

THE HAT MAKING INDUSTRY OF SOUTHERN GLOUCESTERSHIRE
(including FELTMAKING)

This Annex has been added (in 2009) because evidence has just emerged that more of our Cope ancestors than was originally thought were involved in this industry. I will add further information about that at the end of the Annex.

In the September 2007 issue of "Journal of the Bristol and Avon Family History Society" of which I'm a member, there is a very interesting article entitled,-

"The Forgotten Gloucestershire Hatters of 1841" by Chris Heal. (chrisheal@freent.net)

Hatting could almost be called Gloucestershire's forgotten trade. Two hundred years ago it was the lifeblood of a small number of villages close to Bristol. Any genealogist seeking relatives in Winterbourne (especially Watley's End), Frampton Cotterell, Rangeworthy, Oldland Common or Bitton will be likely to have bumped into the hatting trade. Yet, by the 1870s, just the old men were clinging on and, with their gradual deaths, the trade slipped away and out of living memory. Felt hats were once essential wearing apparel: no man, whatever his calling, agricultural labourer or city merchant, would be seen outdoors (and very often indoors, too) without an appropriate head covering. In the prime days of the industry, the Government even saw fit to pass laws requiring the wearing of hats on certain days in order to support complaining hatters.

South Gloucestershire hats were seldom finished ready to sell except for a small local cheap hat trade. Instead, felted 'bodies' ready for shaping, dying and finishing were sent to the great fashion hatmakers of Bristol and, in London, of Bermondsey and Cripplegate. In 1824 parliamentary papers, it was claimed (probably excessively) that all the Gloucestershire hatting masters were on commission to London firms. Frampton Cotterell produced at one time the renowned tall broad-brimmed 'beavers' made in part from Hudson Bay Company beaver fur, and later switched to silk hats. From Rangeworthy, there was also a steady flow of 'Wide-a-wake' slave hats for the West Indian plantation supply ships timed to arrive for the annual sugar cane cutting season.

While many of the feltmakers worked initially as a cottage industry, usually on their own account, there was a move at the beginning of the 19th century into local factories. The local workshops of London-based international hatting concerns Christy, Hall, Moore, Powell and Vaughan increasingly dominated and they were supported by sub-contracting Gloucestershire men like Bryant, Howes, Jefferies, Maggs, Short and Simmonds. Lieutenant Colonel John Christie-Miller, scion of the most illustrious and largest of English hatting firms, Christy & Co, recalled: "We gave work out to be made up in cottages and country farms where families worked as teams. We bought the products from them and marketed them in London and other big cities. The country labour was cheaper than the labour from the big towns."

In his 1936 book 'Winterbourne, Gloucestershire', Dr C.H.B. Elliott records an old hatter remembering 500 hatters from Winterbourne and Frampton Cotterell meeting in a field by the quarry in Swan Lane to discuss their trade rules. Others have ascribed this meeting to 1875 which would appear consistent. However, by this time, the local hatting trade was in its death throes and rules would not have been their preoccupation, but rather putting bread in their mouths as forces far beyond their control changed the industry and their lives. Regardless, it remains doubtful whether, even in its heyday, the combined hatters of Frampton Cotterell could raise this number in one place. In 1761, the Whit Monday Frampton Cotterell feltmaker's procession numbered "to the amount of 70 and upwards". The purpose of this article is to discuss the size and spread of the Gloucestershire hatting trade in 1841 and those who worked in it based on that year's first great modern census. One of the hidden delights of the census is paradoxically the main reason why the new censuses were put in place: to provide information for Government from which national and long-term planning decisions could be informed. So, for 1841 as in later years, among many other overviews, there is an Occupational Abstract which gives fascinating and seemingly quite accurate information.

