

word minstrel had had a separate history before it became synonymous (as in the *Catholicon Anglicum* of 1483) with *gesticulator*, *histrion*, *joculator*, and other names for strolling entertainers. Derived from the Low Latin *ministralis*, it was originally applied to those retainers whose business it was to play upon musical instruments for the entertainment of their lords. In Chaucer's *Squire's Tale*, the "minstralles" play before King Cambuscan as he dines in state "bifrom him at the bord deliciously," and the "loude minstralceye" precedes him when he rises and withdraws to the ornamented chamber,

Ther as they sownon diuerse instrumentz,
That it is lyk an heuen for to here

But even in Chaucer's time there were less respectable musicians than those of the king's household—strolling musicians, players on trumpets, clarions, taborets, lutes, rebecks, fiddles, and other instruments. These also were known by the generic name of minstrels, whether because many of them had learnt their art in noble households before they took to a vagabond life, or because the more respectable of them affected to be in the service or under the patronage of powerful nobles, as later on companies of strolling players figured as the "servants" of distinguished patrons. All the allusions to minstrels in literature from Langland's time to Spenser's point to them as strolling musicians. Some of them may have sung to the harp verses of their own composing, and some of them may have composed some of the ballads that now charm us with their fresh and simple art; but the profession of the "minstrel," properly so-called, was much less romantic than Bishop Percy painted it. It was not merely "the bigots of the iron time" that "called their harmless art a crime"; in a repressive Act passed by Henry IV. they appear with "westours, rymours, et autres vacabondes" among the turbulent elements of the community.

In a passage in Malory's *Morte Darthur*, the word minstrel is applied to a personage who comes much nearer the ideal of the Provençal *joglar*. When Sir Dinadan wished to infuriate King Mark, he composed a satirical song, and gave it to Elyot a harper to sing through the country, Tristram guaranteeing him against the consequences. When King Mark took him to task for this, the harper's answer was, "Wit you well I am a minstrel, and I must do as I am commanded of these lords that I bear the arms of." And because he was a minstrel King Mark allowed him to go unharmed. The service done by Elyot the harper in the old romance is a good illustration of the political function of the itinerant mediæval *joculator*; but even he did not sing verses of his own composing, and he was not a "minstrel" in the sense in which the word was used by romantic poets after the publication of Percy's *Reliques*. (w. m.)

MINT. The mint is the place where the coinage of a country is manufactured, and whence it is issued by sovereign authority, under special conditions and regulations. The privilege of coining has in all ages and countries belonged to the sovereign, and has, in England at least, been rarely delegated to any subject, and in any case in a restricted form, the crown always reserving the right of determining the standard, denomination, and design of the coins.

At a very early stage of civilization it was found necessary to have some definite medium of exchange, in order to avoid the great inconvenience arising from the system of payment in kind, which was the primitive and natural method. It was not long before metal came to be used as such a medium, probably from its durability and portability, and in the case of gold and silver on account of their intrinsic value. The less liable the value of a metal is to change the better it is suited for a standard of value.

Though historians assure us that metals were found in

Britain at a very early period, there does not appear to be any evidence that the mines were worked until considerably later than the time at which the use of metal as a medium of exchange was introduced. It is probable therefore that the metals for exchange were imported into Britain long before the native mines were developed.

The metals chiefly used were silver and brass, which were at first simply exchanged by weight for commodities of all kinds. As commercial transactions became more numerous and more complicated, this system of payment grew troublesome, and it was found convenient to divide the mass of metal into small parts, which soon took the form of rough coins. But the principle of payment by weight was retained through many centuries, and is perpetuated, though in name only, in the word "pound."

Records of attempts to organize the coinage of England are found as far back as the Anglo-Saxon period, and it is known that on the dissolution of the Heptarchy the mints were regulated by laws framed in the witenagemot. The first monarch who appears to have dealt successfully with the organization of the coinage was Athelstan, who framed laws for the regulation of the mints, and appointed officers whose titles and duties are then first recorded. The only officers connected with the coinage of whom mention is found before this time are the "moneys," who appear to have been alone responsible for the manufacture of the coin; but it is probable that even then there existed some officer who had authority over them. In early Saxon and Norman times the number of moneys was considerable, mints being established in almost every important town, as might be expected at a period when communication between distant places was extremely difficult. They appear to have been the officers who actually performed the work of making the coin, the mint master in later times contracting with them, at a high rate, for the work. They were responsible for the purity and perfection of the coins produced, as appears from the fact that it was they who were punished (as traitors) in the case of any deficiency in weight or fineness. They had prescriptive rights in the coinage, and in modern times (even so late as 1850) claimed to have corporate privileges; but it is clear, on the authority of Ruding, that they never were a "corporation" separate from other officers of the mint.¹ The number of mints was greatly reduced after the Norman Conquest, but continued to be considerable until the reign of Richard I., when the work of coining for the whole kingdom was concentrated in the mint in the Tower of London. Only one provincial mint (Winchester) remained till a later date.

