

A MAIL SHIRT FROM THE HEARST COLLECTION

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A MAIL SHIRT FROM THE HEARST COLLECTION¹

By E. MARTIN BURGESS

THIS mail shirt, which was in the Hearst Collection and is now in the Armouries of the Tower of London, dates from the fourteenth century. By tradition it was the property of Rudolph IV, Duke of Austria, Carinthia, and Ferrette (1339-65), but, as far as is known, there are no records to prove this. It is, however, a fine, early shirt which is well worth recording.

The shirt is constructed of alternate rows of riveted and whole rings, of rump length, with a wide and rather square neck opening and three-quarter length sleeves. Brass rings are used for decoration, two rows on the rump edge and three on the sleeve edges.

A collar of heavy fifteenth-century mail has been added at the neck, but this is a 'restorer's' addition as it has been linked on with cut rings from the collar. This is a type of shirt which would not have had a high collar.

DESCRIPTION OF THE RINGS

Recorded thickness of wire (in inches to the nearest thousandth)

Whole rings.

Centre of trunk: 0.045, 0.0455, 0.038, 0.049, 0.021.
Recorded variation: 0.028.
Average: 0.04.
Lower sleeve: 0.043, 0.037, 0.037, 0.03, 0.037.
Recorded variation: 0.013.
Average: 0.037.

Riveted rings.

Centre of trunk: 0.048, 0.0485, 0.0485, 0.049, 0.048.
Recorded variation: 0.001.
Average: 0.048.
Lower sleeve: 0.034, 0.03, 0.034, 0.033, 0.034.
Recorded variation: 0.004.
Average: 0.033.
Brass rings: 0.048, 0.021, 0.018, 0.02, 0.021.
Recorded variation: 0.003.
Average: 0.02.
(0.048 is in the rump fringe and the rest are in the sleeve borders.)
Attached collar: 0.076, 0.085, 0.076, 0.078, 0.078.
Recorded variation: 0.009.
Average: 0.079.

¹ The writer is indebted to the staff of the Armouries of the Tower of London who more than once took the shirt off exhibition and to the Ministry of Works by whose kind permission the photographs of it are here reproduced.

Recorded diameter of rings (where riveted, recorded parallel to rivet joint)

Whole rings.

Centre of trunk: 0.499, 0.511, 0.478, 0.522, 0.501.
 Recorded variation: 0.044.
 Average: 0.502.
 Lower sleeve: 0.487, 0.477, 0.484, 0.478, 0.471.
 Recorded variation: 0.016.
 Average: 0.479.

Riveted rings.

Centre of trunk: 0.497, 0.509, 0.501, 0.501, 0.510.
 Recorded variation: 0.013.
 Average: 0.504.
 Lower sleeve: 0.472, 0.425, 0.472, 0.466, 0.462.
 Recorded variation: 0.047.
 Average: 0.479.
 Brass rings: 0.458, 0.463, 0.481, 0.477, 0.481.
 Recorded variation: 0.023.
 Average: 0.472.
 Attached collar: 0.497, 0.47, 0.481, 0.461, 0.489.
 Recorded variation: 0.036.
 Average: 0.48.

The whole rings

All the whole rings are of iron and all are punchings from a sheet. The sheet used for the lower half of the arms, where the mail is lighter, was thinner than that used for the main construction. The rings in the lower sleeve were punched out with a smaller punch than that used to produce the rings in the centre of the trunk but the internal diameter of each ring remains about the same, which causes the ring wire to be narrower as well as thinner than that in the main construction. The same internal diameter also ensures that the same number of rings cover the same area, and a constriction is not produced at the change-over from one type of ring to another. The rows of whole rings slope to the left.

The riveted rings

The riveted rings are made from flat section drawn wire, the lower sleeve rings being drawn down farther than the rest. This fact is clearly shown by the measurements given above which also indicate that care was taken to match the brass to the iron wires.

All the rivets, in both brass and iron rings, are of iron. They are of the wedge type with their rectangular backs flush with the ring surfaces facing inwards. The direction of overlap of the rings is anti-clockwise.

