

## THE PROCESSES USED IN THE SHODDY AND MUNGO INDUSTRY BY CHARLES DAY

There have been various articles published explaining the manufacture of shoddy and mungo:

Shoddy and Mungo Manufacture. N. C. Gee.

The West Riding Recovered Wool Industry. C. J. Malin.

Something From Nothing. A. J. Pike.

The Woollen Industry. A. Brearley.

These books explain the basic processing of rags in the industry very well. What follows is how it was done from the shop floor between 1960 and 2000. Henry Day & Sons Ltd ultimately had a vertical shoddy and mungo manufacturing company, which included sorting, carbonizing, dyeing, blending and pulling. The manufacturing ceased in 2000, 156 years after it was first started.

### COLLECTION OF RAGS.

Rags were being collected in the early eighteenth century and crudely turned into flock for stuffing into saddles. Then later on when the rag machine was made to work on a commercial basis there was obviously more demand for rags to be processed. It was a chance for the rag and bone man to expand and develop his business because most household textiles could be reclaimed in one way or another. The people who did this were called tatters and after collecting they would sell all the rags to a marine store. They would then roughly sort into qualities and then send to one of the rag auctions to obtain the best price on the market. At the rag auction you soon got to know the buyers and what they bought, some buying high-quality goods such as knits and worsteds and some buying low quality only suitable for flocking. After the auction was over it was possible to approach a rag merchant who had bought rags and offer them a little bit more than the auction price; this was usually cheaper than bidding against somebody else for the rags we also wanted. In time marine stores who had sent their rags into the auction would sell them directly to the shoddy manufacturers, thus saving the auctioneers charges and a middleman. The shoddy manufacturer would also get a slightly better price than if they bought the rags at the auction.

Later mixed rags were coming from all over the world to be processed in Dewsbury and Batley. In time they knew what was in demand and to get a higher price for their wastes and rags they would sort more precisely in their own country. The supply of foreign rags during the wars slowed down and so the supply was reduced to UK.

There were a lot of large companies who had their own uniforms and most of these uniforms were made of wool and shoddy and mungo fibre and were sewn with cotton. The companies

varied from bus companies all over the UK to hospitals, prisons, fire services, police including the RUC and the three forces.

Used uniforms were usually sold by the company and they would ask rag merchants and shoddy manufacturers to tender for the items. The government had a very similar system but obviously in bigger weights of the military uniforms. In most cases it was not worth travelling and looking at the garments as they were made to a strict standard and shade. For example British khaki serge was the same quality and shade for decades. It was the foreign khaki serge which would vary in quality and shade depending on the country. There were also companies who bought all sorts of ex WD equipment, such as tarpaulins, crockery, vehicles, fire hose reels etc, also buying old uniforms. One of these companies was in Heckmondwike and called Parkin, with whom Days did quite a bit of business with. I remember buying some snow chains from Parkin so we could get our wagon in and out of the carbonizing works at Earlsheaton.

## RAG SORTING

The sorters were mainly women and girls, with a few of them having Irish names, and they had warehousemen who supplied them with the bales for sorting and then packing the bales of sorted materials. The basic sorting for quality and shade was their main job. The sorters riddles were in front of a north facing widow; thus giving good natural light and no sun.

When the materials had been sorted they would be put into round or rectangular wicker baskets before being emptied into a bale. We always insisted that a double check by the sorter was done when emptying into a bale. We always bought the wicker baskets from the local Blind Institute, which made high-quality products.

Sorting knits was probably the largest waste they sorted. The coarse stockings were sorted into specified shades with the labels being removed and the fine berlins taken out to be sorted into shades at a later date. A lot of the employees used to obtain clothes to wear from the rags being sorted. They could get good worsted trousers, jumpers, sweaters, socks, gloves and coats, which was overlooked by the company.