An important reorganization of the coinage took place in 1325 under Edward II., the regulations then framed for the manufacture and issue of the coins forming the basis of those still in force. The principal officers under these regulations were—master, warden, comptroller, king's assay master, Ling's clerks, and cuneator. The office of cuneator was one of great importance at a time when there existed a multiplicity of mints, since he had the sole charge of all the dies used not only at the mint in the Tower of London but also in the provinces. He chose the engravers and presented them to the barons of the exchequer in order that they might take the oath of fidelity; he superintended their work, and was generally answerable for the perfection of the dies before they were issued for use in the various mints of the country. The office, which was hereditary, ceased to exist when the provincial mints were suppressed. In its place was instituted the office of clerk of the irons,

¹ Among the special privileges which they undoubtedly enjoyed was exemption from local taxation, as appears in a writ of Henry III., which commands the mayor of London not to disturb them "by exacting tallages contrary to their privileges." Sometimes also houses were allowed to them rent free.

whose functions were more limited, and were not hereditary. This office was only recently abolished.

In the Middle Ages an important duty devolving on the officers of the mint was the collection of the seigniorage which was levied on the coining of money, not only for the purpose of covering the expenses of minting, but also as a source of revenue to the crown which the sovereign claimed by virtue of his prerogative. In former times the collection of the seigniorage was entrusted to the warden, who also superintended the manufacture of the coins, so far as to ensure the proper relations between the moneys on the one hand and the state on the other. He does not appear, however, to have had any responsibility with regard to the fineness and weight of the coins.

The king's assay master was specially charged with all matters relating to the accuracy of the standard. The officer next in rank to him was the comptroller, who presented annually to the barons of the exchequer a report of all the gold and silver money struck in the kingdom during the year. These reports, which were always written upon parchment, constitute the chief mint records. The king's clerk exercised a general superintendence and kept an account of all the mint transactions. As the work of the mint became more extensive and more complicated, other officers were added such as the surveyor of the meltings, surveyor of the money presses, and many others.

The present arrangements with regard to the officers of the mint were made in 1870, when several important changes took place in the mint establishment. Up to that time there had been two controlling officers,—the master, who in some instances was selected on account of distinguished scientific attainments as in the cases of Sir John Herschel and Professor Graham, and the deputy master and comptroller. A careful inquiry, however, having led to the conclusion that the control of the mint might with advantage be concentrated in the hands of a single officer of experience in the conduct of public business, it was decided, on the death of Professor Graham, to entrust the actual administration of the department to the deputy master,—the office and title of master of the mint being held by the chancellor of the exchequer for the time being, without salary. At the same time the services of a scientific officer were secured, by the appointment of a chemist of the mint. The coining and die department and the melting department were united under the name of the operative department, and placed under a single superintendent. The first deputy master appointed under the new regulations was the Hon. C. W. Fremantle, C.B., to whom the public are indebted for a series of *Annual Reports* which have given a new and increased interest to the subject of the coinage, and may be said to constitute in themselves a mint literature.

The actual operations of coining in early times were few in number and simple in character. The metals forming the alloy were melted together in the proportion necessary to bring them to the required standard, and the alloy thus obtained was cast into bars, which were reduced by hammering to the requisite thickness. They were then cut with shears into pieces more or less regular in size and form, roughly annealed, and finally impressed with the prescribed device by a blow with a hammer.

The last-named appears to have been the only part of the process which was performed with any great amount of care. The blank piece was placed by the hand upon a die fixed into a block of wood having a large heavy base to resist the oscillation caused by the blow; the die on which was engraved the device for the reverse of the coin was then placed upon the upper side of the blank and held by means of a holder, round which was placed a roll of lead to protect the hand of the operator while heavy blows were struck with a hammer by an assistant workman. One of the

earliest improvements in coining was the introduction of a tool in shape resembling a pair of tongs, the two dies being placed one at the extremity of each leg. This avoided the necessity of readjusting the dies between successive strokes of the hammer, and ensured greater accuracy in the impression. It was long before the system of coining by hand was superseded by the coining press, or mill, which, even after its first introduction, was only very slowly adopted. Several attempts were made to introduce machinery for coining before it was brought into active use, the objection to it being its great expense. The mill and screw were finally introduced into the mint under Charles II., when many improvements were also made in the preliminary operations. Steam-power was first applied in 1810, when the vacuum screw-press was introduced. In 1839 Uhlhorn invented the lever-press, which still remains in use.

