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## SOME EARLY CHALKWELLS IN N.W. KENT

By JOHN E. L. CAIGER

THE custom of marling or chalking the land in an endeavour to improve poor or impoverished soil has been known and practised since very early times. Heavy clay lands and sour peaty soils considerably benefit from the addition of chalk, whilst friable soils generally benefit by the addition of clay and chalk, i.e. marl.

The Belgae were credited by the elder Pliny (A.D. 70) with the art of using chalk for agricultural purposes, which he states they obtained from deep wells.<sup>1</sup>

Old Norman leases sometimes contained covenants to ensure that marl was applied to the land.

Agricultural writers in the seventeenth century such as Gervase Markham and Walter Blith<sup>2</sup> advocate the application of chalk for soil improvement, the latter writer uses the term "chalking".

The practice of sinking chalkwells, or draw-pits as they were sometimes called, to obtain agricultural chalk can be said to have reached its peak during the eighteenth and nineteenth centuries when woodland was being extensively grubbed up by farmers eager to place more land under cultivation for oats and root crops. Chalk was applied to this newly-tilled heavy soil on a most lavish scale, amounts between 40-80 tons per acre being quite commonly used quantities. The greater proportion of the chalkwells noted in Kent, Surrey, Berks. and Hants. were sunk during this latter period, by farmers who required large quantities of chalk for dressing their fields. When the land bears a considerable upper layer of clay-with-flints the chalkwell method of extracting chalk has much to recommend it, since the minimum amount of superincumbent clay need be removed before the underlying chalk is reached.

Amongst farmers there was a strong preference for chalk obtained from a depth, it being asserted that this type of chalk was "fatter" or "stronger" than surface chalk and had the advantage that it readily powdered under the action of winter frosts. The traditional time to mine and spread it over the fields was late Autumn.

It is recorded from several sources<sup>3</sup> that these chalkwells were dug by itinerant bands of men who followed it as a trade during the latter part of the eighteenth century.

<sup>1</sup> *Lib.* XVII. (8).

<sup>2</sup> *Survey of Husbandry*, 1649, 58.

<sup>3</sup> *A Synopsis of Husbandry*. John Bannister, XVIII, 46.

## SOME EARLY CHALKWELLS IN N.W. KENT

A method employed for extracting chalk in Hertfordshire<sup>1</sup> in 1794 was briefly as follows :

A spot was fixed centrally to the area requiring chalking and a shaft 4-5 ft. diameter was sunk through to the chalk bed, perhaps 20 ft. beneath the surface. At the base of this shaft three separate horizontal headings or adits were driven by the pitman until enough chalk had been hewn to dress an area of approximately 6 acres. The men by custom would distribute the chalk over the surrounding land to a maximum distance of 330 ft. from the chalkwell but insisted on opening a new shaft if a larger area required chalking.

Three men formed the team. The pitman dug the chalk and his two companions wound it up the shaft by means of a windlass and then distributed it from a cart over the field.

The quantity of chalk used approximated to 60 tons per acre, hence by this recorded method each chalkwell yielded about 360 tons of chalk.

A noteworthy fact concerning certain chalkwells which have been examined by the writer in N.W. Kent, namely at Downe, Cudham and Birchwood is that they show a marked uniformity of pattern and size with those described above.

From the typical wages paid for this class of labour in 1790 a chalkwell cost the farmer about £10 but it yielded sufficient chalk to dress generously a six acre plot. Due to the very heavy expense incurred when land required chalking, farmers preferred to give their fields one heavy dressing of chalk at intervals of twenty years or more, rather than smaller amounts spread more frequently. Owing to high cartage costs and poor roads it was not an economic proposition to excavate the chalk very far away from the field that required dressing.

During the evening of September 5th, 1958, a severe and heavy rainstorm revealed the presence of many partly filled up shafts and underground excavations in the Dartford and Gravesend districts. In every case which the writer investigated the existence of the caves and shaft was unknown to the respective landowners and was only revealed by storm water washing away the shaft filling into the chambers below. Of the several subsidences inspected, four, namely three chalkwells and one denehole, are worthy of description.