When it came to sorting wool dyed blue rags, it needed considerable experience to recognize the correct quality in fineness, by handle and making sure there were no piece dyed clips mixed in, by sight. The piece dyed rags were lighter in the centre of the cloth, where the wool dyed was a solid shade all through the cloth. The piece dyed clips were not as fast to light and milling as wool dyed clips. These wool dyed blue rags were made into mungo for use in a cloth with wool for the forces over coats and police capes.

Besides sorting rags Days used to buy the wastes from the woollen manufacturers they were doing business with. This included soft waste from the carding, thread from the spinning and

cloth from the weaving and finishing. These were sorted into quality and shade and then put into regular blends.

Another job for the sorters was to remove the horsehair lining from the worsted uniform jackets; this hair was mainly in military, police and other worsted uniform jackets. While doing this the sorters would check the pockets to see if there were any white five pound notes, unfortunately no one admitted finding one. One sorter did find some live bullets in a pocket of an RUC jacket, which were quickly thrown into the river. One male employee though did collect the medal ribbons off the uniforms and after a few years had a marvelous collection, which also included various different regimental brass buttons.

If new rags had been bought by us from a garment cutter they had to be sorted over the riddle to check for cotton threads and other contraries, which may have got in by mistake; we always double checked the deliveries for quality.

When knitted garments and wastes had been dyed the sorters checked over for contraries. In winter time this was their favourite job especially if the material had just come from the dryer. The sorters had to have their jobs changed once or twice a week to prevent monotony as production would drop and bad work produced. The sorters had a radio to listen to and there was one woman who was in charge of it and by mutual agreement it only went on for certain programs. The sorters also looked after the 2 or 3 wild cats we had to have to keep the vermin down, who lived in the river banking.

Two of the sorters used to clean the office first thing in the morning and light the fire in winter time. Another would go to the shop at break time and then lunch time sometimes for fish and chips. I remember one girl coming back from the shops and she had done her own shopping as well. For many years the company used to provide tea and milk for the employees; the milk was sterilized in a glass bottle with a metal top, ultimately it was being abused and so it came to an end.

As the years went on man-made fibres came onto the scene and these made it a bit more difficult for the sorters to know what was all wool or 80% wool 20% polyester. It was very important to get this right as polyester would not dye with a wool dye, but nylon would. So if you were dyeing 500 lbs you certainly didn't need 25 lbs of contrary with polyester in. There were two main ways of finding if there was synthetic in the rags. One was by experience in handle of the cloth and the other was by burning the yarn. If the burnt yarn crumbled between your fingers the fibre was wool or cotton, if it made a small hard bead it was polyester or nylon.

The company was always looking at ways of improving any process in the mill. For example when using shears to cut the rags after a time became hard work; we invested in a small double headed cutting machine where a motor drove two circular blades. In those days health and safety was not as important as it is today, but fortunately no one did lose a finger. This machine

really did make a difference to some of the jobs we had to do and often halved the time of doing it by hand; for example taking the horse hair linings out of the worsted jackets.

All the materials sorted had to be packed and this was normally into jute bales which were originally used to import wool into the country. There was one problem with jute bales and that was that they were hairy and the hairs would get onto wool dyed blues and contaminate the material. We had a special jute cloth made which was not hairy, but expensive. Initially the cloth was made into bags by Charlie Allott, an employee, and so these bags were called 'Allott bags' and when Charlie died we had the bags professionally made. When the rags were pulled and made into shoddy or mungo the material was hand packed into large jute rectangular bags called sheets and were fastened with pieces of 8" hard wood with a point on and called skewers. The sheets were stored vertically but when craned onto a wagon they were laid flat. Ultimately they were made redundant when forklifts were used and the square jute bales were used. These were about 3 ft square and 6 ft high and again fastened at the top with skewers which were superseded by wire pins called fishhooks. Packing bales was very labour intensive and there were very many different types of press packing machines being introduced to pack the processed fibres. One being the Roypack bale where the material was put into a large plastic bag inside a box. The bag was closed by twisting the plastic and the air removed from the bag. A bale was then put over the vacuumed bag, fastened up then the air was released to form a bale

The company never got involved with production bonuses, in any department, as the company's principle was quality not quantity, which gave the company a good reputation.