The subject of the design on coins, besides being interesting both from an artistic and an historical point of view, becomes very important when it is remembered that it is the impression of the coin with the authorized device which makes it legally current. The artistic merits of the design of the early Greek coins are well known, and prove that the dies from which the coins were struck must have been engraved with much skill and care. The form of the coins before being stamped was at first merely that of natural rounded nuggets of gold, or of the silver-gold alloy known as *electrum*. Such coined nuggets of gold are still to be found among the hill tribes of India. Simple nuggets were afterwards replaced by roughly-fashioned masses like half bullets, a form which rendered it easy to impart high relief to the obverse and comparatively low relief to the reverse of the coins. The early British coins¹ had for their prototype the gold "stater" of Philip of Macedon, but the design of this beautifully finished coin was so roughly imitated by a succession of British copyists that ultimately the wreath round the head of the monarch alone survived, and that in a scarcely recognizable form. It is not only in the early British coins that the influence of classical art may be seen, for it is very evident in some of the present day, the most notable instances being the reverse of the bronze coinage, and the beautiful design of St George and the dragon by Pistrucci, which is still used as an alternative design for the sovereign. It has been ascertained that the impressions on the reverse of very early Greek coins were produced by the rough surface of the anvil or the nail head on which they were placed, while the obverse was struck with the die. A little later the device on the reverse of the coins was obtained by placing the blank piece on small points of metal arranged in geometrical forms which caused corresponding indentations on the coins when struck with the hammer. The beauty and accuracy of design on coins gradually increased as art and manual skill developed, and probably culminated at the period of the Renaissance.

Although it has been the custom since the time of the Saxons to stamp coins with the head of the reigning monarch, it does not appear that any attempt at actual portraiture was made in England until the reign of Henry VII., who, "about the eighteenth or nineteenth year of his reign, did make a great alteration in the form of his coin, upon which his head was now represented in profile, and with a good resemblance of his other pictures."² Since then much care seems to have been taken to stamp the coins with a true likeness of the monarch. In most cases the heads bear a striking resemblance to the portraits drawn by the great artists of the respective periods, and were, indeed, generally designed by artists of eminence. Some of the Milan coinage of Louis XII. is said to have been

¹ See Evans, *Coins of the Ancient Britons*.

² See Martin Folkes, *Tables of English Silver and Gold Coins*.

designed by Leonardo da Vinci, and similar work is attributed to Benvenuto Cellini.

In very early times the silver coins were equal in weight and in tale, each penny weighing 24 grains or 1 penny-weight. The amount now denominated a pound was a pound weight of standard or sterling silver. This principle was in fact, however, not strictly adhered to, the coins frequently falling below the standard of weight. This deviation may possibly have arisen from the imperfection of the methods of manufacture, but Ruding (*Annals of the Coinage*) considers it to have occurred from design, as the deficiency in weight was sometimes made a source of profit. The deviation from the standard weight permitted by law, now called the "remedy," and anciently called the "shere," was taken advantage of to a large extent, so that the coins suffered considerable diminution, particularly when, as frequently happened, they were also "clipped" as soon as they were issued. When these coins were called in they were taken by weight and not by tale, so that the possessors suffered considerable loss. In later times the great improvements in the method of manufacture made it easy to attain far greater accuracy both of weight and fineness; consequently the remedy permitted by law has been considerably reduced, and the possibility of making a large amount of profit by this means proportionally diminished.¹

The seigniorage levied on the coining of money was not a fixed rate, but varied considerably at different times, and accrued from a deduction made from the bullion coined. It was abolished by an Act of Charles II., which provided that whoever brought sterling silver or standard gold to the mint should receive in exchange an equal weight of current coin, the expenses of coining being defrayed by means of duties levied upon certain commodities of common use. The seigniorage on silver was revived in the reign of George III., when that part of the Act of Charles II. which related to the coining of silver without charge was repealed, and another Act was passed, requiring every pound of silver to be coined into sixty-six shillings instead of sixty-two,—the four shillings realized on each pound of silver by this depreciation of its value being handed over to the master of the mint to defray the expenses of assaying, loss, and manufacture. An Act of William IV. required the seigniorage on the silver coinage to be paid to the credit of the Consolidated Fund, and the charges of the mint to be brought annually before parliament. Against the profit derived by the state from this source must be placed the expense of maintaining the silver coinage in a condition fit for circulation by frequently withdrawing, recoinage, and reissuing the silver coins. A vote of £15,000 is annually taken in the mint estimates for the loss on the recoinage of silver.

In former times the work of the mint was performed by contract, the mint master undertaking the manufacture of the coinage at a stated price, and paying the moneyers and other officers and workmen under him at a fixed tariff. The agreement made between the crown and the mint master, called the "master's indenture," was sometimes purposely kept secret. This system appears to have prevailed from the reign of Edward I., when an agreement was entered into between the king and the first master of the mint (appointed about 1279). Under this agreement

¹ Two notable instances are recorded of the use that has been made at various times of the shere, or remedy, as a means of profit, one being in the reign of Queen Elizabeth, when Lonison, then master of the mint, finding the allowance made him under his contract was insufficient to cover the expenses of coining, availed himself of the remedy on the silver coinage, amounting to 6½d. in the pound troy. The other occurred at the time of the great recoinage of silver in the reign of William III., when the profit of the shere amounted to 3d. per pound weight, or rather more than 8s. in every hundred pounds of money.

an allowance was secured to the master to cover all the expenses of coinage. Although the master of the mint ceased to be a contractor, the arrangement with the managers continued in force up to 1851.

