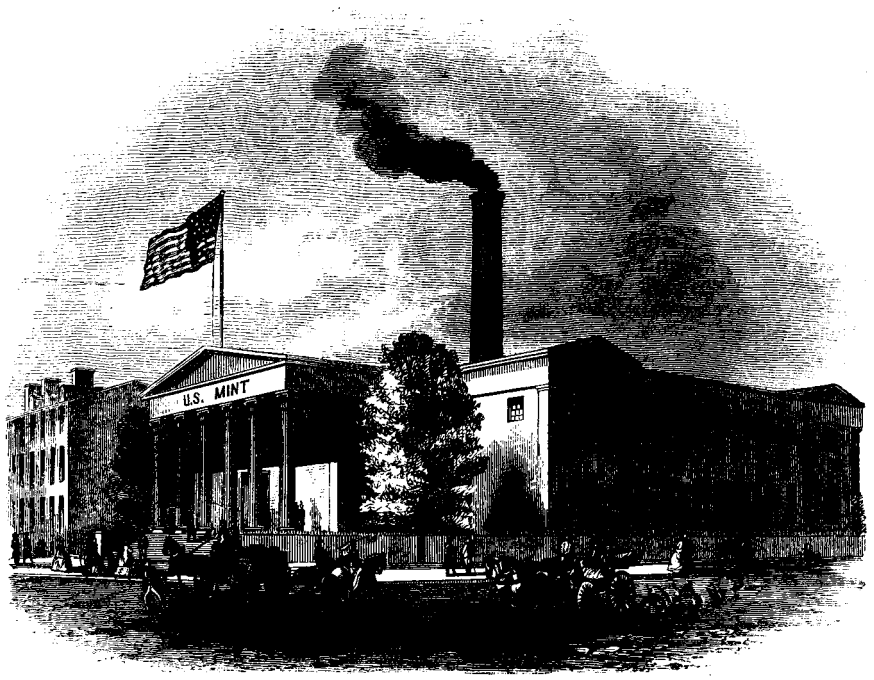


UNITED STATES MINT, PHILADELPHIA.

MAKING MONEY.

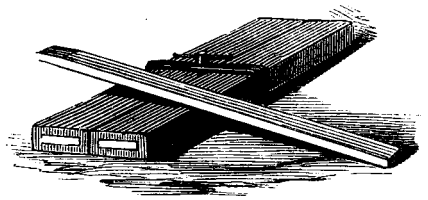
II.—THE MINT AT PHILADELPHIA.

A STRANGER in the Quaker City is naturally desirous of visiting the objects of particular interest, one of the greatest of which is the United States Mint. Philadelphians are rather proud of possessing the general Mint, and are a little anxious lest their rival, New York, should succeed in obtaining a branch, which would perform the great bulk of the work, as the United States Sub-treasury in that city in reality is the nation's banking-house. That there is some cause for this feeling, is manifest by the fact that, in 1859, there was received at the New York Assay Office bullion to the value of $8,859,103 93 more than was deposited at the Mint in Philadelphia. In 1860 the deposits were small, but New York had the advantage in nearly two and a quarter millions; and it is safe to predict, from the receipts so far, that 1861 will lavish on New York fifty millions more than it gives Philadelphia. Whether this is a sufficient cause for duplicating the expensive coining machinery, etc., it is not for us to discuss.

Leaving our hotel we walk up Chestnut Street, and between Thirteenth and Fourteenth streets come to a fine, substantial, two-story marble building, entirely fire-proof, and inclosing within its quadrangular walls a spacious court-yard.

Ascending the massive marble steps, we enter an airy hall, freshened by a gentle breeze which sweeps through into the court-yard beyond. Between the hours of nine and twelve visitors are admitted, who are escorted about the building by gentlemanly conductors, of whom there are seven. Passing through the hall, on one side are the Weigh-Rooms for bullion and the office of the Chief Clerk of the Treasurer, and on the other the offices of the Cashier and Treasurer. Glance into the latter, to see Mr. James H. Walton, Treasurer, as he is deep in the mysteries of columns of figures so long and broad that Jessie observes, "One must be a *great adder* to run up those columns."

We cross the paved court-yard, spacious and orderly, with boxes piled neatly around, and stacks of copper and nickel ingots ready for rolling. The well-proportioned chimney, one hundred and thirty feet high—somewhat bullet-marked by pistol practice of the night watchmen—towers above the surrounding roofs, which look low by contrast. Thus we are conducted into the melting, refining, and assaying rooms; but having witnessed these processes in the New York Assay Office, we will linger for a moment only to see the melter run the gold and silver, now reduced to standard quality, into ingots. The standard of nine-tenths fine gold is now adopted by all the principal nations of the world, except England and Russia.



INGOTS.

The ingots are bars sharpened at one end like a chisel blade, and are about a foot long, three-fourths to two and a half inches broad, and half an inch thick, according to the coin to be cut from them. Continuing our walk through a short entry, we come to the Rolling Room.

Be careful of your dress, Jessie: that light silk had better have been left at home, for this is a greasy place; and dirty grease has a magnetic attraction for finery.

Those massive machines are the rolling-mills —four of them in a row, with their black heavy stanchions and polished steel rollers. The old man who runs this mill has been in the Mint nearly forty years, and young girls who came to see him work are now grandmothers, perhaps, with the tally of their good works marked on their foreheads, a virtue in every wrinkle; and he has gone on rolling out the ingots year after year, handling more gold in a twelve-month than you or I shall see in all our lives. He has not tired of showing his machine to visitors, and caresses the surly old iron with a motherly pride and affection. He measures two ingots, and shows us they are of the same length; puts one of them between the rolls, just above the clock-dial, chisel end first, and it is drawn slowly through. He measures it with the other ingot, and we see it has grown about an inch longer and correspondingly thinner. This is the "breaking down." But it is not yet thin enough; it must be rolled ten times if gold, or eight if silver, to reduce it sufficiently, occasionally annealing it to prevent its breaking. No wonder the rollers look bright, they breakfast on silver and dine on gold.

That dial is not exactly a clock, though it looks like one. Do you see the little crank handle on it, above the hands? That is to regulate the space between the rollers. By turning it the distance is increased or reduced, and the hands of the dial are moved by the same means, to show the interval between them. For instance, when the hands indicate 12 o'clock the rollers are as far apart as they can be. By turning the crank until the hands are at, say, half past one o'clock, the distance is reduced about the sixteenth of an inch. It has been ascertained that when the hands point to, for instance, half past six, the rollers will be at the right distance from each other for rolling the strips thin enough for half eagles. So instead of saying, "Roll that strip the eighth of an inch thick," it is "Roll it to half past six." The rollers can be brought very close together. Give him that visiting card in your hand—there, it is pressed so hard that its texture is destroyed, and it crumbles like crisp pie-crust.

This dial arrangement, and some other improvements in the mill, are due to Mr. Franklin Peale, former chief coiner of the Mint, who devised it for the purpose of securing greater accuracy in measuring the distance between the rollers.