#### RAG CARBONISING AND SHAKING

Carbonising is done to remove the cotton and vegetable from any type of textile waste. For rags the cheapest type of process is dry carbonising, where the rags are treated in an enclosed chamber with hydrochloric acid gas. This was not the best job in textile reclamation as the warm hydrochloric gas affects everything. The men used to get their wool clothes out of the rags and after a few days the cotton seams were soon carbonised without going into the machine. The other problem with hydrochloric acid gas is that it corrodes metal and so there always seemed to be something that had rusted and needed repairing, even the plastic lined metal tank holding the liquid hydrochloric acid needed repairing regularly.

The heat required to turn the liquid acid into gas was done by a coke furnace, which also provided hot air for drying the rags. The coke also heated the two houses next to the carbonising works, where the carbonisers lived rent free. One other perk the men had was being able to collect all the brass buttons and buckles from the uniforms and sell them for ale money.

Care had to be taken when carbonising white rags as they soon turned off white in colour, if left too long in the machine. Both khaki serge and worsted used to turn slightly red with the hydrochloric acid and this could only be solved by neutralizing the acid with water. All carbonized rags had to be neutralized anyway as the acid would affect the alkaline scouring of the ultimate cloth. When the dyehouse was too busy we would have the rags washed by Stanley Beaumont in Batley Carr, who made wiping rags and had industrial washing machines.

The rags when carbonized had to be shook on a rag shaker. This would extract the cotton dust and blow it out of the side of the building onto the land, the rags were then foot packed into bales. The dust could not be used for shoddy manure as it was too acidic. If carbonized rags were left for a considerable time they would need re-shaking before being used.

A rag shaker can also be used for cleaning new rags cuttings of short cotton sewing threads, which costs less than sorting. Mill soft wastes bought from our customers can also be put through the rag shaker to remove some of the short fibre and vegetable. The other use for a rag shaking machine is to use it as a blending machine to mix soft wastes together. Sometimes rags which have been dyed have dust deposits of dye on the surface of the cloth, this can be removed by putting the material through the shaker, so not having to put the material back into the dye pan. This is where the dye would attach itself to the dust and if not removed the dye would run as it was not attached to fibre.

Rag shaking was a very dirty and dusty process, but unfortunately it was one that had to be done and there were various people who took their turn in doing this process. Emptying the dust bags was even worse and you sometimes needed a bath when you finished. Talking of baths some of the younger employees in summer time would take a dip in an empty dye pan at lunchtime to cool them selves off.

## DYEING AND DRYING

In about 1850 Henry had a dye pan in Days Yard, it is believed to be made of brick and fires were lit underneath to heat the water up. The actual design has not been recorded except the fires were lit at about five in the morning as the horses were being groomed and fed. The more modern dye pans were about eight feet in diameter and had wood sides and base and were heated with steam through a copper coil underneath a steel base plate. It was essential to keep the rags moving in the dye pan and so a large wooden pole about eight foot long was pushed under the rags and then the operator pushed down on the other end of the pole and the rags would lift up to the top of the pan. Usually two people poled the pan until it came to the boil.

In the early days of dyeing rags the colours were dark as there were only a few bright dyes being made.

For a good black logwood black or Hematine was used, this natural dye was made from trees which grew in central America and logwood black was used by most textile dyers. Henry Day used to put Fustic with it; this was a yellow dye which helps to make a stronger and more solid black colour. The dyeing was finished by the addition of copperas to completely fix the dye to the wool. The fastness of the dyeing is only as fast as the colour you are dyeing on to, so quite often a chrome and DOV mordant was used, to remove any loose dye before dyeing black with Hematine. The dyeing recipe would therefore be:

2% Chrome

2% DOV Boil for ½ hour. Then tap and wash off.