THE CONSTRUCTION OF THE SHIRT

The brass decorations

The rump edge is decorated with two rows of brass rings. The sleeve edges are decorated with three rows of brass rings running round the sleeve and fixed at right angles to the rows in the sleeve. All the brass rings are riveted.

Irregular rump edge

At some time in its history some rows have been removed from the rump edge of the shirt just above the brass border. This was not done all the way round the border and at some time the two rows of brass rings must have hung down as a loop almost detached from the shirt. It is fortunate that it did not become quite detached or it would have been lost and no evidence would remain either of the brass border or of the original length of the shirt. However, in an attempt to restore the shirt, probably at the same time as the addition of the collar, the brass border was linked up to the body once more but the rows that had been removed were not replaced. Instead oriental mail rings, their rivets broken open (this would not have been so easy had fourteenth- or fifteenth-century European mail rings been used), were employed to join on the brass border. This accounts for the irregular rump fringe, there being two more rows on the right than on the left.

The shape of the shirt

Because of the irregular rump fringe the last row of iron rings on the left was chosen for the bottom counting row. This is the third row on the right. The bottom counting row contains 161 rings. The top counting row, the first whole row under the arms and the 73rd row from the bottom counting row inclusive, contains 172 rings inclusive. The rump edge, therefore, is 11 rings smaller in circumference than the chest.

There are 4 sets of increasing idle rings near the rump edge, in the centre of the front and back and at each side, to form an expansion for the hips. There are 2 of these idle rings at the back on rows 6 and 10 from the bottom counting row (pl. xxi, *c*). There are 3 idle rings in the front on rows 6, 10, and 14 (pl. xxi, *a*). There are 2 idle rings on the left side on rows 6 and 10 (pl. xxi, *d*). There are 4 idle rings on the right on rows 2, 6, 10, and 14 (pl. xxi, *b*). This would make a total addition for the hips of 11 rings but, as can be seen on pl. xxi, *b*, there is also one reduction at the back to the left of the increases placed in row 2. There is another decrease in the front a little to the right of the 3 increases also placed in row 2. The total increase for the hips is therefore 9 rings.

The decreases for the waist are in two lines of idle rings which slope upward and outward on the back of the shirt (pl. xxi, *c*). These lines are not placed at the same height, the right-hand one being lower than the left-hand one. The lines decrease at the rate of one idle ring to every 4 rows, but in the left-hand line there is a break in the continuity half-way up. The right-hand line starts on row 30 and goes up to row 66, producing 10 idle rings one to every 4 rows. The left-hand line starts on row 34 and ends on row 72; 5 idle rings, one to every 4 rows, then a gap of 5 rows and then another 5 idle rings, one to every 4 rows. There are 46 rings between the tops of the lines of decreases and 30 rings between the bottoms. This can only be an approximate count because the ends of the lines are not situated in the same rows. This completes the description of the change of shape in the counted section. The row reductions under the right arm (pl. xxi, *b*) do not affect us here because row changes and the idle rings produced by them do not change the ring breadth of a mail structure. For the counted section then,

the total increase at the rump edge is 9 rings. The total decrease at the back is 20 rings. Therefore 11 rings have been subtracted which is the already counted difference between the top and bottom counting rows, so all the changes of shape in this section have been found.

Shoulder-blade expansion

On each shoulder at the back there are 10 idle rings, one to every other row, increasing for the shoulder blades and the hunching forward of the shoulders. The left-hand increase starts on row 92 from and including the bottom counting row, but the right-hand increase starts on row 90 due to row changes in the back.

Unusual row changes

In the centre of the back between the shoulders (pl. xxi, *c*, marked with a diamond) rows 91 and 93 from and including the bottom counting row on the left are removed with the hole-type row reduction producing 2 idle rings.¹ This accounts for the shoulder-blade increases not starting in the same row on both sides.

Under the right arm (pl. xxi, *b*) 4 rows are taken out in pairs by the knot type row reduction and instantly put in again, but the 4 idle rings produced, one to every pair of rows removed, in no way affects the count of ring circumference of the shirt.

