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PENNY REVERSE MASTER DIES OF GEORGE V

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Introduction

Counting beads around the inner rim of a penny is neither fun nor a highly regarded social skill. Worse, the knowledge gained from this activity is of no value for the identification of individual coins or even of the working die which was used to strike them. Still, it needed to be done as the number of beads does vary and there is a pattern which links the bead count and the dates appearing on the coins. Knowledge of that pattern can help in the recognition of altered dates, a matter of some interest when one thinks of the many copies of the 1930 penny. The pattern may also help in the identification of the mint at which some coins were struck when there are no other indicators.

Working dies, those that actually do the striking of blanks into coins, have a relatively short life compared with the millions of strikes needed to produce a modern coinage issue. Because it is necessary to make all coins look as close to identical as possible, there are therefore a number of stages in die production. The stage prior to the working die is called a hub. This is a steel tool the face of which looks exactly like the finished coin. Its function is to be pressed into the soft steel that will eventually become the working die. One hub can therefore be used to make many identical working dies. The hub itself is made from a master die. This looks like a working die but is used to make hubs. Thus, one master die can make many identical hubs each of which can make many identical working dies each of which can make many thousands of identical coins.

There can be further stages. The Royal Mint when supplying master dies and hubs to its Melbourne Branch would probably have included a further two master tool stages to ensure that they could repeat the supply process with identical tools. For this paper, the exact number of repetitions of the intermediate production stages is not significant.

It is the production of the original master die that can be detected by variations in bead counts. There are other minute variations, but bead counts are simple and definitive.

The Obverse Master Dies

Collectors of the Commonwealth penny series are quite familiar with the two obverse die forms of the George V penny. These are called the "English" and the "Indian" dies by collectors. As already noted, the use of the term "dies" in the name is a misnomer, the variations between them is not traced to the working dies which struck the coins, but to the master tools from which the working dies were made.

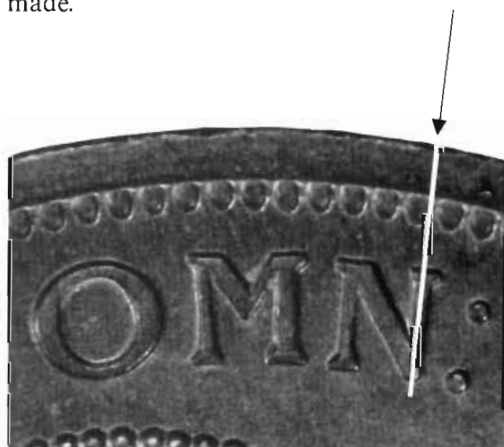


Fig. 1. "English" (E)

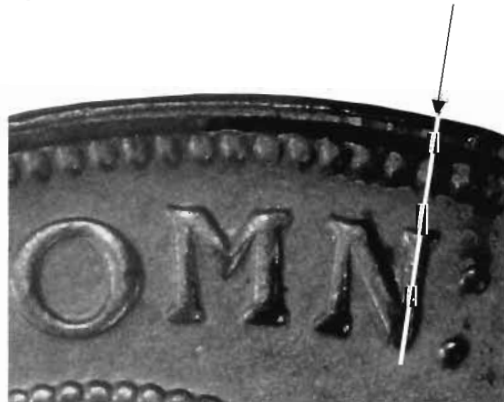


Fig. 2. "Indian" (I)

The “English” die is sometimes called the “London” die but it is suggested that the name “London” might better be used for a reverse master. All obverse masters would then be known by the country in which coins derived from them were first struck, while all reverse masters can be called after the city in which the mint was situated.

Although the names “English” and “Indian” would seem to imply manufacture half the world apart, both masters were in fact made at the Royal Mint in London. The “English” master was first used to make working dies for the 1911 series which was struck at London. The “Indian” was first used to make dies for the 1916 series struck at Calcutta.

The bead count for each differs by one, 177 beads for the “English” and 178 beads for the “Indian”. This means that the precise alignment of beads and letters in the legend varies and this characteristic in turn facilitates a quick method of identification. An imaginary line up the last vertical stroke of the letter N in OMN would pass between two beads on the “English” (Fig. 1), but would cut right through one on the “Indian” (Fig.2).

In 1916, because of the dangers to sea transport caused by the First World War, the production of Australian coins was transferred from England. Bronze coin production went to Calcutta in India and the production of silver was transferred to Melbourne. This was the occasion for the production of the second obverse master tool. Why it was prepared is not known, it would seem that the original master could have been used to prepare tools for Calcutta but it was not.