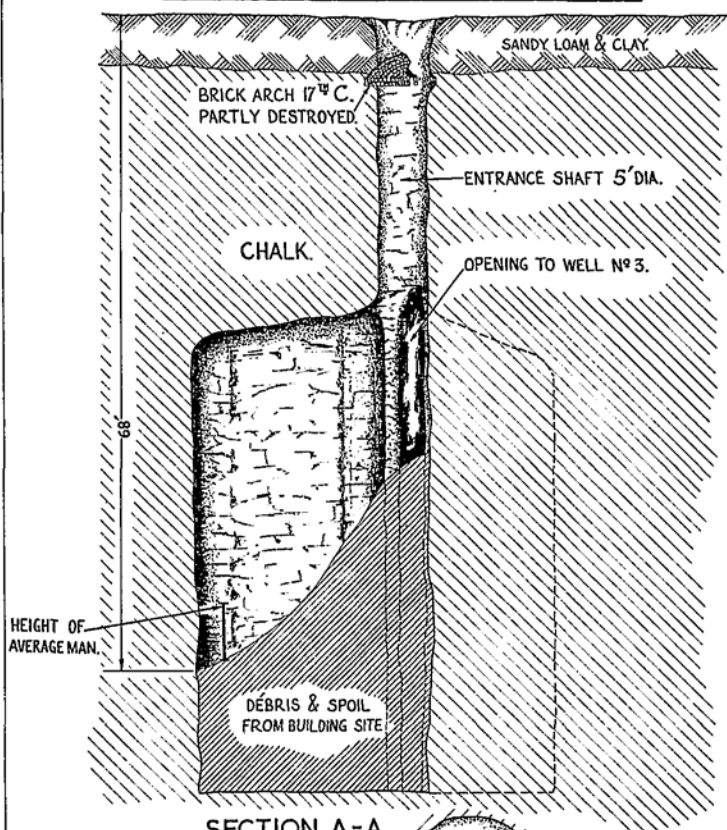
### THE DARENTH PARK HOSPITAL CHALKWELL

This subsidence was in the grounds of the above hospital and occurred within 30 ft. of one of the hospital blocks, location, N.G.R. TQ571730.

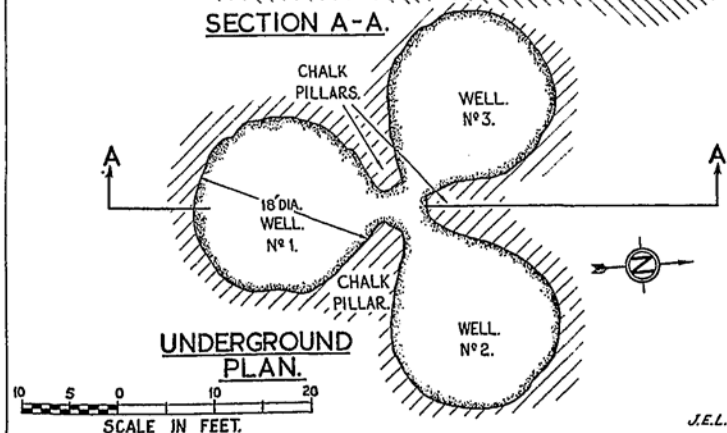
A shaft 5 ft. diameter had appeared at this spot which descended to a depth of nearly 20 ft., and at the base three chambers had been hewn leading off horizontally.

<sup>1</sup> *Report on Agriculture of Hertfordshire.* B.O.T. 1804, 158.