The sleeves

Both sleeves have a top circumference of 82 rows and a bottom circumference of 66 rows. The 16 rows are taken out in pairs with the hole type row reduction on the underside of the arms² (pl. xxi, *b, d*). From the neckband, to, but excluding, the brass border, the left sleeve is 61 rings long and the right sleeve is 62 rings long. These counts were made in the riveted rows which slope to the shoulder on the left sleeve and, in the upper arm, slope from the shoulder on the right sleeve. Of the 61 and 62 rings the bottom 32 in each row are of thinner and narrower wire which makes the lower part of the sleeves much lighter and more flexible. In the right sleeve at the change of one wire to another the riveted rows become rows of whole rings and the rows of whole rings become riveted rows (fig. 1).

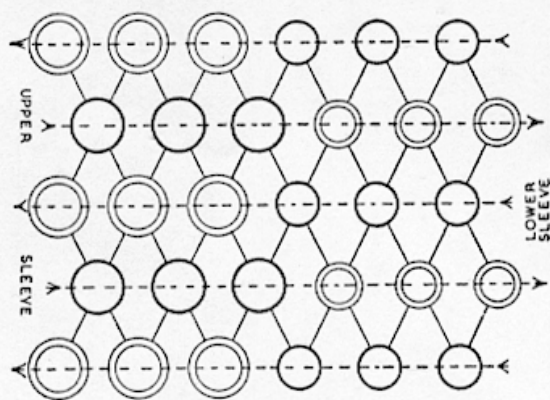


FIG. 1

The arm-pits

Under the arms the sleeve rows join the trunk rows at right angles. The ends of

¹ *Antiq. Journ.* xxxiii (1953), pl. xxiii, *c*, and fig. 6. The basic structures and methods of production of mail cannot be explained again here and readers who do not fully understand them should turn to *Antiq. Journ.* xxxiii, where they will find

the basic techniques set out in diagrammatic form and described.

² On the left arm one pair, not shown on pl. xxi, is on the outside of the sleeve near the elbow.

the alternate rows in the sleeve being linked to one and two rings in the body alternately.¹

The neck-band

There is a neck-band 5 rows deep across the shoulders where the sleeve rows meet it at right angles with a similar structure to that found under the arms. Each alternate row, the riveted rows in the sleeves, links to one and 2 rings in the neck-band alternately. The first row in the neck-band, probably the original neck edge, is of whole rings, so the fifth row must also be of whole rings, and this is why the riveted rows in the sleeves must be used to link to it.

The later collar

Above the neck-band a collar of fifteenth-century mail, 10 rows deep, has been added by cutting the rings in the 10th row and linking them to the first row in the neck-band. This is a modern alteration and the front of the neck may have been cut open at the same time. The type of shirt with a narrow neck-band and a square neck opening does not usually open down the front, for the neck opening is always large enough for the head to be thrust through. On this shirt, however, there is now an opening in the front of the neck 32 rows deep starting on row 76 from the bottom counting row and including the later collar.

CONCLUSIONS

The shirt is a fine one in good state and the constructional plan revealed by the analysis shows that it belongs to the same tradition as the Ernart Cowein shirt (no. 920 in the Wallace Collection)² though probably at an earlier stage of development. The number of increases and decreases at the back is rather larger than usual, there being 10 in each group, but there is no clump of reductions in the small of the back and the expansion for the hips is much smaller than usual, an increase of only 9 rings. Except for 3 increases and one decrease near the bottom there is no expansion or contraction in the front of the shirt at all. The alternate rows of riveted and whole rings are usually regarded as a fourteenth-century sign and it is for this reason that the shirt can be placed in the fourteenth century though, as far as is known at the moment, the shape of the shirt might equally belong to the first few years of the fifteenth century before the thickening of the ring wire starts to take place.