When considering the striking of large diameter coins in Australia, it should be remembered that the three branches of the Royal mint here were established to strike the small diameter gold sovereigns and half sovereigns. The presses employed to do that job were not really powerful enough to cope with the large bronze coins. Nor were there workshops set up in Australia to manufacture dies. London had insisted for uniformity and security of its sovereigns that all dies would be made at the Royal Mint and distributed to the Branches.

When Australian mints were asked by the Commonwealth government to strike its coinage, they therefore had neither the machines to do the work, nor the capacity to manufacture the dies. In 1916, the Melbourne Mint was supplied with fully prepared dies for silver coins and the contract for bronze production went to the larger mint at Calcutta, a mint that could be supplied with master dies and hubs.

At the end of the war the Melbourne Mint took on bronze production. It was however expected that this would be a short term operation and that the small square nickel pence and halfpence would soon be introduced. This did not happen in 1919 and an urgent need for dies to fill Government orders arose. The Calcutta mint, being the closer mint holding master tools was contacted and they forwarded dies to Melbourne for the 1920 issue¹. Between 1919 and 1931 dies from both the “English” and the “Indian” masters were employed at Melbourne.

The pattern of use of the obverse master dies has been quite well mapped (Table 1)

Date	“English”	“Indian”
1911-15	Yes	No
1916-18	No	Yes
1919-22	Yes	Yes
1923	Yes	No
1924	Yes	Yes
1925	Yes	No
1926	Yes	No
1927	Yes	Yes
1928	Yes	No
1929-31	Yes	Yes
1932-36	Yes	No

Table 1 Recorded uses of Obverse masters 1911 to 1936

The Reverse Master Dies

Less well recognised among collectors is the existence of reverse variations which show of the use of at least three master tools. These too can be identified by bead counting and bead-letter alignment. Like the obverse masters, coins which are derived from each are found with different and characteristic dates.

1. Sharples, J.P. “Australian Coinage 1919-1924”, *NAA Journal* vol. 1, July 1985, pp.9 ff.

As mentioned above, to differentiate between these master tools for purposes of discussion, each has been given a name derived from the city in which the mint which first used them was situated. The three are therefore called "London", "Birmingham" and "Calcutta". It is possible that a fourth existed which would be called "Melbourne". However the variation of this from the "Calcutta" is so small that it probably represents simply a poor use of the "Calcutta" hub at Melbourne.

Like the obverse masters, these three reverses were all produced by the Royal Mint in London.

Identification of the Reverse Masters

"London" (L)

The Australian penny dated 1911 was first struck in London late in 1910. The obverse dies were all made from the standard "English" master tools. The reverse dies were all made from the "London" master. This reverse master has 174 beads around the rim. Recognition of the die from bead letter alignment requires two steps. The first step involves an examination of the alignment of the beads and the last A in the word AUSTRALIA. The last A points between two beads (Fig. 3). This characteristic is however shared by the "Calcutta" master. A second step is therefore needed. It is next necessary to examine the alignment of both letter M's in the word COMMONWEALTH (Fig. 4). A fine line up the first vertical stroke of both letters would pass between beads on coins derived from the "London" master. This is not the case on the "Calcutta" master.

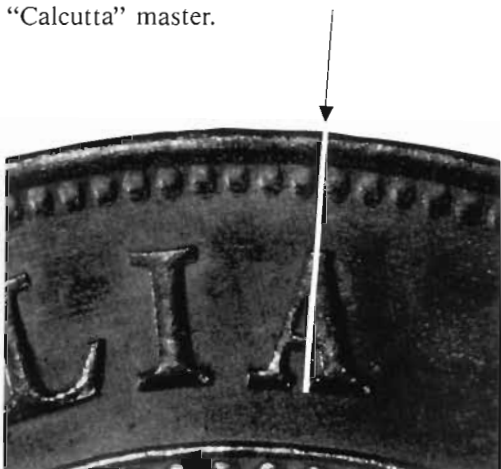


Fig. 3. Alignment of last "A" on "London" master

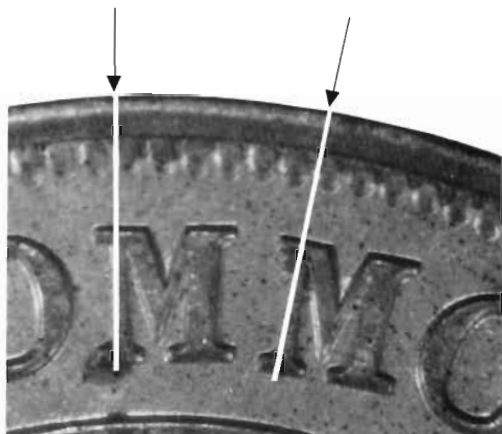


Fig. 4. Alignment of "MM" on "London" master

"Birmingham" (B)