# A CHALKWELL AT GRAVESEND.



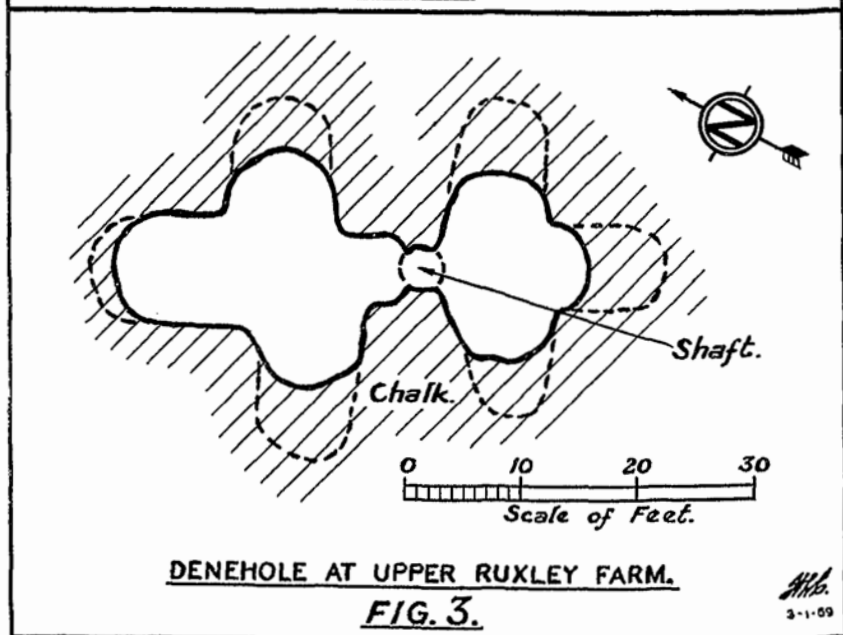
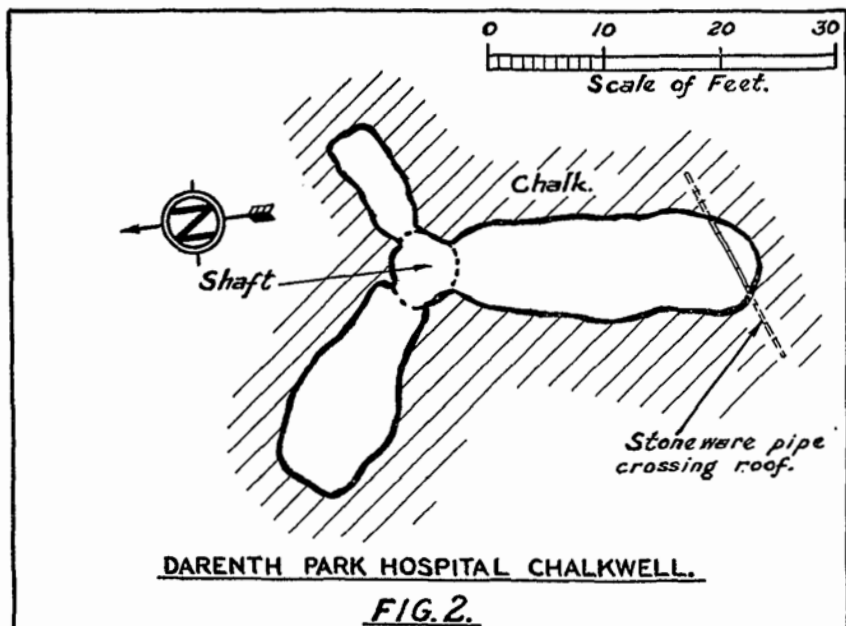
SECTION A-A.



J.E.L. CAIGER. Jan. 1953

**FIG. 1.**

SOME EARLY CHALKWELLS IN N.W. KENT



## SOME EARLY CHALKWELLS IN N.W. KENT

The chalk here lies only a few feet below ground level. Fig. 2 shows the underground plan of the chambers which were roughly hewn, for no attempt to dress off the chalk in a smooth fashion had been made. From the pick impressions left in the chalk walls and roof, it was noted that one pick was of a heavy square-section, whilst a second lighter pick had also been employed in cutting out the chalk.

The South chamber was longer and on a larger scale than the other two, and at the distant end of it a stoneware soil pipe obliquely crossed the chalk roof; the pipe would have been laid 70 years previously when this particular hospital block was erected and presumably the presence of these chambers was unsuspected during that period of construction and pipe-laying.

At no point was it possible to locate the original floor level as all three chambers contained large quantities of clay and chalk rubble, due to earlier attempts to fill them.