The pressure applied is so intense that half a day's rolling heats, not only the strips and rollers, but even the huge iron stanchions, weighing several tons, so hot that you can hardly hold your hand on them.

Every mill can be altered to roll to any degree of thinness, but usually the ingot passes through



COURT-YARD.

several mills, each reducing it slightly. This is quicker than altering the gauge so frequently.

When the rolling is completed the strip is about six feet long, or six times as long as the ingot.

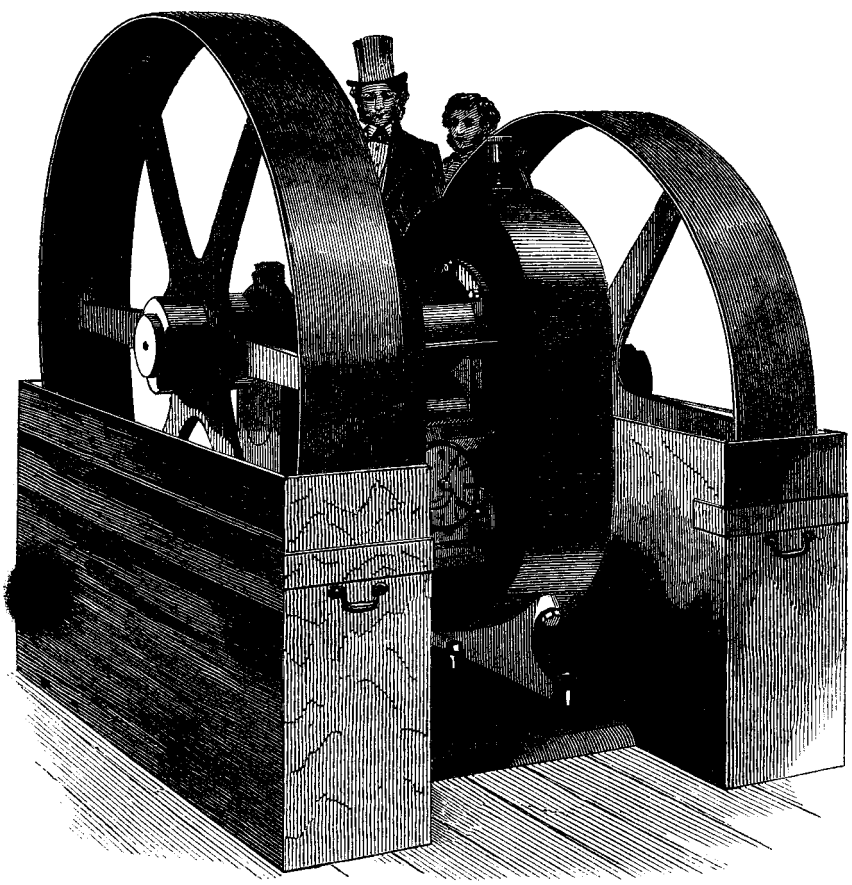
It is impossible to roll perfectly true. Now and then there will be a lump of hard gold, which will not be quite so much compressed as the rest. If the coin were cut from this place, it would be heavier and more valuable than one cut from a thinner portion of the strip. It is, therefore, necessary to "draw" the strips, they first being softened by annealing.

Just turn to your right and see those long round copper boxes, into which that clever, plump-looking man is putting the gold strips. He'll tell us all about it.

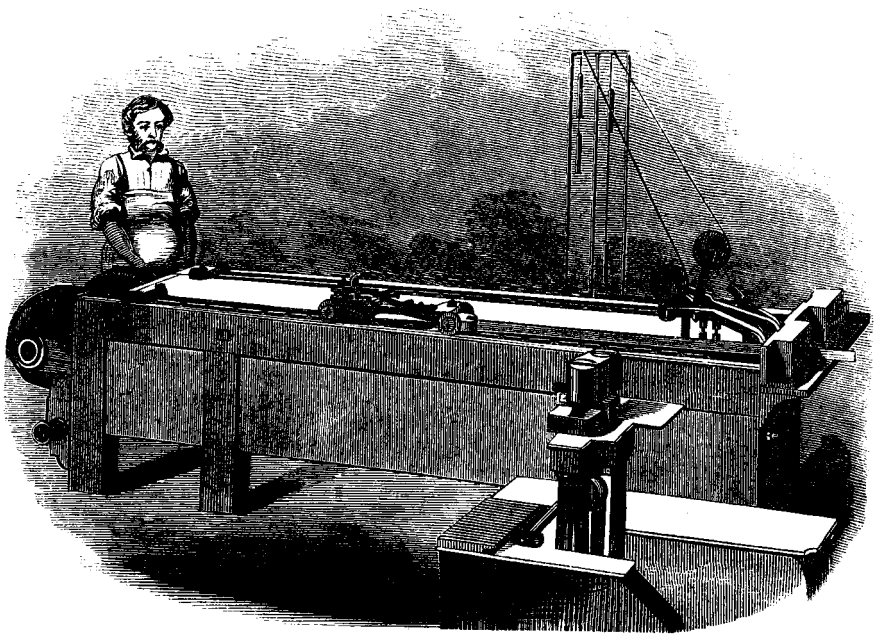
"Yes, mum; ye see we have to anneal this here gold, to make it soft so we can draw it. So we puts it in these boxes, and puts on the cover and seals it up air-tight with clay. It don't do to anneal gold in the open fire like as we can silver; for if we only get a hole in the box no larger than the head of a pin, it will let in the air and turn the color of the whole gold. They call it oxydizing. In that furnace we anneal the silver, but we don't put silver into boxes, 'cause we can heat that in the open fire without its turning. We puts these boxes into this furnace—you can look in at the door while I lift it up. Those in there are red-hot, and we keep 'em in about an hour, mum, till all the gold gets red-hot too. It would twist about like a snake if we took out a strip while it was so hot. When it is well *het* we take the boxes out with tongs, and put 'em into that tank of water to cool 'em, mum. There's from a thousand to twelve hundred dollars in every one of those strips, mum."

It's too hot to stay here long, so pick your way carefully among these boxes of gold, silver, and copper strips, and ingots, to the other end of the room. Be careful of that stand; it is terribly dirty. It is where they are greasing the silver strips and waxing the gold, to enable them to pass through the drawing bench easier. Wax is a better lubricator than grease for gold.

That long table, with the odd-looking, endless chain, running from right to left, making a deafening noise, is the Drawing Bench. In fact, there are two benches, one on each side of the



ROLLING MILL.