The work of coinage was transferred in 1810 from the Tower of London, where it had been carried on for many centuries, to the present Mint on Tower Hill, not far from the Bank of England. The head of the department, as has already been stated, is the chancellor of the exchequer for the time being, who is *ex officio* master of the mint,—the practical direction of the work being placed in the hands of a permanent officer, the deputy master, who is responsible for its due performance. From the English mint is supplied the coinage for the whole of the British empire, including the colonies, with the exception of Australia; the latter and the East Indies are supplied from branch mints established at Sydney and Melbourne, and the mints of Calcutta and Bombay. In addition to the gold, silver, and bronze coins current in the United Kingdom, the English mint strikes gold coins of the value of two dollars for Newfoundland; silver coins of the value of fifty, twenty-five, twenty, ten, and five-cents respectively for Newfoundland and Canada; bronze pence and halfpence of special design for Jersey, and nickel penny, halfpenny, and farthings for the West Indies. The number of coins of each separate denomination issued varies considerably in different years, the demand for special denominations of coin naturally determining the supply.

The following table (from official sources) shows the value of the gold and silver coins issued during the ten years 1871-81. The total value of the bronze coin issued in the same period is £112,890.

Date.	Gold Coinage. ²			Silver Coinage.	
	Sovereigns.	Half-Sovereigns.	Total Value.	Half-Crowns.	Florins.
1872	13,643,885	1,617,556	15,261,441	...	692,010
1873	2,382,835	1,001,733	3,384,568	...	596,574
1874	619,629	941,966	1,561,595	273,240	180,774
1875	...	243,264	243,264	138,996	114,246
1876	3,294,705	1,401,943	4,696,648	79,200	60,786
1877	...	981,468	981,468	55,836	68,706
1878	1,106,289	1,158,780	2,265,069	183,150	178,598
1879	17,325	17,325	35,050	112,662	135,432
1880	3,646,863	594,199	4,241,062	168,102	232,254
1881	...	...	...	280,170	256,806
	24,610,721	7,868,408	32,479,129	1,291,336	2,516,184

Date.	Silver Coinage. ³						
	Shillings.	Six-pences.	Four-pences.	Three-pences.	Two-pences.	Pence.	Totals.
1872	443,322	94,446	69 6	13,916 2	39 12	33	1,243,836
1873	324,324	109,890	69 6	50,744 2	39 12	33	1,081,674
1874	275,022	105,732	69 6	55,694 2	39 12	33	890,634
1875	217,500	81,378	69 6	41,438 2	39 12	33	594,600
1876	38,412	20,988	69 6	22,828 2	39 12	33	222,354
1877	163,350	101,772	69 6	31,142 2	39 12	33	420,948
1878	156,222	65,538	69 6	30,350 2	39 12	33	613,998
1879	180,576	83,160	69 6	37,082 2	39 12	33	549,054
1880	242,154	96,426	69 6	22,490 2	39 12	33	761,568
1881	262,948	159,816	69 6	40,646 2	39 12	33	997,128
	2,303,730	916,146	693 0	346,209 0	396 0	330	7,375,104

The British sovereign or twenty-shilling piece was first issued by proclamation dated 1st July 1817, superseding the guinea or twenty-one-shilling piece. Crown pieces of the nominal value of five shillings were first struck in the reign of Henry VIII., six-pences and threepenny-pieces are first mentioned in the reign of Edward VI., while the great or fourpenny-piece was coined as early as the reign of Edward I.; the florin or two-shilling-piece was introduced in 1849. Copper money was first coined by Charles I. in 1665, but does not appear to have been issued until 1672. Copper was replaced by bronze in 1860.

The weight and fineness of the various denominations of coin struck at the Royal Mint is shown in the first schedule of the Coinage Act (33 Vict. c. 10), 1870:—

² In these gold returns fractions of pounds sterling are omitted.
³ The numbers and weights of the fourpences, twopences, and pence, being Maundy coins, are the same for each of the years:—4518 four-pences, 4752 twopences, and 7920 pence.

Denomination of Coin.	Standard Weight.		Least Current Weight.		Standard Fineness.	Remedy Allowance.		
	Imperial Weight. Grains.	Metric Weight. Grammes.	Imperial Weight. Grains.	Metric Weight. Grammes.		Weight per Piece.		Millesimal Fineness.
						Imperial.	Metric.	
Gold—					} 15 fine gold, 1/2 alloy; or millesimal fineness 916.66.			} 0.002
Five pound.....	616.37239	39.94028	612.50000	39.68935		1.00000	0.06479	
Two pound.....	246.54895	15.97611	245.00000	15.87574		0.40000	0.02592	
Sovereign.....	123.27447	7.98805	122.50000	7.93787		0.20000	0.01296	
Half-sovereign.....	61.63723	3.99402	61.25000	3.96888		0.10000	0.00648	
Silver—					} 15 fine silver, 1/2 alloy; or millesimal fineness 925.			} 0.004
Crown.....	436.36363	28.27590	...	...		1.81818	0.11781
Half-crown.....	218.18181	14.13795	...	...		0.90909	0.05890
Florin.....	174.54545	11.31036	...	...		0.72727	0.04712
Shilling.....	87.27272	5.65518	...	...		0.36363	0.02356
Sixpence.....	43.63636	2.82759	...	...		0.18181	0.01178
Great or fourpence.....	29.09090	1.88506	...	...		0.12121	0.00785
Threepence.....	21.81818	1.41379	...	...		0.09090	0.00589
Twopence.....	14.54545	0.94252	...	...		0.06060	0.00392
Penny.....	7.27272	0.47126	...	...		0.03030	0.00196
Bronze—					} Mixed metal:—copper, tin, and zinc.			} None.
Penny.....	145.83333	9.44984	...	...		2.91666	0.18899
Halfpenny.....	87.50000	5.66990	...	...		1.75000	0.11359
Farthing.....	43.75000	2.83495	...	...		0.87500	0.05669