In 1850, journalist and founder of 'Punch Magazine' Henry Mayhew wrote entirely on hat making in one of his many detailed and fascinating letters for a survey of 'Labour and the Poor' in the metropolitan districts of London for the 'Morning Chronicle' newspaper. Mayhew noted on the 1841 census abstract: "The Government returns do not admit of any comparison being made with those of the previous census; for, in the Occupation Abstract of 1831 (taken without individual identification), the hatters are mixed up with the hosiers. In 1841, the hatters are given by themselves and hosiers are classed with haberdashers. Nor can we separate the last two mentioned

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trades. For on referring to the first abstract we find that the haberdashers are there jumbled together with the linen-drapers; so it is a matter of absolute impossibility to say whether the trade increased or not." The 1841 census, therefore, provides the best and earliest complete point of reference on the hatting trade. That year, there were 984 hatters in Gloucestershire out of an English total of 16,635, placing the county fifth in hatting strength (6%). This total declined steadily, increasingly sharply in subsequent decennial censuses. So, where did Gloucestershire's 984 hatters live and work in 1841? There were three great centres outside of the Gloucestershire main towns: Bitton and Oldland Common with 195 hatting trades people, Frampton Cotterell with 194 and Winterbourne with 171. In some respects, it is hard to differentiate the factories in Frampton Cotterell with their counterparts in the hamlet of Watley's End. The two areas are connected by a 10-minute walk along a packhorse bridleway across the River Frome but there was surprisingly little intermarriage between families who could wave to each other across the valley.

Rangeworthy with its own long-established tradition had 26 men working mainly under Isaac Amos as an offshoot of Christy's Frampton factory. In Iron Acton, 20 men worked around the hat manufactory of Charles Roach. There were further small groups at Westerleigh, Mangotsfield, Siston and Bristol St George, but these were almost entirely clustered on the parish edges and could properly be seen as part of the big three hatting concentrations. Undoubtedly there has been a (very) small proportion of error in reading the 1841 census. Some of its filmed pages are now very faint even with modern enhancement techniques. Equally, some of the writing requires the patience of a saint and arbitrating, for instance, between 'hatter' and 'haulier' and 'hallier' has occasionally led to reliance on probability. However, 678 of the 984 (69%) Gloucestershire hatting force has been now identified by name. A trawl, yet to be made, through all of the Bristol parishes, especially in the hatting centre around the Castle, would certainly take this number very close to its Occupational Abstract figure. Within the 69% of individuals already collected for 1841, there are 678 surnames. Some hatting 'dynasties' begin to appear, many with long-standing Gloucestershire surnames: Allsop, Amos, Andrews, Bailey, Brown, Bryant, Cook, Curtis, Davis, Drewe, England, Flook, Fowler, Fudge, Hallier, Hicks, Holder, Hollister, Howse, Isles, Jarrett, Lacey, Maggs, Roach, Simmonds (the 1841 winners!). Short, Skidmore, Smith, Stone, Turner, Williams and Wiltshire.

Clearly, the dominance of hatting in some of these small towns and villages was considerable. A good example can be found in Winterbourne which, in 1841, had 580 people recorded in employment of which only 48 were women. Hatting provided the largest workforce with 171 (almost 30%) of which 109 were time-served journeymen having completed a seven-year apprenticeship. Many of these old apprenticeship agreements still exist. A further 44 men were described as hatters which may include more journeymen downgraded by the census enumerator's haste. There were seven hat manufacturers and just seven apprentices in the town. Perhaps most significantly there was but one person employed in the finishing trade supporting the claim of control by the London-facing commission masters. Just two years after the census, in 1843, with increasing inter-union strife, the local Frampton Cotterell hatters went on strike. The felt industry was already in decline and, for South Gloucestershire, it was the beginning of the end. A combination of economic forces came into play: fashion, slump, war, profits, mechanisation and, perhaps, employers' revenge.

Winterbourne's employment numbers and proportions changed dramatically through the next sixty years with just four ageing hatters left by 1901. Coal mining had leapt to first place and in second place there was a dramatic newcomer - the railways.

The following is the text of an e-mail I sent Chris Heal on 14th September 2007:-

"I ATTACH a photo that I took about 15 years ago of "Old Oak House" Westerleigh, which was the centre of the Felt Hat making industry in Westerleigh during the 18th C. I also quote from a small local history that I found in Westerleigh Church:

"The Felt and Felt Hat Industry (Old Oak House.)

From 1695 there must have been a thriving FELT Industry in the village carrying on until at least 1797, as in 1695 we read of the death of Luke Parker, feltmaker. We also have discovered that HAT MAKING was flourishing in the Old Oak House, as in 1774 a Hatter is listed - and several more after - which would suggest a subsidiary to the felt works. Westerleigh's business was probably a subsidiary of operations in Winterbourne where felt making

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flourished between 1595 and 1865. 43 Feltmakers are mentioned between 1695 and 1802. Also 7 Hatters are named between 1767 and 1786.”