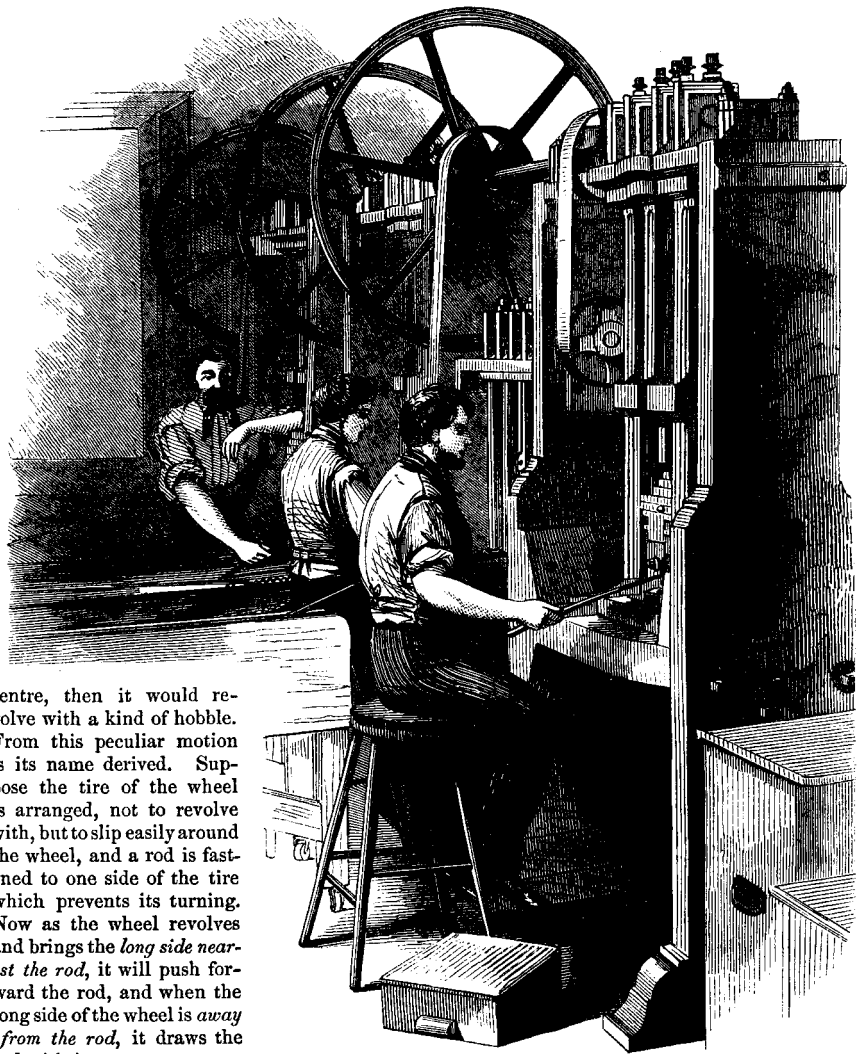
DRAWING BENCH.

table. At the right end you see an iron box secured to the table. In this are fastened two perpendicular steel cylinders, firmly supported in a bed, to prevent their bending or turning around, and presenting but a small portion of their circumference to the strip. These are exactly at the same distance apart that the thickness of the strip must be. One end of the strip is pinched somewhat thinner than the rest, to allow it to slip easily between the cylinders. When through, this end is put between the jaws of a powerful pair of tongs, or pincers, fastened to a little carriage running on the table. One carriage you see has a flag fastened to it, and has drawn a strip nearly through. The carriage to the further bench is up close to the cylinders, ready to receive a strip, which is inserted edgewise. When the end is between the pincers, the operator touches a foot pedal which closes the pincers firmly on the strip, and pressing another pedal, forces down a strong hook at the left end of the carriage, which catches in a link of the moving chain. This draws the carriage away from the cylinders, and the strip being connected with it has to follow. It is drawn through the cylinders, which, operating on the thick part of the strip with greater power than upon the thin, reduces the whole to an equal thickness. When the whole is through, the strain on the tongs instantly ceases, which allows a spring to open them and drop the strip. At the same time another spring raises the hook and disengages the carriage from the chain. A cord fastened to the carriage runs back over the wheel near the head of the table, and then up to a couple of combination weights on the wall beyond, which draw the carriage back to the starting-place, ready for another strip.

The original machine was invented by Mr. Barton, Controller of the British Mint; but this table has been so far improved by Mr. Peale as to be almost his own creation. Barton's table required two men to operate it, while Peale's requires only one. The arrangement of the combination weights to draw back the carriage, fast at first and slower as it reaches the starting-point; the application of the pedals to close the tongs and attach the carriage to the chain, are Mr. Peale's invention. His machine is arranged to run with much less noise than Barton's, and has other minor improvements.

Just turn around and we shall see the next process the strips undergo, after being washed free from grease or wax in warm water. Round pieces, called *planchets*, a little larger than the coins they are to make, are being cut from them. Four cutting presses of one kind are in a row; but more being required, Mr. Peale constructed two on about the same principle, but much more compact and handsome. An outline of one of them can be seen in the fore-ground of the engraving "Drawing Bench." They are not, however, quite so conveniently adjusted as the old ones; and as these show the mode of operating more plainly, we will examine them.

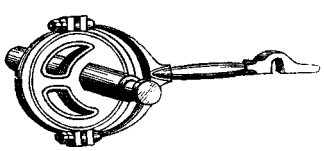
The press consists of a vertical steel punch, which works in a round hole or matrix, cut in a solid steel plate. The action of the punch is obtained by an eccentric wheel. For instance, in an ordinary carriage wheel the axis is in the centre, and the wheel revolves evenly around it. But if the axis is placed, say four inches from the



CUTTING PRESSES.

centre, then it would revolve with a kind of hobble. From this peculiar motion is its name derived. Suppose the tire of the wheel is arranged, not to revolve with, but to slip easily around the wheel, and a rod is fastened to one side of the tire which prevents its turning. Now as the wheel revolves and brings the *long side nearest the rod*, it will push forward the rod, and when the long side of the wheel is *away from the rod*, it draws the rod with it.

The upper shaft, on which are seen the three large wheels, has also fastened to it, over each press, an eccentric wheel. In the first press will be seen three upright rods running from near the table to the top. The middle one is connected with a tire around the eccentric wheel, and rises and falls with each revolution. The eccentric power is very popular among machinists, as it gives great rapidity of motion with but little jerking.



ECCENTRIC WHEEL.