The second Australian penny bore the date 1912 and was struck under contract to the Royal Mint by Heaton and Sons, Birmingham. The working dies for this issue were prepared in London and the reverse die marked with a small letter H. However, these reverse dies were not made from the same master tools as the 1911 dated issue, a new master was prepared and was later used without the H mint mark. This "Birmingham" master had 177 beads around its rim. The point of the last A of AUSTRALIA is exactly aligned with a bead (Fig. 5). This is the only master with this characteristic, but for interest it can be noted that the imagined fine line from the left edge of the first stroke of the M's of COMMONWEALTH would pass through beads and not between them (Fig. 6).

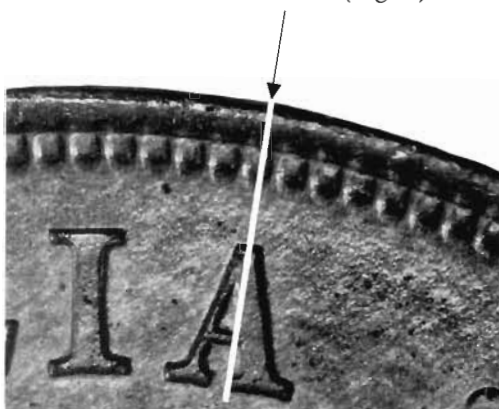


Fig. 5. Alignment of last "A" on "Birmingham" master

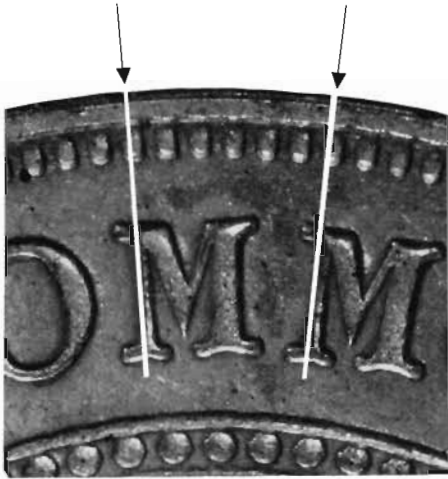


Fig. 6. Alignment of "MM" on "Birmingham" master

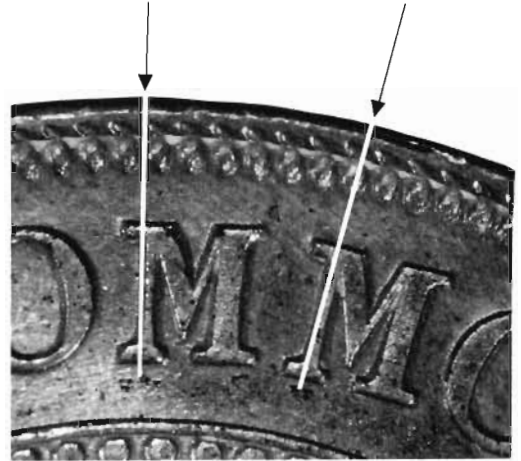


Fig. 8. Alignment of "MM" on "Calcutta" master

"Calcutta" (C)

The master tools for the Australian penny sent to Calcutta for the 1916 issue had 179 beads. As already noted, the alignment of the last A of AUSTRALIA is between two beads, the same as for the "London" master (Fig. 7). The second step is therefore again necessary. The imaginary line drawn up the first vertical stroke of the first M of COMMONWEALTH would run exactly along the side of a bead while the same line on the second M would cut through a bead (Fig. 8).