I found your article “The Forgotten Gloucestershire Hatters of 1841” very interesting because at least two ancestors of mine in the 18th C were described as Hatters. The two I know of died fairly young - presumably affected by the poisonous fumes of chemicals used in the industry (? Arsenic?). I know the term “As mad as a Hatter” had some bearing on this aspect of things. I had no idea how important or extensive the trade was in Gloucestershire in the 19th century.

William Cope, Bapt. 16/6/1735 in the Parish of Westerleigh was at the time of his marriage on 26/12/1760, said to be a Hatter of Frampton Cotterell. An interesting point about this marriage (obviously a “shot-gun” wedding as their first child was born just 3 months later) is that no member of the Cope family signed as witnesses. However, the witnesses were Gabriel Amos, John Edwards and Gregory Nichols and this is interesting since you mentioned the name Amos among the “hatting dynasties”.

That first child was Hart Cope, baptised 11/3/1761 in the parish of Westerleigh. He was also described as a Hatter at one stage of his probably rather unhappy life. Both his parents died young (William was only 43) while Hart was in his late teens, leaving him to look after 6 younger siblings. At a later stage of his existence as a labourer in the parish of Berkeley with a wife and 7 children, he must have fallen on hard times because a Removal Order was taken out by the Parishioners of Berkeley trying to return him to his Place of Settlement - Westerleigh. This must have been disputed or overturned because they remained in Berkeley and about a year before he died aged 52 (very young for our family) he attended a dinner in company with Dr. Edward Jenner and the Mayor and Corporation, where Hart Cope was elected “Ale Taster”! Perhaps Hart was a little happier at this time?”

In response to that e-mail Chris Heal has provided me with these pieces of information.

I am most interested in your comments about the Westerleigh hat industry and the picture of The Old Oak House: I have struggled unsuccessfully to find any reference to Westerleigh hatting that takes me to an actual building, surviving or not. I noted the Old Oak House while walking around and thought it a suspect because of the upstairs windows. When you say 'believe', do you have any sources or other references? It would be very helpful. Have you contacted the current owners? Were the Cope's associated with the building or is that a separate story?

My current feeling is that Westerleigh was a strong early hatting partner to Frampton Cotterell (FC), Winterbourne and Rangeworthy, but fell away quicker, possibly due to it not getting a London factory. From c1770, these incomers went to FC, Watley's End and Oldland Common. In the 50 years from 1598, Westerleigh contributed 4% of all of the City of Bristol's feltmaker apprentices, the largest number of all the outlying villages, apart from, surprisingly, Marshfield.

I have collected only one mention of William Cope as a hatter in FC in 1778; nothing for Hart. However, I do have John Cope, feltmaker, in a marriage licence bond in Chipping Sodbury in 1665 and Jacob 'Coap', feltmaker, in Westerleigh in 1729 (sadly without a source, collected some time ago before I decided to make a study of the industry).

If you are willing to share, I would be very pleased to receive any hatting/feltmakers references you may have on this family.

Well as promised I sent him all the information I had (as obtained through my visit to Westerleigh Church many years ago) and also said: “My 5 X Great Grandfather was a Jacob Cope (Coap) bapt Pucklechurch 6/2/1693/4, first married 25/9/1720 to a Hannah Simmons (having 5 daughters) then marrying, secondly Martha Humphreys, producing 8 more children, including my ancestor William Cope. I've no record of my Jacob's occupation but he died 23/11/1771 at least 76 years of age, which seems improbably old for a Hatter.

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Chris came back with the following:-

Now we know your Jacob was a feltmaker in 1729. Don't be led into thinking that hatters died young; there is no evidence that South Gloucestershire hatters had a mortality rate much different from the norm.

I have found the following reference in Bristol Records Office:-

Jacob Hunt, son of Robert, apprenticed to JACOB COAP, Feltmaker for 7 years. Dated 8/4/1729.

Also I saw in the Bristol Marriage License Bonds for 4/9/1665 an entry for JOHN COPE, Feltmaker of Sodbury to Sarah Lloyd.