The operator places one end of the strip under the punch and cuts out a couple of planchets, which are a fraction larger than the coin to be struck. As the strips are of uniform thickness, if these two are of the right weight, all cut from the strip will be. They are therefore weighed accurately. If right, or a little too heavy, they are allowed to pass, as the extra weight can be filed off. If too light, the whole strip has to be remelted. The strips that are correct are quickly cut up, the press striking 220 double eagle planchets, or 250 smaller pieces, in a minute. A man has cut over a million dollars in double eagles in a single day. As fast as cut the planchets fall into a box below, and the perforated strips are folded into convenient lengths to be remelted. From a strip valued at about

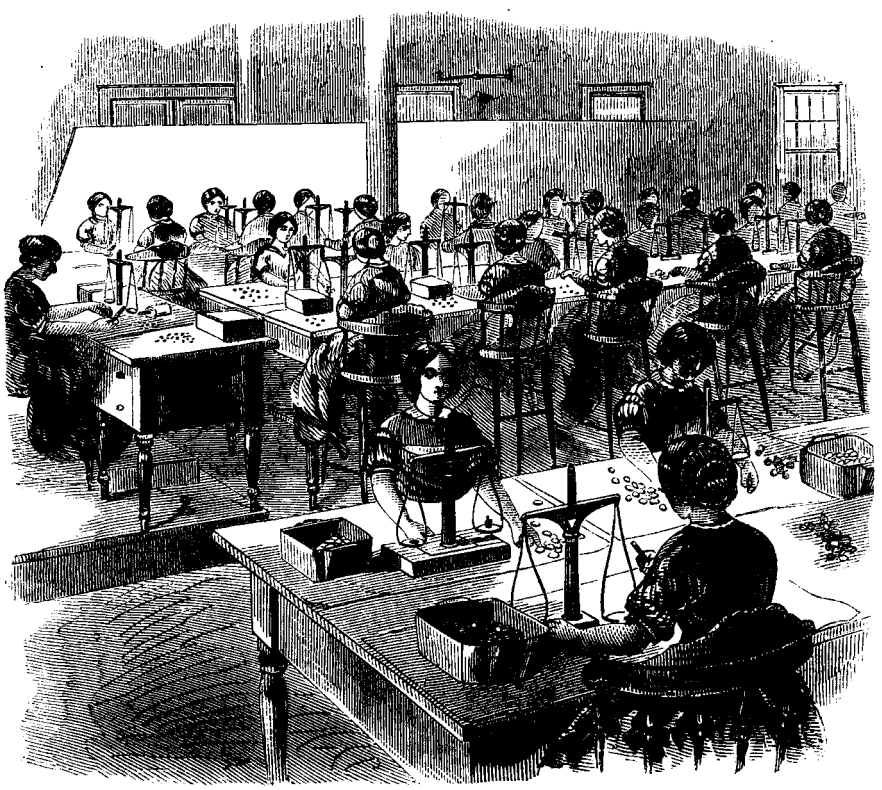
eleven hundred dollars, eight hundred dollars of planchets will be cut. They are still in a very rough, ragged state, and look but little like coin. The second press, rather smaller than the rest, is the first introduced, and has been in constant use for about forty years; has never been broken, or had fifty cents' worth of repairs done to it.

We will leave this room, and go into a much more cheerful one for a moment, to see the sorting of the planchets. They are thrown upon a table with two holes in it, and a woman picks out all the imperfect pieces or chips, which are slipped into one hole, and the perfect ones into the other, where they fall into different boxes. It is not much to see; so come into the entry, up the marble stairs to the second story, past the Director's room, out upon a gallery looking down upon the court-yard below. At the further end of the gallery we pass through a small entry, and enter a room. What a peculiar noise, like a young ladies' school at recess, only a strange filing sound withal! Nearly sixty females, some young and pretty, some—middle-aged and fine-looking. Jessie will have to do the examination: we can not stand the hundred and twenty eyes brought to a focus on us.

She tells us it is the Adjusting Room. Each operator has on the table before her a pair of assay scales. Seated close to the table, a leather apron, one end tacked to the table, is fastened under her arms to catch any gold that may fall. In short sleeves, to avoid sweeping away the dust, and armed with a fine flat file, she is at work, chatting and laughing merrily. She catches a double eagle planchet from a pile by her side and puts it into the scale. It is too heavy. She files it around the edge, and weighs it. Still too heavy. Files it again, and weighs it. Almost right. Just touches it with the file. Right; the index is in the centre. She tosses it into the box, and picks up another to undergo the same operation.

The proper weight of the double eagle is 516 grains, and the smaller gold coins are in the same proportion. Absolute perfection is impossible in the weight of coin, as in other matters, and the law therefore allows a variation of one half of a grain in the double eagles; therefore, between a heavy and a light piece, there may be a difference of one grain. This is so slight, however, not two cents in value, as to be deemed sufficiently correct. The weight of the silver half dollar is 192 grains, and smaller pieces in proportion, with the exception of the cent, which, being composed of 88 per cent. copper and 12 per cent. nickel, the weight is 72 grains. The weight of the silver coin was reduced in April, 1853. Prior to that date the half dollar was 206¼ grains.

To adjust a coin so accurately requires great



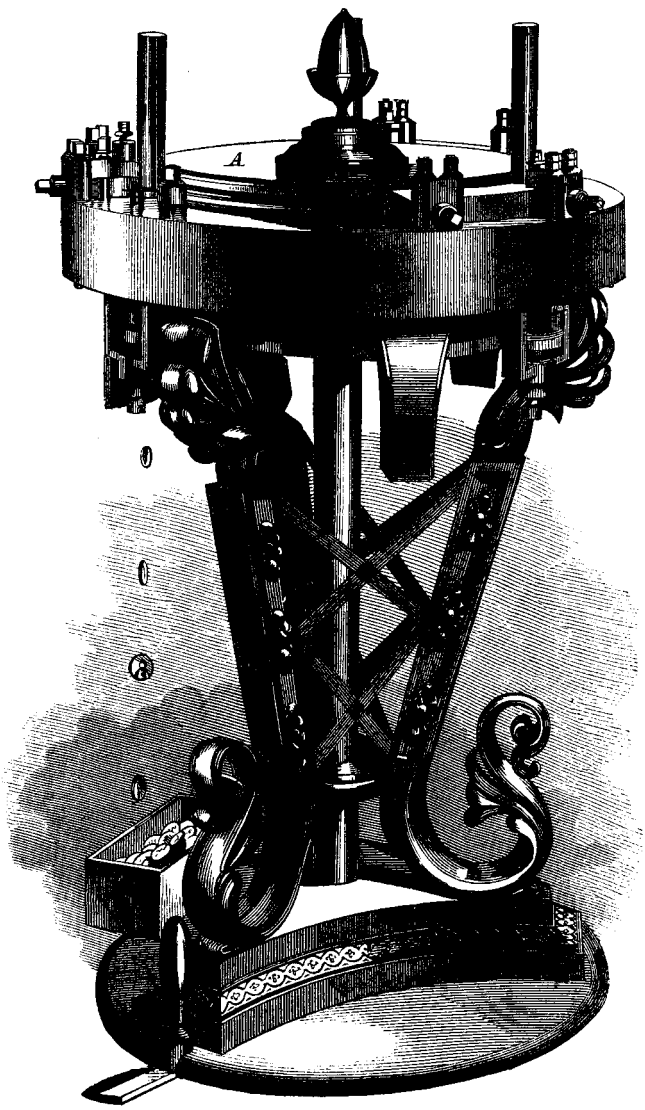
ADJUSTING ROOM.

delicacy and skill, as a too free use of the file would quickly make it too light. Yet by long practice, so accustomed do the operators become, that they work with apparent recklessness, scarcely glancing at planchet or scales, but seemingly guided by their touch. Our artist attempted to obtain a photograph of the room while they were at work, but it was found impossible for fifty-five out of the sixty to remain quiet long enough for the camera to operate. It was necessary to take the room after they had left, supplying the figures in the drawing.