The weight and fineness of the coins specified in this schedule are according to what is provided by the Act 56 Geo. III. c. 68, that the gold coin of the United Kingdom of Great Britain and Ireland should hold such weight and fineness as were prescribed in the then existing mint indenture, that is to say, that there should be nine hundred and thirty-four sovereigns and one ten-shilling piece contained in 20 lb weight troy of standard gold, of the fineness, at the trial of the same, of 22 carats fine gold and 2 carats of alloy in the pound weight troy, and further, as regards silver coin, that there should be sixty-six shillings in every pound troy of standard silver of the fineness of 11 ounces 2 pennyweights of fine silver and 18 pennyweights of alloy in every pound weight troy.

The present standard of fineness for gold, 22 parts fine or pure gold and 2 parts of alloyed metal, was finally adopted in the reign of Charles II., and has remained unchanged up to the present time. Before the passing of the Act determining this standard considerable changes had been made from time to time, the highest degree of fineness having been reached in the reign of Henry III., when the first gold coins were struck of the standard of 24 carats pure gold. The standard of fineness for gold at some different periods may be seen from the following table, which shows the composition of some of the ancient gold trial plates, of which portions are preserved in the Mint:—

Date.	Standard prescribed by Law.		Standard found by Assay.	Remedy or Permitted Variation in Carats and in Thousandths.
	In Carats and Grains.	Decimal Equivalent.		
1349	...	...	...	1 carat, or 13.9
1477	23 3/4	934.8	Gold 933.5	1/4 carat, or 5.2
1537	22 0	916.6	" 915.5	1/4 carat, or 5.2
1543 (?)	23 0	958.4	" 954.4	1/4 carat, or 5.2
1553	23 3/4	994.8	" 990.3	1/4 carat, or 5.2
1560	22 0	916.6	" 913.7	1/4 carat, or 5.2
1560	23 3/4	994.8	" 994.3	1/4 carat, or 5.2
1598	22 0	916.6	" 915.9	1/4 carat, or 5.2
1605	23 3/4	994.8	" 990.3	1/4 carat, or 5.2
1649	22 0	916.6	" 913.0	1/4 carat, or 5.2
1660	23 3/4	994.8	" 990.9	1/4 carat, or 5.2
1688	22 0	916.6	" 914.6	1/4 carat, or 5.2
1707	22 0	916.6	" 917.1	1/4 carat, or 5.2
1728	22 0	916.6	" 916.1	1/4 carat, or 5.2
1829	22 0	916.6	" 915.3	1/4 carat, or 5.2
1873	22 0	916.6	" 916.61	2.0
1873	Supplementary plate.	Pure gold.	...	...

The earliest trial plate of which there is any record was made in the seventeenth year of Edward IV. Before that time it would seem that the coins were compared with others known to be of standard fineness, since among the Cotton MSS. is preserved the account of the trial of the pyx of gold nobles in 1349, when the coins were compared with an ounce of florins of Florence kept in the Treasury as standards. The first gold coins were 24 carats fine or pure gold. Edward III. caused coins to be struck of 23 carats 3/4 grains fine in 1345, but no trial plate of this standard was made until 1477. Henry VIII. lowered the standard to 22 carats, but caused coins to be struck both of that and the former standards. The greatest debasement of the standard ever reached in England was in 1545, when it sunk as low as 20 carats. It reached a low point in the early part of Edward VI.'s reign, but was raised towards the end of it to 22 carats; and it was still further raised to 23 carats 3/4 grains by Elizabeth, who, however, caused gold coins of 22 carats also to be struck. Charles II. on his accession rejected the trial plates of the standard of 22 carats which had been made under the Commonwealth, and caused others to be made of the standard of 23 carats 3/4 grains. No coins, however, appear to have been struck of this standard. The same monarch

afterwards fixed the standard at 22 carats; and no variation in the legal standard has occurred since that time. The last new trial plates, made in 1873, were alloyed with copper only, in order that they might correspond with the composition of the British gold coins, former plates having been alloyed with silver and copper. At the same time supplementary plates of pure gold and silver were prepared in order that the greatest possible accuracy might be secured.