4 ½% Hematine

1 ½% Fustic Boil for 2 hours.

3% Copperas Boil for 1 hour.

The other shades of rags being dyed would normally be done with fast chrome dyes, which require a chrome treatment after dyeing to fix the dye. For brighter shades acid milling and metal complex dyes would be used.

When the rags had been washed off after dyeing they would then be put into a circular cage which would then spin to remove excess water. This is called a buzzer or hydro extractor; originally they were powered by steam and then by electricity. As time went on they became more sophisticated, but the principle was the same.

Henry would have dried his rags in a south facing field, what he did when it was raining is not recorded. Later they used steam and a fan to blow hot air through the rags which would have been laid on to wire meshing. This system was used for many years. The dried rags were hardly ever sent straight to be pulled as the moisture in the rags would be below 15% moisture. If the rags were left under an open shed then in a few days they would have increased in moisture content and so make better shoddy. Wool will hold 16-18% of its weight in moisture.

There were times where light coloured knits could be used to make a shade with the addition of a dye. If the rags were not light enough to get the shade it would be possible to remove colour from some the knits, this was called stripping. There were three types of stripping, which could be used:

- (a) The use of about 15% of ammonia and boiling for about half an hour would give mild stripping.
- (b) 15% stripping salts gave a slightly better strip than ammonia and it was easier to dye afterwards.
- (c) Using hydros and acetic acid would give a slightly better stripping.

(d) To obtain the best stripping 3% Vacolite and 3% Acetic acid would be used. A vacolite strip would not remove all the dye off the rags, as some of the rags would have been dyed with chrome dyes, which are reasonably fast class of dyes. After stripping the rags would need well washing off to neutralise the chemicals used.

Henry Day were the biggest manufacturers of wool dyed blue shoddy, which had a very high specification. There were four or five different qualities of wool dyed blue for the various cloths the government and the armed forces required. One of the biggest manufacturers of military cloth is A W Hainsworth of Farsley and they were our biggest customer for many years. A lot of blue melton had to be dyed with the same recipe as above and we also bought a lot of fine wool dyed melton and their edges from America; the melton was sorted and used as it is, but the edges had to have the full mordant and dyeing treatment. We had one dye pan which was permanently used for black.

One of the easiest type of rags to dye was serge. There were various different colours used by the forces: hospital blue, navy, khaki, and RAF to name a few. For instance hospital blue serge, which was a faded shade of royal blue, could be stripped to a pastel blue and so could be used into a blend to be piece dyed a light shade, or it could be dyed royal blue. The navy blue serge was ideal for dyeing black. Khaki could also be stripped to make a sandy colour and could be dyed to most medium shades with ease. RAF was that little bit darker and was used to get the darker shades.

As the machinery was updated it was possible to use the dye pans for other purposes:

- (a) The dyeing wool and animal fibres.
- (b) The dyeing of fine nylon for the woollen industry or course nylon for the carpet industry.
- (c) The deskinning of sheep skin pieces mainly purchased from New Zealand.
- (d) Depigmenting and bleaching of high value fine fibres.

The dyeing of wool and animal fibres was quite easy as the shade you were dying on was not multicoloured, as with rags and waste, but the accuracy of the colour matching was very important; later this work was done by a computer. Nylon is dyed with wool dyes and so relatively easy and also there was no need to dry because we were using a very high speed hydro extractor made by Broadbents of Huddersfield.

The deskinning of sheepskin pieces used concentrated sulphuric acid (DOV) and this would dissolve the leather and leave the wool and the process was rather smelly. It seemed a bit ridiculous to ship material from New Zealand and then throw 25% of dissolved leather down the drain. Unfortunately we could not find a company who could do the same work in New Zealand as they were already restricted with their effluent.

Silk noils can be bleached to turn the fibre whiter and the chrysalis to a camel shade which also makes the chrysalis less greasy and nearly all of it turns into dust in carding. The basis of the bleaching is hydrogen peroxide with other chemicals. The silk process takes about 3 hours at 70 degrees C. We did a lot of silk noils for a company in Germany, who were making expensive duvets.