The exceedingly delicate scales were made under the direction of Mr. Peale, who greatly improved on the old ones in use. So delicate are they that the slightest breath of air affects their accuracy, rendering it necessary to exclude every draft from the room, which, being poorly ventilated, in a hot day is an uncomfortable and probably an unhealthy place. Colonel Childs, the late chief coiner, exercised great care to counteract this difficulty by occasionally stopping work, and opening the windows. The whole process, however, is behind the times. Hand-work can not compete with machinery. Sixty adjusters can not keep the coining presses supplied, and genius must find a quicker way of performing the work. It is here that the delay occurs, keeping depositors waiting from twenty to thirty days for the coin they should receive in a week. It is astonishing that our Mint has not made the advancement here that it has in every other department.

Only the gold pieces are adjusted in this manner. The silver has merely the adjustment of the two planchets weighed at the cutting press. A greater allowance is made in the weight of silver coin, as it is less valuable, and it would be almost impossible to have such a vast number of small pieces separately examined. Mr. Peale ordered from Paris a beautiful and delicate coin-separator, which he intended to apply to silver (although the one received is adapted to the half eagle only), but owing to its not arriving until he had been removed it has never been put in operation. It is so arranged that the planchets, being placed in at one end, are carried through the hopper and dropped singly on a balance. If too light it is tipped into a box at one side; if too heavy, into another box; if exactly right, into a third box. The instrument does not adjust the weight, but merely separates the heavy and light planchets. For silver, however, this would be desirable, as a more uniform weight could be preserved. Why it has never been put in use we are unable to learn.

The females in the adjusting room are paid



MILLING MACHINE.

$1 10 a day for ten hours' work. They look happy and contented. Behind the screens, at each end of the room, are dining-halls, where they eat the dinners they bring with them. On the whole, it is the pleasantest work-shop for women we have yet seen, and the pay, in comparison with that ordinarily given to women, is good.

If you examine a double eagle, or, lacking one, a quarter of a dollar, a slight rim will be noticed around the edge, raised a little higher than the device. It is done to prevent the device being worn by rubbing on counters, etc., and also that the coins may be piled one on another steadily. This edge is raised by a very beautiful piece of mechanism called a Milling Machine, the invention of Mr. Peale, and vastly superior to any other in use.

Some twenty or thirty planchets are placed in one of the brass vertical tubes, of which there are three, for different sized coins. At the bottom of the tube the lowest planchet is struck by a revolving feeder, which drives it horizontally between the revolving steel wheel (marked A in the engraving) on one side, and the fixed segment (marked B) on the other. The segment is on the same curve as the wheel, though somewhat nearer to it at the further end. The planchet is caught in a narrow groove cut in the wheel and segment, and the space being somewhat less than the diameter of the planchet the edge is crowded up about the thirty-second part of an inch. The planchet makes four revolutions when it reaches the end of the segment, and being released from the grooves falls into a box below. The edge is perfectly smooth, the fluting or "reeding," as it is termed, being put on in the process of coining. The work is so nimbly performed that about one hundred and twenty double eagles, or five hundred and sixty half dimes, can be milled in one minute. This is a vast improvement on the English milling machine, worked by hand, and operating on but two planchets at a time.*

The planchets being milled are called blanks. They are very dirty and discolored by the processes they have undergone, requiring to be polished before coining. This is done in the Whitening Room, and an exceedingly hot place it is. Sometimes in summer the thermometer will indicate 120°, though the tall man by the furnace declares that it is often at 175°. The room is too small and poorly ventilated for the use to which it is put. There are two furnaces for annealing the blanks, they being placed in a copper box, with a cover sealed on air-tight with clay. Boxes and blanks are heated red-hot, and the blanks tipped into a vat containing a weak solution of sulphuric acid and water, to cleanse them. The stream of water in the other vat is hot, in which the blanks are washed free from the acid, leaving them a beautiful white color, almost like silver.

* A full description of the English process of coining, with engravings of the machinery, can be found in "Encyclopædia Britannica," article "Coinage."

The curious copper machine, looking like a large revolving squirrel-cage, is the drying-drum. About half of it is a tight copper drum, into which the blanks from the hot water are placed with a quantity of basswood saw-dust. Steam is introduced through the axis to heat the interior, and the drum made to revolve, causing the blanks to roll among the heated saw-dust and dry themselves. Basswood dust is used because of its freedom from sap, pitch, or gum of any kind. It is extremely pure. In the language of one of the men, "It ain't got nothing about it but just wood."

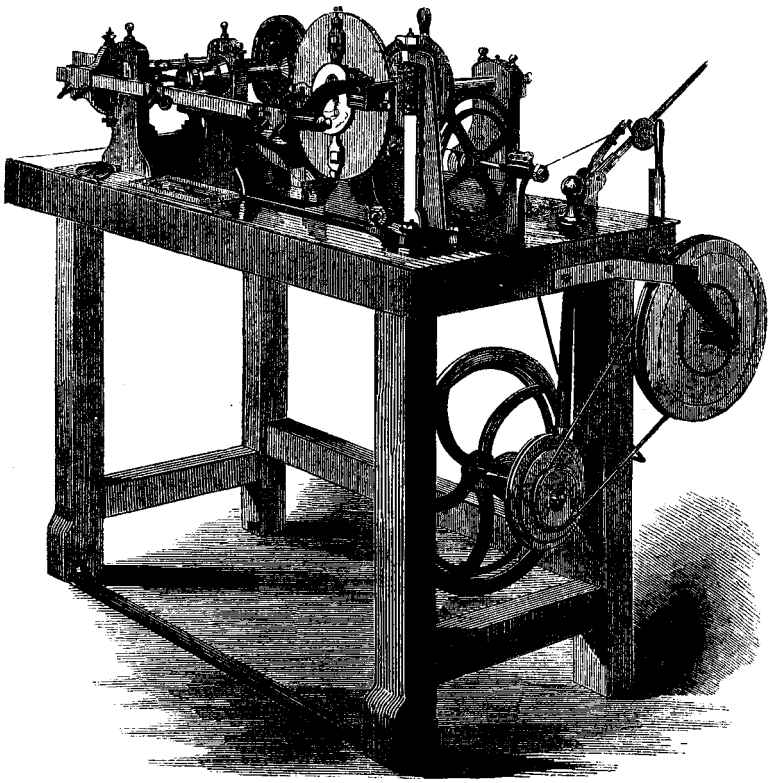
When the blanks are dry a door in the end of the drum is opened, allowing them to fall into the sieve, where they tumble about, the dust gradually sifting out, leaving the coin clean. To brighten them they are kept revolving for an hour, and the friction of one upon another gives them a beautiful lustre. It is in this way that pins, brass buttons, and the like are polished.

