a few years a keel will hardly be known upon either the river Tyne or Wear.

During the year 1837, the quantity of coals shipped from the north of England was as follows: from Newcastle 2,868,651 tons, Sunderland 1,174,598 tons, and from the port of Stockton 1,192,353 tons, making in the whole 5,235,602 tons; of which it may be calculated that at least three-fourths are shipped by means of drops varying considerably in arrangement of the machinery, but all upon the principle of the original patent.

The advantages of the plan are, that it avoids considerable breakage to the coals, as the waggon is lowered down to the level of the deck of the vessel,

and the coal has much less height to fall; that by arranging the length of the vibrating or falling frame according to the situation, a vessel may lie in deep water at a distance from the quay and receive her cargo; and that the whole machine being self-acting, the expense of shipment is very trifling.

General description. The mode of operation will be readily understood on referring to the figures 1, 2, and 3, Plate V., which represent the general elevation, and a front and back view, and to Fig. 4, Plate VI., which shews a general plan of the whole. The waggon weighing from 28 to 30 cwt., and containing 53 cwt. of coals, is run on to the cradle *a*, which is suspended from the top of the vibrating frame *b*, (Figs. 1, 2, 3, Plate V.,) which moves on carriages *i* (Figs. 1 and 3) at its foot, and is retained in its position by means of ropes attached to the upper end. The waggon is secured in its place upon the cradle by means of two wooden chocks *kk*, (Fig. 4, Plate VI.,) and the cradle itself is fastened when in its highest position to the main gangway by a latch and pin *m*, (Fig. 4, Plate VI.) The ropes from the head of the vibrating frame are fastened to and wind upon the sheaves *f* and *g*, which are fixed upon the shaft *e*; (Figs. 2 and 4;) upon this shaft is also fixed the sheave *h*, to which is attached the rope holding the counterbalance weight *c*, and there is also upon the same shaft the brake wheel *d*, (Figs. 1 and 2, Plate V., and Fig. 4, Plate VI.,) which being of 16 feet diameter, and having a brake acting upon its whole circumference and worked by a powerful lever, gives the brakesman entire command over the whole operation.

Counterbalance. The counterbalance *c* is formed of a chain of cast iron links, which lie in the bottom of the well when the frame is in its highest position, as shewn in Fig. 1. Links of wrought iron have also been used, but the cast iron are found to answer best. The weight of the counterbalance is about 5 tons.

Cost. The cost of one of these drops, including all machinery, timber, and iron work, but exclusive of masonry and gangway, is about £500. Great steadiness is given to the machinery by two heavy piers of masonry, the four main legs (upon which the whole of the superstructure rests) being half let into them, and firmly bolted together by strong bolts running through them.

The great length of the vibrating frames enables vessels to receive their cargoes at these staiths, whilst lying in a depth of water varying from 13 to 16 feet (at the different drops) at low water of a spring tide.

Powers of shipment. One of these drops is capable of shipping one Newcastle chaldron of coals of 53 cwt. every minute, but this is never required in practice, as

the coals cannot be trimmed in the ships so fast, the usual work being from 25 to 35 chaldrons per hour.

Mode of operation.

The waggon being placed upon the cradle *a*, and the cradle being released from the gangway by taking out the pin *m*, (Fig. 4, Plate VI.,) the brakesman eases the brake from the brake wheel by raising the handle *d*, (Fig. 1, Plate V.,) and the vibrating frame *b*, with the waggon suspended in the cradle, begins by its gravity to descend. As the waggon descends, the counterbalance ring weights *c* are gradually lifted from the bottom of the well, the rope sustaining them winding on to the sheave *h*, as the ropes sustaining the vibrating frame are unwound from the sheaves *f* and *g*.

The waggon having arrived at the proper point, and the coals being discharged into the vessel by a man who descends with the waggon for that purpose, the counterbalance weight has then the preponderance, and by its gravity brings the vibrating frame and light waggon back to its original position.

The weight of the counterbalance is so nicely adjusted, that either the loaded waggon in its descent, or the light waggon ascending, will move at any angle at which they may have stopped. The brakesman has also ample power to stop the waggon at any point he may require, or even, in case of accident to the counterbalance weights, to hold the loaded waggon suspended.

The general arrangement of the whole differs from that of any drops erected either upon the Tyne or Wear.

FIG. 3.
Front View shewing the Vibrating Frame.

FIG. 2.
Back View shewing the Counterbalance Weight
when the Waggon is Lowered.

FIG. 1.
Longitudinal Section, shewing Machinery, mode of fastening the Frame work &c.

Reduced by G.A. Jermyn.

J.W. Lowry, Sculp.

FIG. 4.

Plan of Frame Work and Machinery.

Counterbalance Weight Sheaves.

Front Sheaves for conveying the Ropes

Carriage for Vibrating Frame.

Top of Vibrating Frame Side View.

Top Cradle Rod. (Side)

Top of Cradle Rod.

Straps 3.6 Long
Nuts 1 1/2 in.
Bolts 1/2

Carriage for Main Shaft.

Shaft at Top of Vibrating Frame. Total Length 11 Ft 7 in.

Reduced by G.A. Jermyn.