CHANGING HEADGEARS AT PLEASLEY COLLIER Y.

By G. A. Longden.

Introduction.—The headgears at both of the pits at Pleasley colliery were erected 23 years ago. The front legs were cast-iron columns fastened to pitchpine main legs by wrought-iron lattice-frames, nearly semicircular in shape, and two cross-girders fastened to these frames carried the detaching-hook plates. The main legs were 16 inches square at the bottom and tapered to 12 inches square at the top, the height was 60 feet, and the difference in width (being only 7 feet less at the top than the bottom) made them appear to be nearly vertical. The back legs were also made of pitchpine, 18 inches square at the bottom, tapering to 12 inches square at the top, and were placed parallel; shoes resting on large stones in the wall of the engine-house received the lower ends, and two cast-iron columns supported the middle of the back legs. The condition of the woodwork had deteriorated, and it was decided to erect new headgears at each pit.

Both shafts are used for coal-winding for 9 hours per day, so that one of two methods had to be adopted:—(1) To remove the existing headgear, and to build a new one in position while winding coal at the other shaft for two shifts in each day; or (2) to build the new headgear at a distance from the pit-top, and to move the complete structure into its desired position.

Upcast Shaft.—It was decided to build the headgear, in position, at the upcast shaft, and at the same time to erect a more powerful winding-engine and boilers. This work occupied several months, during which the downcast shaft was worked by double-shifts, work being thus found for the men employed in the upcast shaft. A capstan-engine and small pit-frame were erected for use, in case of accident, at the downcast shaft, and the engine proved extremely useful in dismantling the old and erecting the new headgear. These alterations to the winding-engine and headgear at the upcast shaft were not completed until May, 1900.
Downcast Shaft.—In the meantime, the condition of the back legs at the downcast shaft became serious, and it was decided to proceed with the erection of the new headgear, as soon as possible. The underground arrangements and the surface-plant precluded two coal-working shifts being employed at the upcast pit, while the new headgear was being erected at the downcast pit; and it was decided to build it in line with the engine-house and shaft, but at a distance from the shaft, in order that coal-drawing could be continued. As much ground would have to be removed, in order to allow the top of the frame-girders to rest on the same level as the flat-sheets, it was decided to raise the pit-top, together with the tram-roads, weighing-machines and cabin, by 15 inches, as being the readiest and least costly operation.

Fig. 4.—New Headgear, before its Removal to the Downcast Pit.

The headgear was built upon long girders, 15 inches deep, so that it could be rolled into position as soon as the old headgear was removed. It may be mentioned that it was impossible, in either case, to erect the new headgears over the existing ones, because the new headgears were to be erected of the same height as those already existing. The new headgear was erected about 180 feet in front of the shaft (Fig. 1, Plate XXII., and Fig. 4), and the contractors commenced to erect the headgear on March 25th, 1901. To facilitate the removal of the pulley-wheels, a pitchpine derrick, 91 feet long, was raised on May 17th, 1901, three guy-ropes were fastened to steady the derrick, and a fourth guy- rope was fastened to a crab, to enable the top to be moved and thus assist
in raising and lowering the pulley-wheels. Pulley-blocks were fastened to the top of the derrick, and a flexible steel-ropes, $\frac{2}{3}$ inch in diameter, was connected to a steam-winches. During the evenings of the following week, strong gangs of workmen were engaged in clearing the ground.

Fig. 5. - Removing the North Side Winding-ropes from the Old Headgear.

On Friday, May 25th, 1901, work at the downcast shaft ceased at 1:20 p.m., and all the men were out of the pit by 2:15 p.m. The wooden conductors were cut above the stays, the cage-prop levers were removed, and the props were fastened back. The rope on the north side of the pit was removed (Fig. 5) and coiled into a wagon, the rope on the south side was wound on to the drum, and both cages were left in the pit-bottom. The pulleys, and their pedestals and brasses, together with the detachings-hook plates, were then lowered to the ground.

The derrick was then inclined towards the engine-house, and the lower block was fastened to a timber cross-piece, fixed under the back legs about 6 feet from where the back legs were joined to the main legs. The back legs were then cut through, with cross-cut saws, above this cross-piece, and the blocks were then tightened.
by the steam-winche; but as two of the six cuts had not been cut through at the proper angle, instead of the back legs being lifted away, they fastened themselves. As it was almost dark by this time, the attempt to drop the old headgear was abandoned for that night.

Meanwhile, gangs of workmen cleared away the roads, gantries, weighing-machines, and cabin from the pit-top, and laid a road upon which the new headstock could be rolled, and this work was not completed when daylight returned. A piece was then completely cut out of each back leg and stays. A haulage-rope, ½ inch in diameter, was then fastened to the main leg and another to the wrought-iron half-moon girder on the south side, and both of these ropes were attached to the rails of a siding by snatch-
blocks, which could be pulled by locomotives. All being in readiness, the back legs were raised by the winch (Fig. 6), then both locomotives pulled as nearly together as possible at the ropes, and the front and main legs fell forward to the ground. It had been hoped that by pulling from the side, it would have fallen in that direction, but the heavy iron columns lifted up the lower ends of the wooden legs, and the whole mass fell at 6:40 a.m., in a direct line towards the new headgear, and caused considerable delay, as the whole of the wooden headgear had to be removed before the new one could be moved into position.