They are taken from the drying-drum, and heated in a large warming-pan, with steam-pipes running under it, until Jessie would hardly hold a handful for the gift of them, though they are all double eagles. They are now ready for coinage, and that prettily painted truck is taking a couple of hundred thousand dollars to the other room for the purpose.

Before examining the coining we must visit the Die Room, to learn how the dies are made. A coin has an impression on both sides, requiring, of course, a die for each. These are to be made with extreme care, to be of the finest workmanship, and all exactly alike. Their manufacture is one of the most important operations in the Mint.

Look at the bas-relief of Liberty on one side of a coin. It would be exceedingly difficult to design this in hard steel and of so small a size; so they first make the design in wax, probably six times as large as the coin, by which means the beautiful proportions can be obtained. From this a brass cast is taken, and reduced on steel to the size of the coin by a transfer or reducing lathe. This ingenious instrument was introduced from France by Mr. Peale, who also operated it for some time.

The brass cast is fastened to the large wheel at the right-hand side of the lathe. On the small wheel to the left of the cast is fastened a piece of soft steel, on which the design is to be engraved. Both of these wheels revolve in the same way and at the same speed. There is a long iron bar or lever fastened by a joint to an iron support at the extreme left, which runs in front of the two wheels. A spring at the upper end draws it in toward the wheels. Fastened to the lever is a pointed steel stub, which touches the cast. A very sharp "graver" is fastened to the lever below, which touches the steel. The wheels revolve, and the stub, when it is pushed back by the heavy relief of the cast, forces back the lever, which draws back the graver, and prevents it cutting the steel. So where there is a raised place in the cast the graver is prevented from cutting



TRANSFER LATHE.

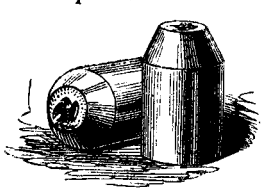
into the steel, but where there is a depression in the cast the graver cuts the same in the steel.

As the lever is jointed at the left, the nearer the graver is placed to that end the less motion it will have. So that the distance of the steel from the joint regulates the proportion of the reduction from the cast.

After the graver has cut one small shaving around the steel, a screw is turned, which lowers the right end of the lever slightly, just enough to allow the graver to cut another shaving, and the stub to touch the cast a very little further from the centre. Thus the graver cuts a very little at a time; but the work is cut over several times, until the design is sufficiently blocked out. This machine will not finish off the die perfect enough to use; but it reduces the design in perfect proportion, and performs most of the rough work. The original dies for coins being now all made, the lathe is used mostly for medals, of which a great many are struck, by order of Congress, for various purposes. A very fine one was presented to the Japanese while they were in this country. There is now in the machine a cast of Washington's bust, merely to show how the cast is placed.

After the die comes from the lathe it is carefully finished off by hand, and when all polished is a beautiful piece of work. It is still very soft, requiring to be hardened before it can be used, which is done by heating it very hot, and holding it under a stream of water until cold. The relief is exactly like the coin—that is, the device is raised as in the coin. It will not do to use this in stamping, as it would reverse the appearance on the coin. Therefore this "hub," or "male die," as it is named, is used only to make other dies.

Round pieces of very soft steel, a little larger than the die, are smoothed off on the top, the centre being brought to a point a little higher than the sides. It is placed on a solid bed, under a very powerful screw-press, and the hub placed on top of it—the centre of the hub on the point of the steel, like a seal on the sealing-wax. The screw is turned with great force by several men, and presses the hub a little into the steel. It is necessary to have the steel higher in the centre, as if the centre impression is not taken first, it can not be brought out sharp and distinct. The steel is softened again by being heated and allowed to cool slowly, and the operation is

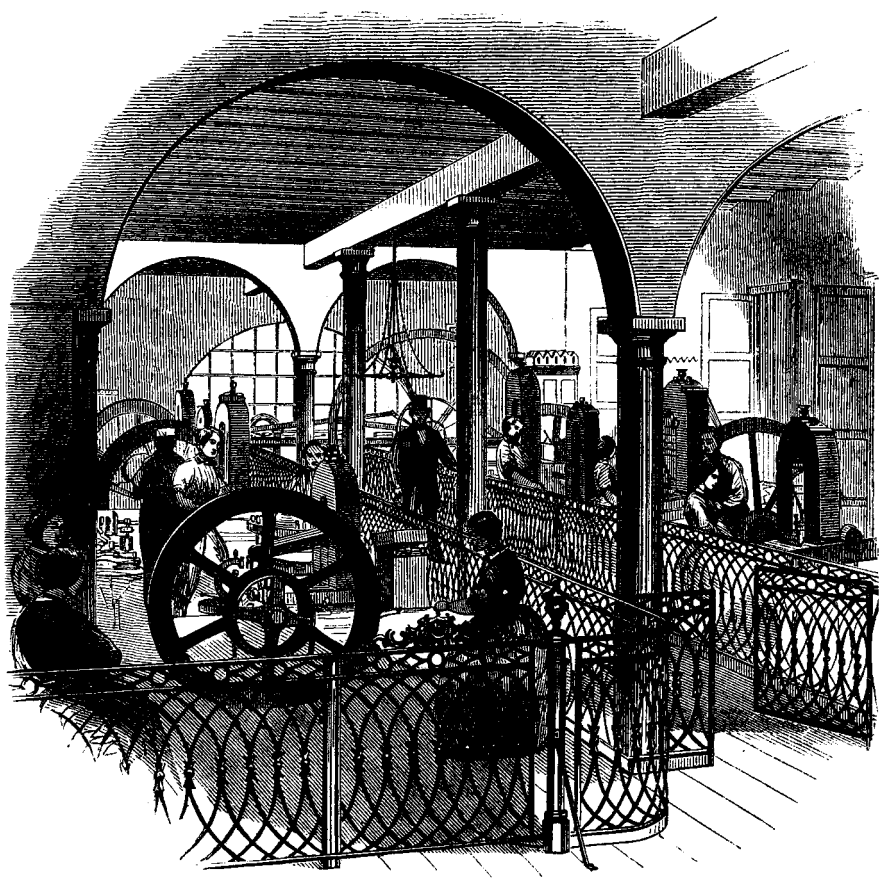


DIES.

repeated. This is done several times, until the whole impression is full and distinct. If there is any little defect it is rectified with the engraver's tool. The surplus steel around the edge is cut off, and the date put in by hand, when it is hardened and ready for use. The date is not cut on the hub or on the first die—which is called a "female"—as perhaps the hub will last for two years, and the date can not be altered. This die is never used to stamp with, but preserved, so that if the hub breaks it can be used to make another. The dies for use are prepared in the same way. About thirteen hundred a year are made for the various Branch Mints, and those for the New Orleans Mint were sent on just before the State seceded, which the authorities have not yet had time to return. Sometimes a die will wear for a couple of days, and again they will break in stamping the first coin. Steel is treacherous, and no dependence can be placed in its strength. As nearly as can be ascertained their cost is sixteen dollars a pair.