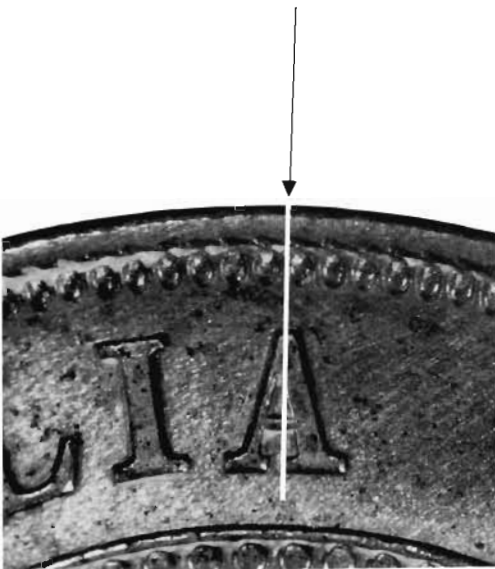


Fig. 7. Alignment of last "A" on "Calcutta" master

"Melbourne" (M)

There is an apparently variation on the "Calcutta" master which appears first, and only, at Melbourne. It has 179 beads and differs only minutely from "Calcutta" in that the line up the first M of COMMONWEALTH would run exactly between two beads and not up the left side of one. This is so close to the "Calcutta" variation that it is probably simply be the result of poor workmanship at Melbourne, a result of their lack of experience in die work.

Pattern of Master Die Use

Phase 1

Date	Mint	Obverse	Reverse
1911	London	E	L
1912H	Birmingham	E	B
1913	London	E	B
1914	London	E	B
1915	London	E	B
1915H	Birmingham	E	B
1916I	Calcutta	I	C
1917I	Calcutta	I	C
1918I	Calcutta	I	C

Table 2 Recorded die combinations, Phase 1 - 1911 to 1918

Table 2 shows the known combinations of obverse and reverse tools during Phase 1, 1911 until 1918, of Australian penny production. It was a straight forward period which reflects the introduction of new master tools. Why they were needed is a problem which requires access to the Royal Mint archives for its solu-

tion. It should be noted that in this phase the "London" master (L) was only employed for production of the dies of the 1911 dated pence.

Phase 2

Date	Mint	Obverse	Reverse
1919	Melbourne	E	B
1919-	Melbourne	E	B
1919=	Sydney?	E	B
1920	Melbourne	I	C
1920-	Melbourne	E	C
1920-	Melbourne	I	C
1920-	Sydney	I	C
1920=	Sydney?	I	C
1920=	Sydney?	I	C

Table 3 Recorded die combinations Phase 2 - 1919 and 1920

Table 3 shows the recorded obverse and reverse die combinations during Phase 2, 1919 and 1920, the period when the Melbourne and Sydney Mints first undertook the striking of bronze. At the beginning Melbourne employed dies sent from London (obverse E/reverse B). These proved insufficient to meet demands. As a stop gap until further supplies of dies could be imported, new dies were made from a pair of the "London" dies. Most of these dies were marked with a dot below the lower scroll (Fig.9) while a few, perhaps only three, were marked with a dot above the top scroll as well.

Records have survived from the Melbourne and Sydney Mints which enable a reconstruction of the actual die holdings of the different Australian Mints with reasonable accuracy during phase 2.



Fig. 9. Dot below scroll, 1919 penny

As can be seen from Table 4, in mid 1919 Melbourne's die holdings were very small indeed. Melbourne requested information from London on die manufacture but this did not arrive until the end of September. Prior

to that it is unlikely that they could have made their own dies at all, the directions were quite basic:

ROYAL MINT, LONDON, E.1.

17th July, 1919.

In your reply please quote No.2239/1919

Sir,

Referring to your letters of the 17th April and 8th May last, regarding steel for dies and the manufacture of the latter, I beg to inform you as follows:

1. The 32 bars have been ordered from Messrs. B. Huntsman Ltd., Attercliffe, Sheffield, and have been despatched to you.

2. As regards manufacture, it is assumed that matrices and punches will still be sent from here and only dies made locally. I am not aware of any literature on the subject, but can give you our own experience.

Steel. The steel is usually received in the form of forgings, but we have also had very good results from our own forgings from the bars. In the latter case we get the best results when making the forgings across the bars as, by adopting this practice, any "piping" in the metal is kept away from the surface of the dies.

Forgings. Several sizes of forgings are used, the shape and dimensions of which are shown in the accompanying sketch. (this sketch seems to be lost)

All forgings are annealed when received in the Die Department. They are placed in the furnace in plumbago pots each containing about six forgings packed in vegetable charcoal and are subjected to a temperature of 770 to 800 C. for about 75 minutes, when they are removed and allowed to cool naturally in an atmosphere protected from draughts The tops of the forgings are next turned in the lathe, the cone shape being preserved with an angle of about 135, and the turned surface is cross buffed to remove the marks of the turning tool. The buffing is performed at the lathe by means of a boxwood wheel, four inches in diameter, treated with emery and oil.