Camel hair and cashmere fibre can also be bleached using the hydrogen peroxide process, but for the darker shades a mordant treatment is used prior to the bleaching. The full process takes between six and eight hours. Camel hair can be bleached to an off white and depending on the original shade of the cashmere fibre from camel to an off white is possible. The same process can be done on natural brown wool, mohair, and Yak hair, but the cost makes the product too expensive. Depigmenting animal fibres, such as cashmere and fine camel hair, does damage the fibre which restricts the end use.

#### OIL AND OILING OF RAGS

To preserve the fibre length of the pulled rags and reduce the friction in pulling a lubricant was added to the blend of rags before pulling to prevent fibre breakage. Initially olive oil was used which came from Lisbon and Naples, and usually delivered into Hull where it then came by road to Dewsbury. In 1871 two men stole two casks (36 gallons) of olive oil from Hull docks and were given 7 years penal servitude by the Hull Court. We do have the letter from the solicitors in Hull Lambert and Smiths and the invoices for the olive oil which give the Captain and name of the ship and the weights of the casks and their value.

Later there was a process for reclaiming oil and this produced a recovered black oil, which had to be heated with steam, as it was rather thick. It could be put on to the cheap blends using a type of watering can with a T piece on the spout with holes in it and sometimes a small amount of hot water was also added. A better type of oil contained oleine and there were different qualities with different percentages of oleine in. This oil was better heated to make it thinner and easier to put on the blend and penetrate into the rags. Henry Day's used only 40s oleine and 60s oleine, until the customers decided they would rather use a self scouring mineral oil from the 1960s onwards. The mineral oil was water-soluble and was put on to the blend with 50% of warm water. It was found to be easier to pull meltons and felts if they had a reasonable amount of hot water on them, besides the oleine, to lubricate and soften the fibres. Henry Day's never used a mechanical oiler or a feed lattice oiler.

#### BLENDS

There are various ways of producing blends to make a better profit:

(a) Adding cheaper material to reduce price of a blend.

(b) Using about 20% of carbonised and washed old khaki serge into a blend of new khaki serge. Besides being a cheapener the 20% was also helping to reduce the rag bits as the old large rags were put on the feed sheet first then the new cuttings put on top less rag bits were made; so the machine was able to run faster. This would be the same for any new cuttings being pulling.

(c) Making sure that extra water is added to a blend in summertime, due to the evaporation rate.

Examples of standard blends:

Australian New Khaki Worsted. March 1946

20% New baratheia khaki worsted

20% New US khaki worsted

20% Carbonised English khaki worsted

15% Carbonised Australian khaki worsted

15% Pulled Australian khaki putties

10% Fine khaki soft waste

This blend is a real mixed blend virtually of anything at hand to make a khaki worsted, which is not the same shade as English Khaki worsted.

Coarse Navy Blue Stockings. July 1947

80% Coarse navy blue stockings

20% Pulled naval serge

In this blend the cheapener is the naval serge even though it had probably been pulled first.

White Stockings. July 1947

40% Cleaned white stockings

40% Cleaned white blankets

20% Coarse white felt

This blend made with only 40% of what it is meant to be.

Cleaned Black Worsted. February 1948

65% Cleaned old black worsted

35% Cleaned old black velours

This would have made a very good blend even with all the velour in it. Note that the materials were cleaned and not carbonized.

New Coloured Worsteds. May 1948

80% New fancy worsteds

10% Carbonised blue worsteds

10% Pulled fine blue/grey lists.

Standard blend composition for most worsted blends.

New RAF Serge. January 1962

50% New RAF Serge

20% Carbonised RAF serge

15% New RAF tweed

15% New RAF great coat.

Standard type blend with these approximate portions have been made for over 50 years.

New Dyed Green T120. June 1963.