It is now time to discuss more fully the use of whole rings in a mail structure and to explain the reasons for their disappearance in Europe in the late fourteenth or early fifteenth centuries. Early mail of Roman origin such as the first- or second-century mail from Carlingwark Loch³ or from Newstead⁴ is of quite different construction to later mail in Europe, but it *is* made with alternate rows of riveted and whole rings. Until further evidence has been collected it is safe to assume that

¹ *Ibid.* xxxvii (1957), 203, fig. 4.

² *Ibid.* xxxiii (1953), pl. xxiv.

³ *Proc. Soc. Ant. Scot.* lxxxvii: 'Three Metal-

work Hoards of the Roman Period from Southern Scotland' by Stuart Piggott, V-P.S.A.

⁴ Curle, *Newstead*, p. 161; pl. xxxviii, 10.

the use of whole rings was the common practice and that it continued up to the end of the fourteenth century. The reason for the use of whole rings at the beginning of the mail-makers craft was probably as follows. When wire drawing, punching, and riveting were difficult it is easy to understand why mail-makers wished to use as few riveted rings as possible. Not only would the labour of riveting be halved but the work could be subdivided. One man could be employed, with punches and sheet or ribbon metal, stamping out the whole rings. The only disadvantage was that the craftsman who built the finished garment had to link his riveted rings, not only through the 'whole' row in the garment but also through the next 'whole' row below the one he was actually working on. In other words each riveted ring had to be linked through four others before it was riveted. These rings tended to get in the way and hamper the work.

The method also produced an attitude towards the finished product in the craftsman's mind. He had to think of two rows at once as he was working and his designs had to take this into account. The right sleeve of the Hearst shirt is an example of the troubles that can result from the use of whole rings. One of the factors which controls the build-up of a mail garment is 'row slope'. If the first row slopes to the right the second must slope to the left and the third to the right and so on. Two rows with the same slope cannot be linked to each other, so if whole rings are to be used in alternate rows then the whole rings will always slope the same way in any one garment. In practice they usually slope to the left, which in turn is probably dependent on the direction of overlap of the riveted rings at the rivet joints, and this direction must remain constant because of the methods used to manufacture the riveted rings themselves.¹

From all this it can be seen that though the use of whole rings may reduce the physical labour of constructing a garment it restricts the mail-maker in the number of patterns he may use as well as very much increasing the brainwork involved. However, it was probably not these disadvantages which brought about the change at the end of the fourteenth century.

By the fourteenth century the riveting technique had been perfected and the objection to having all the rings riveted must have largely disappeared. In the opinion of the writer the greatest difficulty encountered when riveting was the punching of the rivet holes. A fine mounted steel punch was required for this and, judging by results, these punches were giving very little trouble long before the change to all riveted rings was made. Wire drawing had also improved so the all-riveted shirt was a much more practical proposition.

The change, however, must be regarded as part of the other rapid changes that were going on in the production of arms and armour in the second half of the fourteenth century. The mail-maker, every now and then, was required to produce mail of an exceptionally dense texture. Density of texture not only depends on the size of the rings but on the thickness, and breadth as well, if it is a ribbon wire, of the wire employed in relation to the internal diameter of each ring. Maximum density, and therefore greatest strength, depended, not on the desired flexibility of the finished product but on the minimum space through which each ring could

¹ *Antiq. Journ.* xxxiii (1953), 48-55.

still be linked before it was riveted and the accessibility of each rivet point after it had been so linked. As has been stated above, when whole rings are used each riveted ring has to be passed through four whole rings before it is riveted and this cannot be done if a really dense texture is desired. If, however, all the rings are riveted then each ring at the time of linking will only have to pass through two others, and there will be no second row to fold back while the ring is being riveted.

As the demand for denser mail increased a point would be reached in each workshop where the whole ring punches would cease to be used and now that the mail-maker need only think of one row at a time the alternate row technique would not be used again. This natural evolution must have taken place quite slowly all over Europe, but it probably happened quite suddenly in each workshop as punches, now little used, were broken or lost.

To return to the Hearst shirt: alterations always tend to obscure the original plan, but in this case they are not extensive enough to prevent a full examination and it is easy to see what has been done in recent times. It may have been thought, when the collar was added, that the shirt once had a high collar and that it was missing. Though fourteenth-century shirts with high collars do occur, the usual form is to have a wide and rather square neck opening. If an aventail was to be worn over it the aventail would come right down over the shoulders and a collar might not be necessary.