### THE NURSTEAD CHALKWELL

The position of this excavation is N.G.R. TQ629685 in a corner of a field farmed by Mr. Farries, where the underlying chalk bears an upper layer of clay-with-flints some 6 ft. in depth.

The surface of the field had subsided at this spot into a shaft 4 ft. wide and some 14 ft. deep. At that depth two chambers had been cut into the chalk sides of the shaft leading off north and south approximately. The south chamber could not be entered due to soil entirely blocking the opening, the arching of its roof alone being visible. It was clear however, that the roof of this chamber had collapsed during the storm and a large depression on the field surface nearby was noted bearing testimony to this fact. By measurement the north chamber was found to be 14 ft. long and 6 ft. wide, the finish overall was very roughly executed. Large fissures were visible in the roof and it was apparent that this chamber too, was on the verge of collapse; it was almost filled with clay and rubbish, evidence of an earlier attempt to fill it up.

A similar excavation was examined on farmland at Southfleet in 1955 by members of The Gravesend Historical Society.<sup>1</sup> They found that this shaft had, like the Nurstead example, been deliberately filled. It is interesting to recall that John Bannister of Horton Kirby, writing in 1799,<sup>2</sup> describes the manner in which chalkwells were excavated in his time. Significantly Nurstead and Southfleet are only a few miles distant from Horton Kirby and therefore it would appear most likely that these two chalkwells were sunk during the latter part of the eighteenth century and in the lifetime of John Bannister.

<sup>1</sup> *Gravesend Historical Soc. Trans.* 1955-6.

<sup>2</sup> *A Synopsis of Husbandry.* John Bannister.

## SOME EARLY CHALKWELLS IN N.W. KENT

The perilous nature of this work and the outlook of the men who performed it is aptly described by this eighteenth century writer who states : " Obstacles to this work sometimes fall out from the light contexture of the soil which does not infrequently give way to the destruction of the chalk drawer.

"These accidents render this profession extremely hazardous, but as the people who embark in it entertain but little thoughts of a future period, and since the chief end of their pursuits is the obtaining of a liberal supply of drink ; if this end be answered they bestow little attention to the hazards of their profession and for this reason there are never wanting a race of men for the performance of this perilous undertaking."

### THE GRAVESEND CHALKWELL

During the course of clearing and excavating some ground adjacent to Whitehill Road, Gravesend, prior to the erection of a block of garages, an unusually large and very deep triple-chambered chalkwell was discovered.

The discovery was made by Mr. Whiting the contractor in charge of the building work who reported the facts to the Gravesend Borough Librarian.

The shaft lies at the junction of the Thanet Sand and Upper Chalk, N.G.R. TQ654728.

Footings cut by the contractors had revealed the presence of a ragged entrance shaft which formerly had, at a depth of some 6 ft. below ground level, been sealed off by a skew-arched brick cap set into the chalk. Soil erosion, due to rainwater seeping between the arch setting and shaft had caused part of the arch to collapse, leaving the shaft partly open. This fracturing of the arch must have occurred a considerable time ago, as the writer was informed by a nearby householder that he had been disposing of rubbish at this spot for 30 years, not realizing that a very deep pit-fall lay concealed in the brambles.

Unfortunately, before the shaft could be descended and thoroughly examined the contractors had dumped about 500 tons of site clearance spoil into the newly found shaft.

As the descent was considered to be somewhat hazardous, the Gravesend Civil Defence very kindly volunteered to arrange for this to be done by means of heavy rescue tackle with an expert lowering party at the surface. By this means the writer, his wife and Messrs. Whiting and Tilley were lowered singly in a rope harness on the evening of the 29th July, 1958.

After passing through the partly destroyed brick capping, the shaft was measured and found to be 5 ft. diameter and it descended vertically

## SOME EARLY CHALKWELLS IN N.W. KENT

for a distance of 35 ft. At this depth three narrow openings only 2 ft. 6 in. wide and equally spaced had been hewn outwards from the central shaft. These three openings each gave access to separate wells which formed a cluster around the shaft but did not communicate with each other.