We will now enter the Coining Room, a light, airy hall, filled with brightly polished machinery, kept as clean as the milk-pans in a New England dairy. Jessie can handle it as freely as her fan without soiling her light gloves, or trail her dress over the floor without a misgiving. A passage-way in the middle of the room is separated from the machines on both sides by a neat iron fence. The quantity of gold and silver lying about would make it unwise, especially in these times, to allow strangers to mingle among it. Visitors can see every thing from this passage-way, but the pleasure of handling is denied.

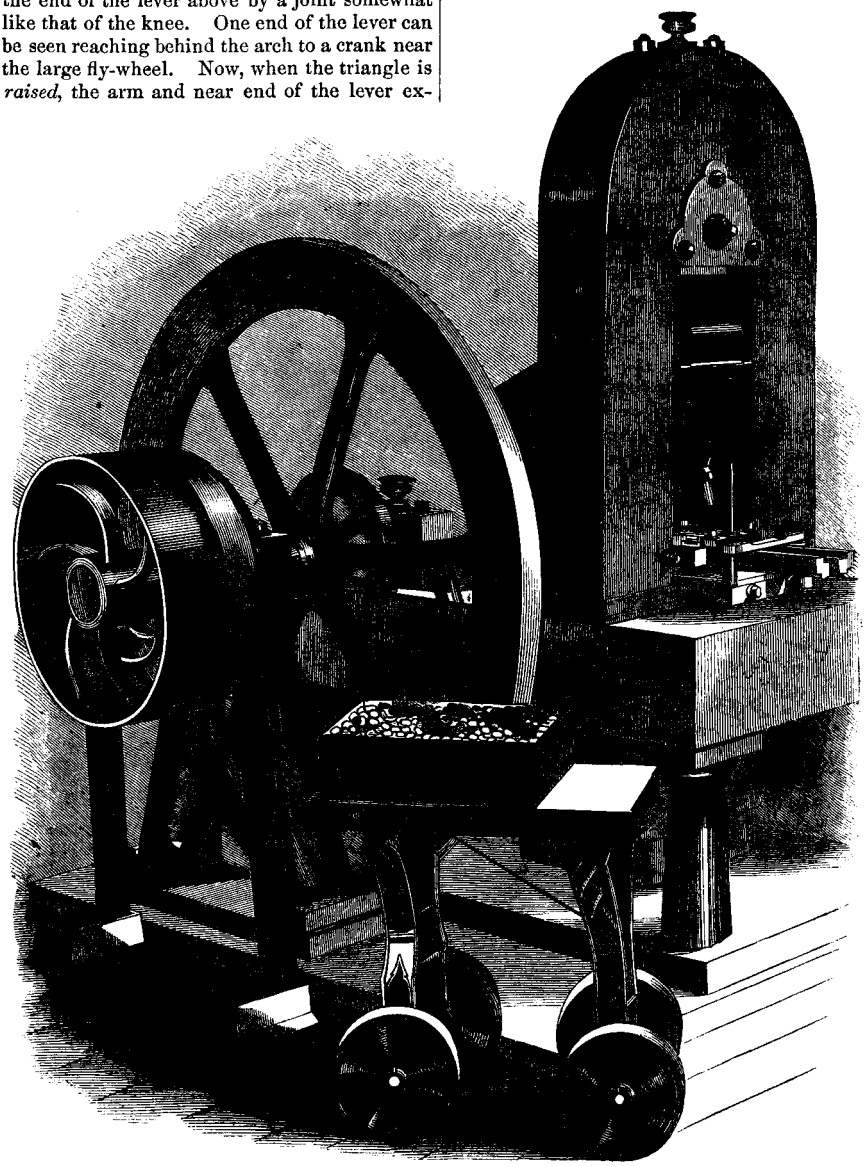
There are two styles of coining presses, both working on the same principle, but some more compact and handsome than the others. They are the invention of Mr. Peale, the plan being taken from the French press of Thonnelier's. Peale's press works much more perfectly and rapidly, and is a vast improvement over the old-fashioned screw-press still used in England. It seems to be as nearly perfect as any thing can be. In the engraving we have given one of the old presses, as it is more open and exhibits better the working power. There is so little difference, save in form, that, essentially, they are the same. There are eight presses, all turned by a beautiful steam-engine at the further end of the room.



COINING ROOM.

The power of the press is known as the "toggle," or, vulgarly, "knee" joint, moved by a lever worked by a crank. The arch is a solid piece of cast iron, weighing several tons, and unites with its beauty great strength. The table is also of iron, brightly polished and very heavy. In the interior of the arch is a nearly round plate of brass, called a triangle. It is fastened to a lever above by two steel bands, termed stirrups, one of which can be seen to the right of the arch. The stout arm above it, looking so dark in the picture, is also connected with the triangle by a ball-and-socket joint, and it is this arm which forces down the triangle. The arm is connected with the end of the lever above by a joint somewhat like that of the knee. One end of the lever can be seen reaching behind the arch to a crank near the large fly-wheel. Now, when the triangle is *raised*, the arm and near end of the lever extend outward, as when one is resting his whole weight on one leg the other bends out at the knee. If the knee is drawn in and the leg straightened, the whole body will be slightly raised.

The press is on exactly the same principle. When the crank lifts the further end of the lever it draws in the knee and forces down the arm until it is perfectly straight. By that time the crank has revolved and is lowering the lever, which forces out the knee again and raises the arm. As the triangle is fastened to the arm it has to follow all its movements. Thus we have got the motion, which is all-important.



COINING PRESS.

Under the triangle, buried in the lower part of the arch, is a steel cup, or, technically, a "die stake." Into this is fastened the reverse die, or, according to boys' dialect, the "tail" die. The die stake is arranged to rise about the eighth of an inch, but when down it rests firmly on the solid foundation of the arch. Over the die stake is a steel collar or plate, in which is a hole just large enough to allow a blank to drop upon the die. In the triangle above the obverse die is fastened, which moves with the triangle; and when the knee is straightened the die fits into the collar and presses down upon the reverse die.

Just in front of the triangle will be seen an upright tube made of brass, and of the size to hold the blanks to be coined. The blanks are examined by the girl in attendance, and the perfect ones are placed in this tube. As they reach the bottom they are seized singly by a pair of steel feeders, in motion as similar to that of the finger and thumb as is possible in machinery, and carried over the collar and dropped upon the die. The knee is straightened, forcing the obverse die to enter the collar and press both sides of the blank at once. The sides of the collar are fluted, and the intense pressure expands the blank about the sixteenth of an inch, filling the collar and producing on the coin the fluted or reeded edge. It is put on to prevent any of the gold being filed away.