40% New RAF worsted dyed T120

20% Carbonised Glasgow transport green worsted

15% New Glasgow transport green worsted

7% New RUC green worsted

7% New RAF worsted dyed T120

11% New blue worsted dyed PV Black

This is a most interesting blend as T120 was a popular Government green cloth, we do not know who used it. The shoddy was made for John Hainsworth, Cape Mills, Farsley. The garments from Glasgow Transport Company were very close to the T120 shade, but a bit light. The RUC is a black green colour and the black worsteds would darken the blend. In mid June 1963 we delivered about 5 tons of T120 shoddy to them.

There was a company in the Leeds area called John D Johnstone, who made collar melton cloth in a range of about 10 shades for the suit manufacturers. We used to supply them with the shoddy for all these shades, to which they added a small amount of wool. Our blends for these were made from fine wool threads from the West of England and we then added to the blend 50% of their own wastes which we used to buy from them and then sort into their shades. Every shade had to have 5% of a cheapener adding to the blend as well, like some short fudd / soft waste.

Some of the Government cloths had to be piece dyed and we would make a blend specially for that certain shade. For instance we made a pastel blend for the National Bus Company and it was a shade similar in depth to RAF. When our blend was mixed with virgin wool it would produce a light shade, suitable for piece dyeing. The pieces were dyed using wool and cotton dyes to hide any small contamination in our product, which was expected. If the shade was navy blue then we could provide a dark coloured material which could be mixed with virgin wool for that cloth.

#### RAG AND WASTE PULLING

The rag machine is a very versatile machine it could be used to open or pull every kind of textile waste that was used in the industry. There were various manufacturers of these machines which included Walker Smith, Asquith Brothers, John Halsted, Joseph Regwick, Wilson Knowles and Bob Thornes. Henry Day's only used 18 inch rag machines as those that were wider seemed to make more rag bits. The main reason for a rag bits being made is that when the rags go through the feed rollers some rags can get through the feed rollers and not be pulled because there are not under pressure from the rollers, so the wider the machine the more rag bits were made.

When Henry started pulling in the 1860s he had about four qualities of rags to pull and looking at his records they were mainly dark in colour. Learning how to pull at Henry Day's in the 1950s could not be done in a few weeks as the variety of products pulled varied from jute bagging, carpet threads, stockings, velours, meltons, billiard cloth and hard white piano felts; the last three making mungo.

**FEED SHEET:** This was normally made of metal laths and was driven by the feed roller gearing. Its speed had to be slower than the feed rollers and this was done by changing the cog on the drive roller.

**FEED ROLLERS:** The rollers were from 1 1/2 inch to 3 1/2 inch in diameter. The small rollers were used to make mungo and the larger to make shoddy. They were fluted so they could hold the rags firmly. The top roller which was driven by friction is shorter than the bottom roller which had a drive cog at one end. The top roller should be smaller in diameter than the bottom roller; this is so a piece of cloth can be wrapped round the full-length of the top roller until it touches the teeth of the swift and it is this point where the pulling occurs. The speed of the feed rollers can be changed by the cog on the end of the bottom roller or from the variable drive or gearbox to the bottom roller. The feed roller has to be kept under considerable pressure at each end so correct pulling could occur.

**SWIFT:** The Swift is about 40 inches in diameter and would rotate at about 500 rpm. For making mungo the speed of the swift has to be increased by putting a smaller pulley on the swift shaft. Sometimes the pulley on the motor was changed to alter the swift speed. The pulleys were flat and a flat leather belt was used to drive them, the rag machine had to be moved every time pulley was changed as belt tension was very important. Besides the big pulley on the shaft there was another double pulley which drove the fan at the back of the machine and the bitter roller. On the opposite side to the drive pulley the shaft drove the gearing for the feed rollers. The Swift has a wooden lags round it with teeth in; Henry Day's only used four types of swifts a 32, a 40, a 60 and a needlepoint. A 32 swift had 32 teeth across the lag and the 40 had 40 teeth etc. The 32 was used for pulling blankets and a 60 was for pulling the melton and hard felt.