All this has made me do more research on Feltmakers on the Internet. I found the Crest/Arms of the **THE WORSHIPFUL COMPANY OF FELTMAKERS.**

Arms:

Argent a Dexter Hand appaumée coupé at the wrist Gules between two Hat-bands nowed Azure in chief a Hat Sable banded Azure

Crest:

Upon a Helm on a Wreath of the Colours A Dexter Arm embowed proper holding in the hand a Hat Sable banded Azure

Motto:

Decus Et Tutamen

Granted 31 May 1946.

History:

The first Charter was not received until 1667, the Company having been incorporated by Letters Patent in 1604. Many of their members were previously haberdashers. Later competition (for felt hats) came from silk and machines. When Elizabeth I was greeted by a company of hatters on a visit to the City she commented on their 'superior bearing and lusty loyalty', and announced that 'such journeymen must be gentlemen'.



Our History

Brief History of the Feltmakers

The first known reference to Feltmakers as a distinct craft association is in London in 1180, although it is not known how long this lasted. In 1269 the Cappers became officially established. Hurers made shaggy and bristly caps at that time and in 1311 the Hatters are found carrying out an examination of hats at the Guildhall. Faced with the need to combat imports, obey the new Act of 1488 restricting sales prices and enforce the ordinances controlling the trade, the Hurers and the Cappers amalgamated with the Hatters and then merged with the powerful Haberdashers in 1502. Many of the feltmakers were already members of the Haberdashers and, as the Haberdashers controlled the retail outlets and the raw materials, this unification of the hatting trade, no doubt, seemed a sensible step. The Feltmakers were the only group to survive in name and became synonymous with hatters and is today the Livery Company of the hatters.

In the middle of the 16th century discord developed between the Feltmakers and the Haberdashers from whom they were forced to buy their raw material of wool in 'sacks unseen'. This led to much unrest and in 1583 they petitioned Queen Elizabeth I for their own Charter. This step was vigorously opposed by the Haberdashers. It was not until 1604, when King James I came to the throne and needed funds, that the Feltmakers were granted a Charter of Incorporation – the first of eight granted at that time – in the name of 'Master, Wardens and Commonaltie of the Art or Mysterie of Feltmakers of London'. The cost was £500 and it was claimed there were 'seven thousand persons of the said trade'. In 1667, King Charles II granted an expanded 'Charter of Confirmation' extending the powers of the Feltmakers. This was confirmed again by King George III in an Inspecimus Charter in 1772.

In 1733 the Company was granted Livery by the Court of Aldermen. The Company is number 63 in order of precedence. One of the historical stories of the Feltmakers refers to Queen Elizabeth I who, on her journey to Tilbury in 1588 (at the time of the destruction of the Spanish Armada), was passing down Holborn Hill when she was met by a cheering crowd of well-dressed men wearing polished beaver hats; these were the hatters from Blackfriars and Southwark, the then centre of the hatting industry in London. It is reported that Her Majesty, much struck by their lusty demonstration of loyalty as well as their appearance, enquired who "these gentlemen

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were?”. On being told they were journeymen hatters, she replied “then such journeymen must be gentlemen”. The description stayed and journeymen hatters were referred to as “the gentlemen” until well after the First World War. In the period 1870-74, 11 famous politicians joined the Feltmakers.

They included W.H. Smith, Cecil Raikes, Rowland Winn, Admiral Hay, the Earl of Iddesleigh and Sir Edwards Hicks Beach. Between them four had been Chancellor, two First Lord of the Admiralty, two President of the Board of Trade and two Foreign Secretary as well as being the holders of many other high offices. The hatting trade flourished and the Company grew strongly in the early part of the 20th century. Between 1914 and 1918, 27 Mayors and ex-Mayors were elected. In 1927 there were 9 Knights on the Feltmakers’ Court. However, during the second half of the 20th century, the trade declined to its present level. There are now some 170 Feltmakers and members are drawn from the higher ranks of many professions, businesses and trades as well as the hatting industry. The Feltmakers have produced two Lord Mayors, Sir Louis Newton in 1923 and Sir Hugh Wontner in 1973. A third, Sir Thomas White, Lord Mayor in 1876, transferred to the Vintners, as was the custom in those days, after serving as Sheriff.



This sketch from the British Library depicts Hatmaking in the 16th Century (Schoppert Technologia Carminiabus 1568.)