Striking. The screw of the press used in this Department is 5 1/2 inches in diameter. The punch is placed on a hardened, surfaced, steel block resting on the bed of the press, and the blank die is held in position on the punch by

Date	Notes	Die Record		Comments
		Obverse	Reverse	
1919				
15 May	From London	6(E)	6(B)	
5 June	Began striking pence			
17 June	From London	9(E)	9(B)	
6 August	From London	12(E)	12(B)	
30 Sept.	Information on die manufacture received			
1920				
4 March	Made Melb since Sep.	71(E)	78(B)	
4 March	Destroyed	93	100	Quarterly Report
4 March	Balance	5(E)	5(B)	
18 May	Finished first striking of pence			
19 July	To Sydney	3(E)	3(B)	dated 1919?
20				
August	From Calcutta	20(I)	20(C)	dated 1920
7 Sept	Began second striking of pence			
19 Sept?	To Sydney	17(I)	17(B)	
From				
Aug	Made at Melbourne	102(I)	113(C)	
16 Nov.?	To Sydney	3(I)	3(C)	
16 Nov.?	To Sydney	9(I)	9(C)	
1921				
4 Jan	Destroyed (worn)	97	103	

Table 4 Penny dies at the Melbourne Mint 1919-1920

Date	Notes	Die Record		Comments
		Obverse	Reverse	
1920				
July 21	From Melbourne	3(E)	3(B)	
21 Sept	From Melbourne	17(I)	17(C)	Calcutta
18 Nov	From Melbourne	3(I)	3(C)	Balance
18 Nov	From Melbourne	9(I)	9(C)	
14 Jan	Destroyed worn	6	10	dated 1920
31 Jan				
1921	Balance good dies	26	22	dated 1920

Table 5 Penny dies at the Sydney Mint, 1920-1921

hand while the blow is given by means of the foot lever. For halfpenny size two blows are sufficient, but for penny size three blows are given. The dies are annealed between blows, the treatment being similar to that given to forgings. Before giving the final blow it is necessary to turn off the flat on the die outside the design so that the full force of the blow shall fall on the impression. It is of the utmost importance that the surfaces of the punch and die be free from grease, dust or acid.

Turning. After the finishing blow the dies are turned on the bottoms, sides and necks to working gauges. The first two of these operations are performed with one setting by means of a reversible ring-chuck.

Hardening. The dies are placed in the furnace and after a heat of 770 to 800 C for 90 minutes in charcoal (we find Willow charcoal best for the die faces) they are plunged in two jets of water, one playing on the face and the other on the back of the die. Before

tempering they are tested for hardness, which should be about 100 on the Scleroscope test. The tempering is done on iron blocks brought to red heat, and is carried to a dark straw colour. The dies are then tested with gauge collar, ground on the necks if necessary, and are then ready for use in the Coining Press Room.

With regard to the machinery that you mention as available, the large screw press should be powerful enough for striking up the dies, but it is essential that the lower end of the screw and the bed of the press should have good surfaces and be true with one another. The addition of special chucks to the existing lathes would provide for the turning operations on the dies, while the universal grinder would meet any grinding operations that may be necessary.

For annealing and hardening the dies, an oven furnace and quenching tank will be required. This would complete the equipment with the exception of small items such as plumbago pots, furnace tongs, etc.

I need only add in conclusion that dies for nickel coinage do not receive any special treatment.

Dies and hubs were ordered by Melbourne from Calcutta and twenty pair of partly finished dies, they still needed to be shaped to fit the Australian presses, and one set of hubs were supplied on 16 August 1920. All twenty pairs of dies were finished in Melbourne and sent to Sydney. It is not surprising that all but one of the recorded combinations of 1920 are derived from the "Calcutta" masters. The 1920 exception was simply the result of there being five "English" obverse dies left in stock in Melbourne at the beginning of the year.

Phase 3

Phase 3, 1921 to the 1931 (variety with misaligned last 1 in the date)² actually began on 24 November 1920 when the Melbourne Mint sent this telegram to London: "Owing delay approving nickel pair bronze penny punches required urgently"³. Melbourne needed therefore to continued employing the "Calcutta" hubs to make its working dies, including all those supplied to Perth.