The Swift teeth would wear on one side and so the Swift had to be turned 180° and so the teeth were sharper. If the teeth became blunt then they could be sharpened by using a special grinding frame and stone; this frame was fastened on to the rag machine frame behind the Swift. The swift would also wear more in the middle as there is usually more material going through the centre, from the feed sheet. To overcome this the swift is ground with the grinding frame to level the teeth to the same height, across the swift.

The pulley on the swifts would be changed regularly depending on the material to be processed. For the easy pulling blends, like blankets and flannels, a large pulley would be used with a 32 swift as there would be little work to be done to burst the blankets. The feed rollers would be large and the feeding speed would be fast, so giving a high production. If melton or well felted rags were to be pulled a 60 swift would be used and a small pulley on the swift and

small feed rollers and production low. The bitter roller would be set close to the swift as there are likely to be more rag bits from this type of material.

**BITTER ROLLER:** This is a spiked or bladed roller above the feed rollers and driven from the swift shaft. This is to throw back onto the feed sheet any rags which have passed through the feed rollers and so pulled again.

**BITTER PLATE:** This is an adjustable plate above the top of the swift and is set close to the swift. This helps any rag bits left to be sent to the bit box at the back of the machine and done by centrifugal force.

**BIT BOX:** This is at the back of the swift and collects any rag bits, which have not been pulled and the machine man empties this box for repulling, on a regular basis.

**BITTER SLIDE:** This is a steel plate on the swift side of the bit box. The height of it controls the amount of rag and shoddy going into the bit box.

The pulled material passes under the swift and then under the feed sheet into the collecting bin. This bin is emptied by hand into the jute sheets by the machine man with the packer in the sheet treading the shoddy down to get as much in as possible. The machine man checks for rag bits in the shoddy as he is doing this job. When the sheet is full it is fastened up with wood skewers then weighed and ticketed. Production records are kept and given to the office every month.

The basic adjustments for a rag machine are:

Speed of feed sheet, feed rollers and swift.

Size of feed rollers, swift pulley and motor pulley.

Density of teeth. Shape of teeth. Length of teeth.

Setting of the bitter roller, bitter plate and bitter slide.

## TRANSPORT

In the 1800s all transport was done by horse and cart and in Days Yard at Hanging Heaton someone had to get up early to start the fires under the dye pans and groom the horses ready for a days work. The canal system was used to bring rags into the area; one barge could carry 80 tons of rags with one man and one horse. The barges were loaded either at Hull or Goole

direct from the ship. At the canal basin in Dewsbury there was a large wooden warehouse where the rags were stored prior to processing. One company at the end of the 1800's bought 25 rail wagons of knitted rags; this was a full train load. The processed material was delivered to the woollen manufacturers by horse and cart and the canal played no part in the end product. Henry Day's bought a considerable amount of rags from America, mainly wool dyed blue melton and the loom edges from the same cloth; these came into Liverpool and the material was picked up and brought to Dewsbury, but not on the Leeds Liverpool Canal. The first company motorised wagon was purchased in 1919, a Vulcan for £600 an ex WW1 vehicle, which ran for many years delivering round the area. In those days we had to make sure that people didn't know who was delivering to which mill and so the company name was never on our wagons, until the 1960s. We knew of one shoddy manufacturer from Ossett who often followed our wagon round the area to see who we were selling to. From the 1940s we ran two wagons one for delivering the shoddy and mungo and the other for delivering and picking up mainly from our carbonising works at Earlsheaton. The first wagons we had were petrol and so we had built our own petrol storage tank underground and above it a brick storage shed for drums of engine oil and paraffin. In later years we found a fault in the tank when it was put underground, they had used ashes for the tank to sit on and round the tank when it was put in. These ashes slowly corroded the outside of the tank and so it did not last as long as hoped.