The Company

The Company is administered by a Court of 26 headed by The Master and four Wardens. Lady members are welcomed on the same basis as men. Ladies who have joined the Company include the former Speaker of the House of Commons, the Right Honourable Baroness Betty Boothroyd, OM, and Deputy Mrs Joyce Nash, OBE, a senior member of the Court of Common Council and Chief Commoner in 2004. Young people, aged 14-20, may be apprenticed to a Liveryman and this step is warmly welcomed. After four or seven years they have the right to seek election to the Livery. The minimum age for joining the Livery is 21.

The Company’s Meetings

The Company dines three times a year. The Installation dinner – on the occasion of the installation of the new Master – is in October. In April there is a Spring Dinner and the Ladies’ Banquet is in June, normally at the Mansion House with the Lord Mayor, the Sheriffs and their ladies. Many eminent Company and private guests attend these functions. A most popular Carol Service is held in December. Masters often introduce other functions during the year. To help new Liverymen meet others in the Company there is a Livery Society. This holds a number of less formal occasions. There is also a Masonic lodge. The Master uniquely entertains the Sheriffs and the Court on Plough Monday.

The Company’s Activities

Charity: The Company has many activities, the main one being charity. The first recorded charitable bequest was that of Philip Macham who donated Sullens Farm in Essex in 1692. More recent bequests include particularly generous legacies from a number of Past Masters. The Company’s charitable giving is guided by the Trustees and by an active charity committee of Liverymen. There is a wide range of beneficiaries including

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Pensioner Hatters and many other good causes. Recently the Company has assisted the newly formed City Academy in Southwark, an ancient hatting centre. The Feltmakers' Award and the Lord Mayor's Appeal are supported each year.

Feltmakers' Award: Some 15% of the Feltmakers are, or have been, associated with the trade and in 1989 a most successful Feltmakers' Award was instituted. Annual prizes are offered for the design of headgear containing an element of felt. This is a Europe-wide competition open to students at design schools and fashion colleges as well as apprentices at hat making companies. The number entering has grown remarkably and in a short time the Award has achieved wide recognition and competitive support. The first prize (the Arthur Hemens prize) is presented to the winner by the Lord Mayor at the annual banquet.

The Feltmakers' Hats:

Other than through its close association with the hatting industry, the Worshipful Company of Feltmakers is well known for three particular hats. The first is the splendid Master's tricorne hat with white plumes. It is true to say that it is the envy of Masters of most Livery Companies. A number were kindly donated to the Company by the late Sir Hugh Wontner. The second are the hats worn by the Wardens. These are copies of those worn by Gentlemen at the time the Company obtained its Livery. The third is the hat that is presented to the incoming Lord Mayor each year. This is a tricorne hat with black plumes and is made and fitted specifically for the incumbent. This is received graciously by the Lord Mayor at a delightful presentation ceremony at the Mansion House.

HMS Lancaster:

In 1991 HMS Lancaster became affiliated to the Feltmakers. This type 23 Frigate has a displacement of 4000 tons, is 133m long and has a Ship's Company of 185. The Company entertains the Officers and Ship's Company when possible and many Liverymen have been on board.

Sport:

The Feltmakers are heavily involved in sport. As well as The Master's Golf Day, they also play in the Inter-Livery Golf competition which they won in 2005. They organise the Inter-Livery Tennis competition at Queen's Club and shoot in the Inter-Livery Clay Pigeon Shoot. There are cricket matches and, in some years, visits to race meetings.

NOW A LITTLE ABOUT THE FELTMAKING PROCESSES.

Felt can be built in many ways using wool fibres as the base. However it is important to make sure that you are using the correct quality of wool fibres. Too coarse a fibre slows felting as fibre below 56's Bradford count ([learn more](#) about fibres) will not felt easily. Lustrous, fine fibres felt quickly and reduce the time for working the design into shape. The felted bag, made by Linda Chapman and pictured here, is made from [Fine White Wool](#) tops (60's, 12cm staple) and [Dyed Merino Wool](#) tops (Bradford count 64).

Heavily dyed wool fibres do not felt easily and black can be a particular problem in feltmaking unless special dyes are used.

With all these points in mind, a range of white and [coloured Merino Wool tops](#) are available for feltmakers and spinners. A count of around 64 provides a fibre which will felt readily, but can also be spun into yarn for garments which do not turn into felt at the first wash! The fine black wool has been specially and carefully dyed for Fibrecrafts to retain a good felting performance.