The present standard of fineness of silver for coinage was fixed at a very early period, but has been subject to considerable variation since the reign of Edward I., the first English monarch who debased the silver coinage. In the reign of Henry VIII. it was once reduced as low as 4 ounces of silver to 8 of alloying metal, and Edward VI. reduced it even lower. It was restored by Elizabeth to the original standard.

The following table shows the composition of some of the ancient silver trial plates of which portions have been preserved in the Mint:—

Date.	Standard prescribed by Law.		Standard found by Assay.	Remedy or Permitted Variation in Dwts. and in Thousandths.
	In ozs. and dwts.	Decimal Equivalent.		
No date.	...	...	Silver 757.4	2 dwts.
1477	11 2	925.0	" 923.5	1/4 carat, or 5.2
1542	9 6	775.0	" 885.5	3 dwts. (7), or 12.5
1568	11 2	925.0	" 927.0	2 dwts., or 8.4
1660	11 2	925.0	" 930.2	2 " " 8.4
1690	3 0	250.0	" 252.0	3 " " 12.5
1691	11 2	925.0	" 925.1	2 " " 8.4
1694	11 2	925.0	" 922.7	2 dwts.
1699	11 2	925.0	" 924.2	2 dwts., or 8.4
1688	11 2	925.0	" 922.0	2 " " 8.4
1707	11 2	925.0	" 922.0	2 " " 8.4
1728	11 2	925.0	" 928.9	2 dwts.
1829	11 2	925.0	" 925.0	1 dwt., or 4.2
1873	11 2	925.0	" 924.96	4.0
1873	Supplementary plate.	Pure silver.	...	...

The alloy used for the bronze coinage is composed of 95 per cent. of copper, 4 of tin, and 1 of zinc. The bronze coinage superseded the old copper coinage in 1860, the latter having been in use since the reign of Charles II. The vicissitudes of the copper coinage were even greater than those of the superior coinages, coins for Ireland having been issued at one time of pewter and of other alloys in which scarcely any copper was contained.

The annual testing of the standard of gold and silver coins, called the trial of the pyx, from the "pyx" or chest in which the coins to be examined are kept, is a ceremony of very ancient institution. It arose from the circumstance that the mint master was originally a contractor, under the crown, for the manufacture of the coinage, and it was therefore necessary that periodical examinations of the coins should be held in order to ascertain that the terms of his contract had been complied with. At the present day, when the mint master is no longer a contractor, but an officer of the crown, the trial of the pyx has a somewhat different object; but it would appear from the description of these periodical examinations in some of the earliest mint records that but little change has taken place in the manner of conducting them. The finished coins are delivered to the mint master in weights called "journey weights,"

supposed to be the weight of coin which could be manufactured in a day when the operations of coining were performed by the hand. The journey weight of gold is 15 lb troy, coined into 701 sovereigns or 1402 half-sovereigns. The journey weight of silver is 60 lb troy. From each journey weight a coin is taken and deposited in the "pyx" or chest for the annual trial. This is made by the freemen of the goldsmiths' company under the direction of the crown in the presence of the queen's remembrancer, who administers the oath to the jury and presides over the proceedings. The coins selected for trial are compared with pieces cut from trial plates of standard fineness, which are in the keeping of the warden of the standards, these pieces being assayed against the coins under examination. If the coins are found to be of the standard fineness and weight, within certain limits, a verdict to that effect is drawn up by the jurors and presented to the Treasury.

In consequence of the impossibility of ensuring an absolutely exact admixture of metals in coining, it has been found necessary at all times to allow to the mint master a certain margin, or "remedy," within which coins may vary in weight and fineness from the fixed standard and still be considered of the current standard. The remedy of fineness for English gold coin is now fixed at 2 parts per 1000. The great importance of maintaining the standard of fineness for gold will be evident when it is stated that the variation of $\frac{1}{10}$ of a millième (or thousandth part) above or below the standard causes a gain or loss of £100 in every million sterling. Gold coins would be within the remedy of fineness permitted by law if the amount of precious metal contained in them varied from 914.6 to 918.6 parts in 1000; and, although this remedy cannot be considered to be more than would meet occasional and unavoidable deviation from the exact standard, still, in the case of gold, but a very small part of the remedy of fineness is actually used, the coins seldom falling below 916.3 parts of gold in 1000, or rising above 917.0, while the mean composition of many millions of coins issued from the mint is often of the precise legal standard, 916.66. The remedy of fineness for silver coin, which appears to have been always greater than that for gold coin, is 4 parts per 1000. The remedy of weight for gold is 1.6 per 1000 parts, that for silver, 4.17, and that for bronze 20. Extreme care is taken to prevent the issue from the mint of any coins that exceed these permitted variations in weight and standard, each coin being weighed separately, and all those found to be above or below the standard being returned to the melting-house.