After the blank has been dropped upon the die, the feeders slide back on the little platform extending in front of the machine, in readiness to receive another. The knee is bent, which raises the die about half an inch above the collar. The die stake is raised at the same time, so as to lift the newly-born coin from the collar, and the feeders coming along with another blank, push the coin over into a sloping channel, whence it slides into a box underneath. The pressure on the double eagle is about seventy-five tons; yet so rapid are all these complex motions that eighty double eagles are coined in a minute; and while the reader has been studying out this explanation probably ten or twelve thousand dollars could be struck on a single press. The smaller pieces, such as dimes and half dimes, are coined at the rate of one hundred and forty a minute. — While usually only seventy-five tons pressure are applied, the large presses will stand a strain of one hundred and fifty tons. Sometimes Government and other large medals are struck, which require this heavy power.

It is a beautiful sight, as the bright glistening coins drop in a golden stream, with the peculiar metallic clink so pleasant to hear. It is as pretty a cascade as one often sees. Jessie remarked to one of the men that it must be exceedingly tantalizing to be handling so much wealth, yet to have so little of it.

"Why, we don't think nothing of this—we just kick it about like so much old iron; but when we get our month's pay in our pockets we feel rich, I—tell—you!"

The number of pieces here coined is almost incredible. During the year 1860 there were coined 25,164,467 pieces, amounting in value to $22,781,325 50. Among these were 21,466,000 cents. During the first five months of 1861 there have been coined 12,248,037 pieces, in value $31,123,206. The gold demand has been entirely for double eagles, 1,461,506 having been coined. The present interruption of foreign importations has caused a great influx of gold, to be coined for home use. Since the commencement of the Mint in 1793 there has not been as much value coined in any *year* (save in 1851), as during the first *five months* in 1861. The smallest coinage was that of 1815, when only 69,869 pieces were struck, in value $16,385 50. The greatest coinage in value, before 1861, was in 1851, when 24,985,716 pieces, including 147,672 half cents, and in value $49,258,058 43 were struck. The largest number of *pieces* were coined in 1853, amounting to 69,770,961. The whole amount of coinage at the Philadelphia Mint, up to June, 1860, is 671,904,388 pieces, of a value of $423,426,504 24. The coinage of the branch Mints will add $227,803,096 to this value. Very possibly much of this has been coined over two or three times, our specie having been sent to Europe and there melted and coined; then perhaps returned here in shape of sovereigns, to be reconverted into eagles.

There is a melancholy pleasure in seeing these



DELIVERING COIN TO THE TREASURER.

large figures of unrealized, if not untold wealth; and it seems strange that, with such a vast amount in the world, it is so difficult to collect a few paltry thousands.

After being stamped the coins are taken to the chief coiner's room, and placed on a long table—the double eagles in piles of ten each. It will be remembered that, in the Adjusting Room, a difference of one half a grain was made in the weight of some of the double eagles. The light and heavy ones are kept separate in coining, and, when delivered over to the treasurer, they are mixed together in such proportions as to give him full weight in every delivery. By law the deviation from the standard weight, in delivering to him, must not exceed three pennyweights in one thousand double eagles. The gold coins—as small as quarter eagles being counted, and weighed to verify the count—are put up in bags of $5000 each. The three-dollar pieces are put up in bags of $3000, and one-dollar pieces in $1000 bags. The silver pieces, and sometimes small gold, are counted on a very ingenious contrivance called a "counting-board," somewhat resembling a common wash-board. They are all subsequently weighed, however, to verify the correctness of the counting. For the various duties of the Mint there are about two hundred persons employed as clerks, workmen, etc.—say one hundred and forty men and sixty women—the number depending, of course, upon the amount of work to be done.

We can not conclude without a tribute to the skill and genius of Mr. Franklin Peale, brother to the late Rembrant Peale. In 1833 he was appointed assistant assayer, and ordered to spend two years in examining the European Mints, which he did, returning in 1835 laden with plans of improvements much needed in our then very imperfect Mint. In 1836 he was appointed melter and refiner; and while performing those duties introduced the beautiful process, described in the last number of the Magazine, of precipitating chloride of silver by means of common salt—a much quicker and cheaper process than the old one, requiring the use of copper. He is not the discoverer of this method, but the first to apply it to a practical use on a large scale. In 1839 Mr. Peale was appointed chief coiner, and we have seen traces of his skill in the various machines employed. It is safe for the visitor to ascribe to his ingenuity—either in design, improvement, or construction—almost any machinery in the Mint which is finished, complete, and compact. In 1854 Mr. Peale was removed by the President.

This removal was certainly unfortunate, as mainly to the efforts of Mr. Peale America is indebted for the finest Mint in the world. An attaché of the Royal Mint, London, recently visited ours at Philadelphia. As he was leaving, he remarked to the coiner, "When you come to London, I beg you not to visit our Mint. You are a hundred years in advance of us."

THE OKAVANGO RIVER.*

AFRICA has within a few years furnished materials for several valuable books. Barth, the most diligent of explorers, journeying with note-book and pencil in hand, has given the topography and history of the continent from Tripoli on the north to Adamawa on the south, and from Darfur on the east to Timbuctu on the west, covering three-fourths of the continent north of the equator. His great work will not be superseded in our day. He covers the northern part of Africa to within four degrees of the equator. Livingstone, who brings to the missionary work faculties which would have made him a Marshal of the Empire under either of the two great Napoleons, describes a broad belt reaching across the continent south of the equator. "What do you think of Livingstone?" asked Mr. Andersson of a famous African sportsman and traveler. "Well," was the reply, "to look at the man you would think nothing of him; but, saving your presence, he is a plucky little devil." The "plucky" little missionary has that authority in him which men would fain call master. The Makololo, the scourges of the central parts of Southern Africa, obeyed him like children, attending him all through his marvelous journey across the continent, the only complete transit hitherto made; and quietly awaited on the eastern shore the fulfillment of his promise to return to them. Four degrees of latitude on each side of the equator separate the regions described by Barth from those traversed by Livingstone. Burton from the east, and Du Chaillu from the west coast, penetrated some distance into this hitherto unexplored equatorial belt. Du Chaillu's explorations are especially interesting. So strange are his accounts of the tribes whom he encountered, that many have doubted the truth of his statements. Even Barth is inclined to discredit them. But Barth was never within six hundred miles of this region—a distance in Africa equivalent to some months' journey, and his travels brought him among people of a wholly different race. Burton, on the contrary, who has approached nearest to this region, gives full credit to Du Chaillu's representations. The relations of Marco Polo and Bruce were in like manner pronounced fabulous; but subsequent observations have shown their entire truth. We doubt not that such will be the case with Du Chaillu. At all events, Burton, who has just been appointed consul at Fernando Po, will doubtless in time explore the equatorial belt, and thus solve the only remaining problem of African geography.

Among African travelers a high place belongs to Mr. Andersson. Nearly five years ago this

* *The Okavango River:* A Narrative of Travel, Exploration, and Adventure. By CHARLES JOHN ANDERSSON, author of "Lake Ngami." Harper and Brothers.