There are certain features about the original construction which are exceedingly hard to explain in the light of our present knowledge. There are at least two quite different possible explanations for the irregular expansion of the hips with some rings actually taken out again. It is possible that the maker changed his mind about how many increases he required. It will be noticed, however, that all the decreases here are at a lower level than the increases and this once again raises the important question of where the maker started when he began to build a shirt. Naturally the neck opening and the arm junctions are the most difficult part and the work might be simplified if the shirt was started at the bottom and there was a solid piece to build on. If this shirt was started at the rump fringe with a brass border and built up the body then the maker would have to be decreasing though he would have increases in his mind. An absent-minded worker might start his increases as decreases in this way and then correct the fault higher up.

The row changes under the right arm and in the centre of the back are much harder to explain than the irregular increases for the hips. Unless our beliefs about the build-up of a shirt are fundamentally wrong, and at the moment there is no reason to suppose that they are, then these row changes can hardly be accidental. The reduction of rows, especially when alternate rows are composed of whole rings, has to be a quite deliberate act. If, then, the row changes are deliberate they must have been carried out for some definite reason. If the shirt was made for some individual who carried his left shoulder slightly higher than his right, then he would require extra rows above the waist on his left while a droop might occur under the right arm. Adjustment of the design to fit such an individual might produce row changes similar to those found in this shirt. It is, however, difficult to see what difference would be made by only two extra rows on the left. The

removal of four rows for a very short distance under the right arm certainly does lift the level of the rows slightly (pl. *xxi*, *b*).

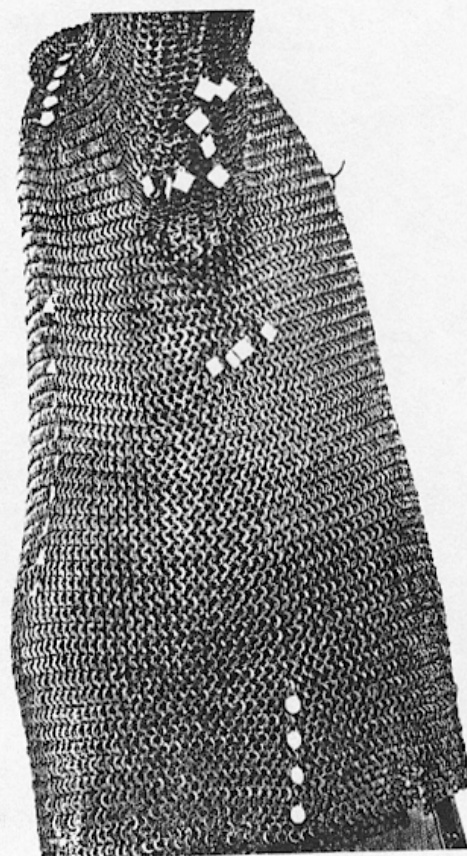
A mail shirt of this type was never a close fit as it was usually worn over a considerable thickness of padding which tended to blur any irregularities, short of real deformity, in the body underneath. Most mail-makers, however, seem to have been over-conscious of the body form and really did try to make a well-fitting garment. The trouble taken over these row changes does not agree with the somewhat slipshod hip expansion, and it may well be that there is some hidden error in the shirt which compelled the maker to make the best of a bad job which would be quicker for him than pulling his work to pieces and correcting the fault.

The differing length of the sleeves is explained by the change from riveted to whole rings in any row at the change of ring weight on the right sleeve. The sleeves are terminated at both ends by borders of rings running at right angles to the sleeve rows and these borders must be fixed to sleeve rings of the correct slope. The changes on the right sleeve are probably the result of building the lightweight lower sleeves first and joining them on afterwards. Riveted rings would be used for this and the edges to be joined would have to have the correct row-slope. If the lower sleeves were identical one would be incorrect and a change of ring at the join would be the only way to join them on.