Since the real value of the gold coinage is the same as its nominal value, it is of the first importance that gold coins which are below the standard weight should not be allowed to circulate, otherwise holders of large quantities of gold coin are liable to considerable loss. After a certain amount of wear a gold coin in passing from hand to hand loses weight and becomes legally uncurrent. By the Coinage Act it is made compulsory for every person to "cut, break, or deface" any coin tendered to him in payment which is below the current weight, the person tendering it bearing the loss; but, as no penalty is imposed for disregard of this obligation, the law is practically without effect. The withdrawal of light coin from circulation was formerly accomplished solely by the Bank of England, the mint regulations making provision for the receipt of gold tendered for coinage only in the form of bars. The bank undertook to purchase the light gold from the public at the rate of £3, 17s. 6½d an ounce, a price which, as compared with the mint value of £3, 17s. 10½d., entailed a loss of no less than 4d. an ounce on the seller. This loss was occasioned chiefly by the circumstance that the bank, being obliged

before sending the light gold to the mint for recoinage to melt, assay, and cast it into bars, found it necessary to deduct the sum of 2½d. an ounce from the rate of £3, 17s. 9d. an ounce at which it was allowed by statute to purchase gold for coinage, in order to cover the expense of these operations and the loss incident to them. The heavy loss in price, added to that from deficient weight, occasioned constant disregard of the law requiring all light coin to be cut or defaced, and consequently a large amount of light gold continued to be circulated. After the passing of the Coinage Act in 1870, accordingly, fresh regulations were made, by which the mint authorities undertook to receive light gold coin for recoinage, returning to the importer the full mint value of £3, 17s. 10½d. an ounce, thus reducing the loss to that arising from deficiency of weight only. As the Bank of England was enabled by these regulations to raise its price for light gold to the rate of £3, 17s. 9d., the same rate at which it is bound to purchase ingots of standard gold, greater inducements were offered to the public to send in light gold for recoinage, and its withdrawal from circulation was in consequence greatly facilitated. It is evident, however, that, as the deficiency in weight must entail some loss on the holders of light gold coin, they will be disposed to keep it in circulation as long as possible; consequently only a small proportion of the light gold received by bankers finds its way to the Bank of England and thence to the mint for recoinage. The result of some careful experiments made by the late Mr Stanley Jevons, and published by him in the *Journal of the Statistical Society* (vol. xxxi. p. 426), showed that a sovereign becomes so light as to be legally uncurrent at the end of eighteen years. The last state measure taken for the withdrawal of light gold coin from circulation was the issue of a royal proclamation in 1842 calling attention to the laws and regulations relating to light gold coin, and instructing those persons whose duty it was to enforce them to see that they were carried out. From the beginning of July 1842 to the end of March 1845 £14,000,000 in light gold coin was withdrawn from circulation and recoined. This amount was estimated to represent 95 per cent. of the whole of the light gold then in circulation. In order to facilitate this withdrawal the Treasury had in June 1842 entered into arrangements with the Bank of England by which the bank was enabled to purchase light gold on behalf of the Government, at the full mint value of £3, 17s. 10½d. an ounce. Light coin, however, continued to be sent into the bank for some time after it had reverted to its original rate of payment for light gold, i.e., £3, 17s. 6½d. an ounce. The expense to the state of this withdrawal, including the expenses of recoinage, was £67,816. As no important withdrawal of worn gold coin has occurred since that time, it is evident that a large amount of light gold must be at the present time in circulation, and that the loss in weight must be considerably greater than that of the coins withdrawn in 1842, the oldest of which were not more than twenty-five years old, the first issue having taken place in 1817. It has been proved by experiment that the average loss of weight in worn sovereigns and half-sovereigns now in circulation is about 3d. in each sovereign, and that the deficiency in fineness of a large proportion of the coin amounts to about £400 per million. This deficiency arises from the trial plate of 1829, which determined the standard of a portion of the coins still in circulation, being itself below the legal standard. Taking the gold circulation at £100,000,000, of which about 50 per cent. is light, it is estimated that the amount to be recoined cannot be less than £50,000,000, on which the loss from deficiency of gold, both in weight and fineness, must be reckoned at about £650,000, independent of the expenses of recoinage.

In the case of the silver coinage, the loss consequent on the

withdrawal and recoinage of silver money is now covered by the seigniorage arising from the difference between the real and the nominal value of the coins. Before the adoption of gold as the sole standard of value, the conditions attending the withdrawal and recoinage of silver were much the same as those for gold. In the period between the reign of Charles II. and the accession of William III. the condition of the silver coinage became so unsatisfactory as to demand the attention of parliament. A recommendation made at the suggestion of Sir Isaac Newton for a recoinage of silver was at first strenuously opposed, but was finally adopted. In the course of the discussion the question of raising the standard of weight and fineness arose, and this important change would probably have been made but for the representations of Locke, who warmly took up the question and convinced the Government of the desirability of preserving the established standard. In the great recoinage of silver, the loss arising from clipped and defaced coin was borne by the public, the money being raised by means of a special tax on glass windows. The silver reissued at this time amounted to £7,000,000, and the tax raised to cover loss and the expenses of coinage to £1,200,000. The work of this recoinage was so great that the resources of the mint in London were found to be unequal to the pressure put upon them, and therefore mints were either revived or established for the first time in a few of the large provincial towns. In addition to this ten furnaces were erected behind the Treasury at Whitehall to melt down the old pieces. By these means the renovation of the silver coinage was completed within the year. The new silver coins then issued were the first which had milled edges, the milling having been introduced in order to prevent clipping.