The road used for moving the new headgear into position consisted of two lines of boiler-plates, $a$, 3 feet wide, laid on the ground, above these two pitchpine baulks, $b$, 12 inches square, were placed. Tram end-plates, $c$, 2 feet wide by $\frac{1}{4}$ inch thick, were fixed, on these baulks, upon which the rollers would run, as it was thought that if any roller received any excess of weight it would make a hollow in the timber, into which the following rollers would probably stick (Figs. 2 and 3, Plate XXII.). The cast-iron rollers, $d$, 6 inches in diameter, with a hollow core 2 inches in diameter, were $3\frac{1}{2}$ feet long, and 50 were used.

The morning of May 26th was occupied in clearing away the old headgear and in re-laying the road, which had been disturbed by the fall of the old headgear. A rope was taken from the winch to a block at the centre of the engine-house, and fastened by two chains round the bottom of the main vertical legs. The new headgear was erected on oaken baulks, 6½ inches square, and these had been replaced by about 40 rollers evenly distributed, and rather more than 4 feet apart.

By 11:40 a.m., the bank was cleared; and with the assistance of over 100 men and the steam-winch, the new headgear, 112 tons in weight, then began to move forward, a few feet at a time, so as to allow of the rollers being brought from behind and placed in front. By 1:45 p.m., the back-end of the headgear was nearing the first foundation-stones (Fig. 7), and about 1 hour was spent in laying the road to the engine-house.

Fig. 2, Plate XXII. shows that the stones projected about $4\frac{1}{2}$ inches above the line of the top of the road, thus leaving only $1\frac{1}{2}$ inches of space between the top of the stones and the bottom of the moving girders, and this necessitated the baulks being cut on each side of the stones so as to allow the rollers to be removed.
from behind and replaced in front of the stones; and instead of 6 inches, the diameter of the rollers, the headgear had only to be lowered 1 ½ inches to the permanent foundation when the rollers were removed.

When the road to the engine-house was complete, the last stage of the journey of the headgear was commenced. The road

![Image of headgear in motion](image_url)

**Fig. 7.—** New Headgear in Motion towards the Downcast Pit.

on the south side sank about 1½ inches, under the weight of the headgear, and the girders touched the foundation-stones. Two 40 tons hydraulic jacks were placed under each side of the girder, and the headgear was raised slightly, so as to allow of plates ½ inch thick being placed under the rollers in order to raise the girders above the foundation-stones. Considerable delay ensued, and the headgear was not placed in its position until 4:15 p.m., 4½ hours being occupied in the traverse of 180 feet.

The headgear was then 4½ inches from its correct position, and the 40 tons hydraulic jacks were placed on each side of the longi-
tudinal girders, which were raised so as to allow the rollers to be removed. Workmen continued clearing the road and removing the old headgear throughout the night, and by 8 p.m., the south side pulley was placed in position; but owing to a difficulty in fitting the brasses to the new pulley and shaft, the north side pulley was not set until 11 a.m. on Sunday morning.

![New Headgear at the Downcast Pit](image)

**Fig. 8—New Headgear at the Downcast Pit.**

The whole of Sunday was occupied in levelling the headgear, and lining through so as to determine its correct position; and it was found to have settled evenly upon the foundation-stones, which had been previously levelled. The headgear was pushed into position by the hydraulic jacks, holes, about 9 inches deep, were drilled into the stones, and the bolts were run in with molten lead; and then it was fixed as nearly level as possible (Fig. 8).

Monday was spent in clearing away the old pit-top frame carrying the cage-props, and in lowering and removing the derrick. On Tuesday, the erection of the new weigh-cabin was commenced, new baulks were fitted for the cage-props, as the old ones
To illustrate Mr. G. A. Longden's Paper on "Changing Headgears at Pleasley Colliery." Vol. XXIII, Plate XXII.

Fig. 1.—Plan.

Position in which the new headgear was erected

Scale, 50 Feet to 1 Inch.

Fig. 2.—Side Elevation.

Scale, 4 Feet to 1 Inch.

Fig. 3.—Cross-section.

The Institution of Mining, Civil & Mechanical Engineers.
Transactions 1900-1902.
were defective, and the cage-props were fixed in position, giving
he level to which the tram-roads round the pit-top should be laid.
In Wednesday, the north side winding-rope was replaced,
both ropes were fastened to the cages, the cage-conductors were
joined to the new headgear, and the pit-top roads and decking
arrangements were commenced. On Thursday, water was drawn
from the cistern in the pit-bottom, and the tram-roads, weighing-
machines, and decking arrangements were proceeded with.

This method was very expensive for labour, and the extra
frame-girders carrying the headgear enhanced the cost; but, on
the other hand, it was impossible to allow the downcast pit to
stand for 2 months, while the old headgear was being removed and
the new one erected on its site.
The actual time occupied in removing the old headgear and
in placing the new headgear into position, and in fitting the
pulleys, was about 48 hours, from Friday afternoon, May 25th,
to Sunday afternoon, May 27th, 1901.

A cordial vote of thanks was accorded to Mr. G. A. Longden
for his interesting paper.

SINKINGS AND BORINGS.
The Chairman (Mr. John Gerrard) said that at a meeting of
the Council of the Midland Institute of Mining, Civil and
Mechanical Engineers it had been decided to begin to collect
sections of the strata sunk or bored through, in order to compile
a volume of sections of strata, and a committee was appointed
to compile the volume. He invited the Midland Counties Institu-
tion of Engineers to co-operate in this work, and to appoint a
committee to work jointly with them.

Mr. G. E. Coke stated that he would bring the question before
his Council, and he hoped that they would adopt so very useful a
suggestion.