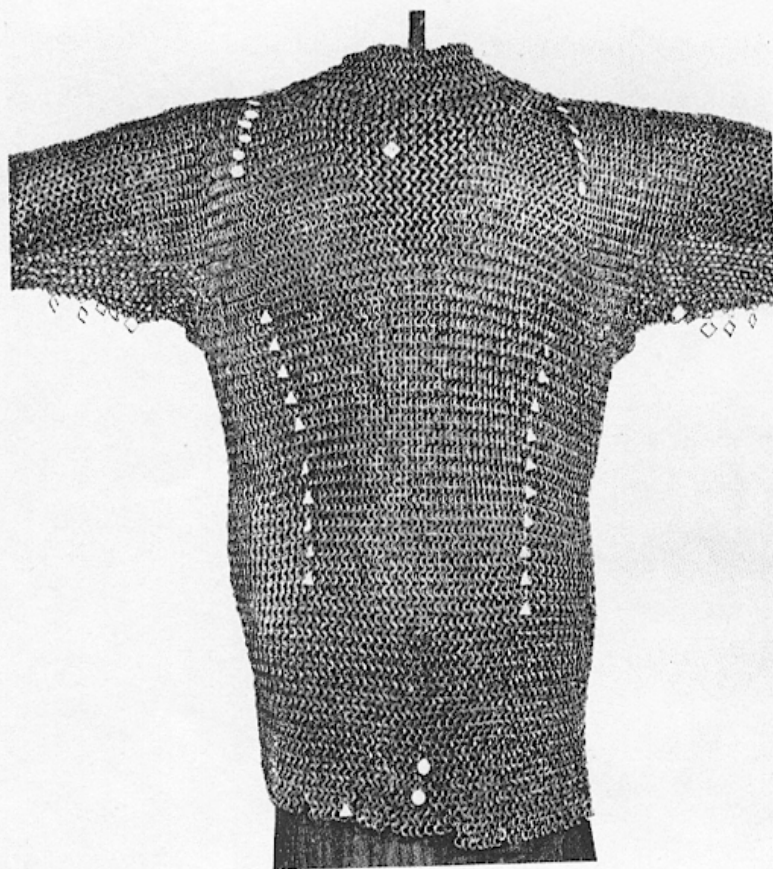
This fine shirt is spoilt by the modern additions and repairs. Its appearance would be much improved by the replacement of the missing rows in the rump fringe by rows of butted rings similar in appearance to the original rings. Also there is no reason why the fifteenth-century high collar should not be removed. It is a fine piece of work in its own right, but it is quite out of place here fixed as it is to a shirt which already has its own border at the neck. It might then be possible to see if the opening at the front of the neck is original and, if not, to close it up again.



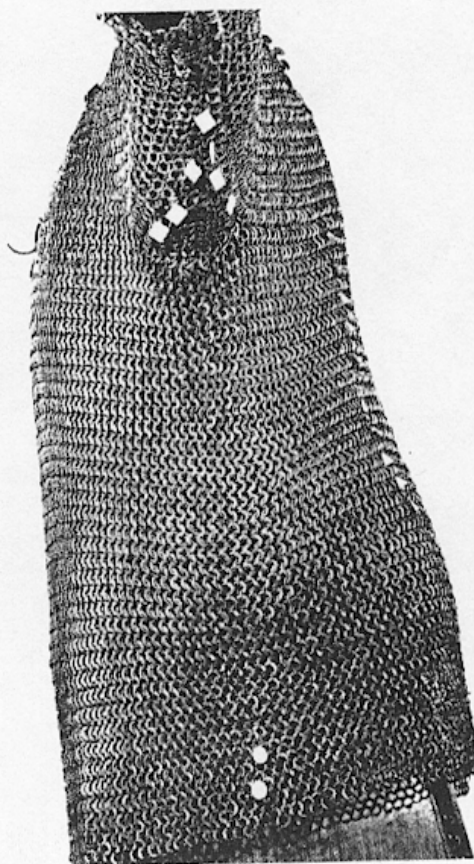
a. Front



b. Right



c. Back



d. Left

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