The mode in which the silver currency is distributed throughout the kingdom is explained by the late Mr George Forbes, cashier of the Bank of England, as follows:—

Every banker in the kingdom has a banker who is his agent in London. Every London banker has an account with the Bank of England. In the Bank of England there is a department devoted to the issue and receipt of silver coin. If in a district there is a deficiency of silver currency, the bankers of the district are the first to find it out. They at once write to their London agents, who draw on their account with the Bank of England, and obtain what silver is required, which they send to the country banker. On the other hand, if there is a surplus of silver in a district it accumulates in the coffers of the local bankers, who send it up to their London agents, and they send it into the Bank of England. If there is a general demand for silver currency, the stock which the Bank of England endeavours to keep on hand becomes unduly diminished, and immediate notice of the fact is conveyed to the mint authorities, who proceed with all convenient speed to coin a supply of florins, shillings, sixpences, or of all of these coins, as the nature of the demand may require.

Gold bullion for coinage is supplied to the mint almost entirely by the Bank of England, the bank being bound by law to purchase at the rate of £3, 17s. 9d. an ounce any gold bullion of the legal standard which the public may bring for sale. Private individuals are permitted to bring bullion to the mint, and to receive back the full amount (at £3, 17s. 10½d. an ounce) converted into coin, free of any charge for loss or manufacture; but, as they are subject to considerable delay, all "importations" of bullion being converted into coin in the order in which they are brought to the mint, the public practically prefer to sell their bullion to the bank, and receive its value without delay. In order to be accepted by the bank, the bullion must be cast into ingots and assayed, a guarantee being given by certain recognized assayers that the gold is of a certain standard fineness. This is known as the "trade assay." When the bank requires gold to be struck, due notice is sent to the deputy master, and on a fixed day the bullion is conveyed to the mint and delivered into his custody. It arrives in the form of ingots, each weighing

about 200 ounces, the aggregate value of each importation being about £144,000. When the ingots arrive at the mint a small sample is taken from each and assayed,¹ the result being sent to the authorities of the bank in order that it may be compared with that of the trade assay. If the bank authorities find that the two assays agree, within certain limits, as to weight and fineness, the ingots are immediately sent to the operative department of the mint to be converted into coin. The mint assay affords the basis for calculating the amount of copper, the alloying metal, that must be melted with the gold in order to produce the standard prescribed by law. The case of silver is somewhat different, the bullion being purchased by the department at its market value, which varies from year to year. During the ten years ending 1881 the average price of silver bullion sank gradually from 60½d. to 51½d. The silver bullion arrives at the mint in the form of ingots, each of which weighs about 1000 ounces, the value of each set of ingots varying considerably. The ingots, both of gold and silver, are weighed on a balance capable of turning with 1 grain when loaded with 1200 ounces.

The operations of coining have undergone some slight changes with the introduction of new machinery and the increased extent of the Royal Mint, since the reconstruction of the operative department in 1881.² The plan (fig. 1) shows the present arrangement of the operative department.

The operations employed in the manufacture of gold and silver coin are as follows (incidental operations being printed in smaller type):—

- I. Assaying the bullion.
- II. Melting the metal.

(a) Addition of the amount of copper necessary to form the prescribed alloy; (b) pouring the metal into moulds so as to form bars; (c) dressing these bars to remove rough edges and hollow ends; (d) recovery of precious metals from crucibles and "sweep."

III. Assaying portions of metal cut from certain bars, to ascertain whether sufficient accuracy has been attained in the standard fineness.

- IV. Rolling the bars into strips or "fillets."

Annealing the fillets (in some cases).

V. Adjusting the fillets by a final rolling, and in some cases by the use of the drawbench.

Testing the fillets to ascertain whether they are of sufficient accuracy as regards thickness.

- VI. Cutting out disks or blanks from the fillets.

Adjusting the blanks in weight (in some mints).

- VII. Edge-rolling the blanks to produce a raised rim.

Annealing the blanks and (in some cases) "blanching" or "pickling" them in dilute acid.

VIII. Coining, or stamping the device on the blanks, by means of engraved steel dies.

Milling the edges of or (in some cases) impressing a device, inscription, or ornament upon them.

IX. Weighing each coin, usually by the aid of automatic machinery.

X. Assaying and weighing pieces taken from the finished coin before it is issued to the public.

The foregoing list will make it clear that the operations of minting consist, not simply in the mechanical production of accurately adjusted disks of metal the purity alone of

¹ The assays are conducted in the manner already described in the articles ASSAYING and GOLD.

² In order to provide a stock of silver coin during the temporary suspension of the work of the mint, a large coinage of silver was issued, and 50 tons of bronze coins were manufactured by contract in the autumn of 1881. The governor of the Bank of England had previously reported that the stock of gold coin held by the bank was abnormally large, and that no inconvenience would arise "if the mint were to cease coining sovereigns and half-sovereigns for a period of six months or a year or even more."