Felt is created by agitating fibres until they mat together to form a non-woven fabric. The fibres can be laid flat on a surface or molded around a former such as a hatshaper, cardboard or even a ball.

The piece of felt here, made by Alison Bate, was created by first weaving Light and Dark Herdwick and Black Welsh Mountain tops and placing between two pieces of mesh netting to hold it in place before felting.

On a bad day use the felt making process to relieve the tensions, it usually makes a very good felt. Making the felt is simple, it requires only a little time and effort to achieve a pleasing result. Numerous techniques are used to create the felt fabric and generally the feltmaker will experiment to find the technique which most suits them.

Materials required for feltmaking:

- Plastic sheet - to protect the work surface
- Reed/Bamboo mat or bubble wrap - to roll the felt in and help the agitation process
- Wooden dowel - to roll the felt & mat around
- Hot soapy water - solution made with soap or washing up liquid

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- Wool tops - about 100gm will make quite a thick 30cm x 30cm square. It will be easier to decide how much fibre is needed for projects as you do more and more. The overall amount will be determined by the thickness of the felt and density to which it is felted. Trial, error and note taking are recommended.
- Netting - to hold any patterns in shape during the initial agitation process.

The process of felting the fibres:

Take a small handful of [dyed wool tops](#), open the fibres out and place in a thin, even layer onto the reed/bamboo mat. This is called the 'roving'.

Place another handful of fibres at 90° to the first layer. Add another 2 or 3 layers (at 90° to each other) until there are about 3 to 4 layers in total - depending on the thickness of felt required.

Patterns can be set on to the fibre using other colours of wool tops, silk fibres, 'silk paper' shapes, or pre-felted shapes.

Place the netting over the top of the fibres. Pour the hot soapy water into the centre of the fibres and gently rub in a circular motion working out towards the edges of the fibres. The fibres settle down quickly and form a mat.

Continue rubbing vigorously for about 5 minutes, lifting the net occasionally to check progress and that it is not sticking to the fibres, and add more hot soapy water as required.

Remove any excess water with a towel/cloth and lift off the netting. Roll the felt and the reed/bamboo mat around the piece of dowel to make a 'package'.

Roll the 'package' back and forth on the work surface - the felt will shrink (up to 50%) in the direction you are rolling. Unroll the mat and rotate the felt 90°. Roll up the 'package' again and continue rolling. Repeat the rotation and rolling process twice more so that the felt is an even thickness and has shrunk in both directions.

Alternatively, use a felting board. As you rub the wool on the board the ribbed surface accelerates the felting process and the curved grooves allow the soapy water to drain away.

The felt is ready once it has reached the required stiffness and shape.

Remove the felt from the mat, rinse out the soap under cold running water and leave to dry.

To make a wall hanging or to add further elements such as silk fibres or cut-out shapes, the fibres should only be loosely felted to create a pre-felt and therefore a base for the inclusions. The [prefelt fabric](#) can be bought ready made and used as a 'canvas' by the feltmaker.

Making Felt Balls (see also [washing machine method](#)):

Take approximately 50gm of wool fibre. Tease the wool open and fluff it up to a consistent mix, and shape it into a ball, with the coloured wools making the surface pattern. Alternatively the surface pattern can be added later, as the balls begin to harden.

Mix two teaspoons of washing-up liquid in a washing up bowl half full of hand hot water. Wet the outside of the ball with the soapy liquid. Shape the wool into a ball and pat, squeeze and roll it in the hands. Place further pieces of coloured wool on the surface of the ball to make the final pattern.

Again wet the outside of the ball, and continue to pat and squeeze to keep the shape. Make sure the ball is thoroughly wetted and after ten to twenty minutes the felt ball is ready. Put the ball in a warm place to dry out.

Nuño or Laminated Felt

Fine wool fibres such as Merino, combined with fine openly woven fabrics such as Gauze Chiffon, give the best effect. The fibres are bonded onto the fabric during the felting process. As they shrink, they adhere to the surface of the material which becomes distorted in the direction the fibres are laid, creating a ruched effect.

Combining different fibres such as Tussah silk and threads with wool tops, and using other fabrics such as an open weave [silk](#) like Georgette or Chiffon, will produce a variety of effects in feltmaking.

Lay the fibres across the open weave fabric and felt in the same way as above.