An enormous cone of sandy debris from the recent dumping sloped steeply downwards to the extreme end of each well but it was found possible to descend over this and down to the bottom of one of the wells. Fig. 1 shows details of this chalkwell both in section and in plan. The loftiness of the chambers can be judged by the vertical black line shown in the section, which represents the height of an average man.

The well which was examined was found to be nearly circular and 18 ft. in diameter. Despite the recent filling, measurements showed that the roof of this well was still over 30 ft. from the edge of the present spoil heap. By computation each well would originally have been at least 50 ft. deep, when a due allowance for the present known dumped spoil has been taken into consideration. From the dimensions of these three wells, it can be reasonably calculated that approximately 2,400 tons of chalk have been extracted from this chalkwell.

The tooling on the walls of the well was roughly executed and many impressions left by the picks were still visible. "Plasticine" casts of these impressions showed that at least two different types of small, square-section iron picks had been employed in winning the chalk.

Reference to Fig. 1 shows that the excavators of this chalkwell were experienced enough to ensure a good degree of stability and structural strength to their mining by leaving three large chalk pillars at the entrances to the wells and a generous camber to the roofs.

There is some evidence for approximately dating this Whitehill Road chalkwell. As previously stated, the entrance shaft had purposely been sealed by the construction of a skew-arched brickwork cap and it is quite apparent that this arch must have been set in position at some later period when chalk mining had ceased and the presence of the shaft would prove a dangerous pit-fall in its surrounding.

The bricks used in the arch were of a deep red colour, set in a strong brown mortar, and from their colour, size and setting, one may judge that the arch was constructed and the shaft sealed off in the seventeenth century.

The existence of two other chalkwells is known in the immediate neighbourhood at Combe Road and these, too, were accidentally discovered during the work of clearing away woodland for a school playing field in June 1950, but unfortunately they were not examined.

The general proportions of this Gravesend chalkwell resemble in some ways an excavation discovered on private property at Irene Road, Orpington, in 1953.



## SOME EARLY CHALKWELLS IN N.W. KENT

In common with the Gravesend example this also had at an earlier period been sealed by the construction of a bricked dome near the top of the shaft upon which had been placed many thousands of chalk flints to consolidate the structure. Rainwater seeping down behind the brick dome and entering the shaft had undermined the structure to such an extent that it had ultimately collapsed into the shaft which was 70 ft. deep. At the base of this shaft three chambers were visible, one of which was estimated to be 16 ft. in width. The Borough Engineer of Orpington who examined the excavation was of the opinion that the brickwork dome had been constructed over the shaft some 200 years previously.

It has been previously stated that the amount of chalk extracted from the Gravesend chalkwell was at least 2,400 tons, and this tonnage alone is exceptionally high, but when the possible quantities of chalk removed from the two associated chalkwells at Coombe Road are also taken into consideration the combined amount is far in excess of; and quite contrary to, any recorded tonnages used by farmers for purposes of field dressing.

Bearing in mind that for economic reasons the chalk would be used in their immediate neighbourhood it would appear most unlikely that these three wells were all specifically dug for agricultural chalk alone.

The remote possibility that they were intermittently worked for chalk over a long period of time cannot of course be entirely precluded. Another and more likely explanation may be postulated however, as to their problematical use.

It is known that these chalkwells were sited on lands belonging to the old Manor of Parrock and it is possible that the chalk was mined and used for building material; such building chalk when used for this purpose is usually described as "clunch". Evidence is available that this material was not always obtained from open quarries for the practice of mining it from chalkwells is recorded at West Wycombe<sup>1</sup> as late as the middle of the nineteenth century. The record states that the block chalk was mined from wells sunk in the fields and drawn up by the aid of a windlass; it was then cubed and dried prior to using.

A late Mediaeval chalk-mine<sup>2</sup> was discovered at Thetford, Norfolk, in 1949 and had been used for excavating good quality chalk clunch. Pottery found in the chambers suggested that the mine was in use during the late fifteenth and early sixteenth centuries.

### A DENEHOLE AT UPPER RUXLEY FARM

On the 6th September, 1958, a deep shaft suddenly appeared in an orchard at Upper Ruxley Farm, N.G.R. TQ496704.

<sup>1</sup> *Notes and Queries*. 2nd series. XI, 167.

<sup>2</sup> *Norfolk Archaeology*, XXX, 220.

## SOME EARLY CHALKWELLS IN N.W. KENT

Less than half a mile to the north of this location lies Joyden's Wood, an area notable as formerly containing over a hundred of those deep excavations known as deneholes.

Their general proportions and degree of workmanship are of quite a different form to the chalkwells described above.

In this district these shafts with their underground caves were first noted by William Lambarde<sup>1</sup>, writing in 1570.

A large proportion of them are grouped in a small copse known as Cavey Springs and an area formerly known as Stankey Wood which together once formed part of Joyden's Wood. The greater number of these shafts are now fallen in or have been deliberately filled up and exist only as depressions in the ground. There still remain, however, many deneholes scattered throughout the wood which are still open, and it is apparent that they are directly associated with the many earth works, lynchets, bank and ditch systems which abound within this wood.

A. H. A. Hogg in a paper published in *Archæologia Cantiana*<sup>2</sup> has shown that these earthworks belong to four distinct periods. Many of the deneholes have been sited at the corners and along the boundaries of the field systems which have been described by Hogg as belonging to Period III.

Recent excavations within the large square earthwork<sup>3</sup> whose banks in certain cases overlie those of Period III and are therefore later, has revealed a complex of buildings dated between 1280 to 1330 A.D. This earthwork constituted Period IV and was probably the final medieval settlement in Joyden's Wood. From these facts it can be firmly established that these deneholes can be dated to a period earlier than 1280.

The existence of the denehole at Upper Ruxley Farm was entirely unknown to Mr. Woods, in whose family the farm has been for the past hundred years.

A narrow shaft just 3 ft. in diameter had been sunk through the Thanet Sand to a depth of 38 ft. At this level the usual Bull-head layer of flint which marks the junction of Thanet Sand and chalk was encountered. After continuing downwards for a further 4 ft. the shaft had been opened out into two sets of chambers. Arranged diametrically opposite down the shaft were roughly cut footholds in the Thanet Sand at 18 in. intervals. These footholds are a prominent feature associated with deneholes and are never seen in chalkwell shafts. The chambers, six in number, were of clover-leaf shape, three being grouped on either side of the shaft. It was quite apparent that this denehole had at some period been deliberately filled up, as all six chambers had a sandy

<sup>1</sup> *A Perambulation of Kent*. Ed. 1826, W. Lambarde, 401.

<sup>2</sup> *Arch. Cant.*, LIV, 10.

<sup>3</sup> *Arch. Cant.*, LXXII, 18.

soil filling in them almost to roof level. Fig. 3 shows the arrangement of these chambers and their size. The dotted outlines indicate the probable maximum extent of the chambers. Due to the high soil level and lack of headroom it was impossible to examine closely the distant end of each chamber but an excellent degree of dressed finish was visible on the upper walls and the roof.

It is pertinent to note that John Dunkin<sup>1</sup> writing in 1844 specifically mentions the area of the farm as containing many deep underground pits which frequently subsided, to the consternation of the farmer and his ploughmen. Apparently the farmers of that period had no knowledge of their whereabouts or the purpose of these excavations. John Dunkin mentions that a ploughteam had passed over an unknown shaft in a pea field and a few days later the filling collapsed and revealed a shaft 60 ft. deep. He also mentions that other pits had been deliberately filled in "many, many years ago". From the same source it is recorded that farmers of his day attempted to fill up these shafts when they appeared in their fields and in one specific case he quotes that over 200 loads of soil were used in a vain endeavour to achieve this end. In view of John Dunkin's statement it seems likely that this denehole shaft may have received the major part of its huge infill during the early nineteenth century.

<sup>1</sup> *History and Antiquities of Dartford*. John Dunkin, p. XIX.