Date	Mint	Obverse	Reverse
1921	Melbourne/Perth	I	B
1921	Melbourne	E	B
1922	Perth	I	B
1922	Melbourne	E	B
1923	Melbourne	L	
1924	Melbourne/Sydney	E	L
1924	Sydney	I	L
1925	Melbourne	E	L
1925	Melbourne	I	L
1926	Melbourne	E	L
1927	Melbourne	E	L
1927	Melbourne	L	
1928	Melbourne	E	L
1928	Melbourne	I	L
1929	Melbourne	E	L
1929	Melbourne	I	L
1930	Melbourne	E	L
1930	Melbourne	I	L
1931	Melbourne	E	L
1931	Melbourne	I	L

Table 6 Recorded die combinations, Phase 3 – 1921 to 1931

The new hubs, the reverses probably all dated 1922, arrived in Melbourne from London on 13 January 1922 and on 10 February 1922 ten new reverse dies bearing the date 1922 were sent to Perth. No new obverse dies were supplied to the Perth Mint as it had received

Date	Notes	Die Record		Comments
		Obverse	Reverse	
1921				
4 Jan	Balance in store	10(I)	15(M)	dated 1920?
2 Aug	Destroyed (worn)	43	46	also hubs Calcutta
2 Aug.	Balance in store	15	25	

Table 7 Penny Dies At Melbourne Mint, 1921

2. The 1931 pence included in this table both have the last 1 of the date misaligned. These are commonly called the "dropped 1" variety. See Dean, John *The 1965 Australian Coin Varieties Catalogue*, Hawthorn Press, Melbourne, 1965, p.44 nos. P31C and P31D. The die combinations of the other forms of 1931 pence indicate that they should be placed in the next phase of production.

3. Victorian Public Records Office, Laverton (VPRO), Series 644, Unit 27, 24 November 1920.

fourteen obverse dies from Sydney in November 1921 (which Sydney in turn had received from Melbourne in 1920). Significantly, the new reverse punch used to make the dies for Perth was from the "Birmingham" master while the obverse dies they had received from Sydney were from the "Indian" version.

By the time Melbourne began striking 1922 dated pence, the new "London" masters were available and so it is that all 1922 pence bearing the combination I/B must have been struck at the Perth Mint.

Again the die holdings at the mints can be traced, table 7.

On 2 August 1921 the master tools supplied from Calcutta in 1920 were destroyed at Melbourne. In theory that should have marked the end of the appearance of the "Indian" obverse except for unused dies in storage in Melbourne, Sydney or Perth. In practice this was not the case.

On 12 December 1922 a single new obverse penny hub arrived at Melbourne from London and a week later Melbourne's first penny master die arrived. At the beginning of 1923 Melbourne held five obverse hubs and one master die. These were its total supply of master tools for the penny obverse until mid 1928.

At the same time, a new reverse hub and master die had arrived at Melbourne. To make life interesting, while the 1922 hubs had been derived in London from the "Birmingham" masters, this new issue was for some reason based on the original 1911 "London" master die form. Therefore, for the first time since 1911, the Australian penny in 1923 was struck from the original combination E/L. This was to be the standard form for the balance of the decade and at first we are presented with no great problems.

The existence of a 1924 I/L combination can be put down to coins struck at the Sydney Mint, we know that Sydney held stocks of penny obverse dies from 1920 (and therefore of the "Indian" type) and were experiencing problems with new dies supplied from Melbourne. In April 1924 some 220,000 pence were struck with the new dies but this had involved six of the new obverses failing⁴. It is also known that Sydney continued striking

pence dated 1924 until its closure in 1926. Even at Melbourne the 1924 date was used well into 1925. Of the 1,639,200 pence struck at Melbourne in 1925, all but 117,600, bore the old date of 1924.

There may be a problem in attributing all 1924 I/L pence to Sydney in the reported existence of the 1925 I/L combination. If it exists, and this is doubted, the 1925 I/L form must have been struck by the Melbourne Mint since no dies dated 1925 were sent to Sydney. The reason for doubting the existence of the 1925 I/L is that the records of die holding at Melbourne suggest that they did not have had an obverse die derived from the "Indian" master in 1925. This matter is discussed further below.

The year 1926 was an important one in Australian minting history. That year the Sydney Branch of the Royal Mint was closed. At the closure the mints stocks of old reverse dies were destroyed but its obverse dies, including ten penny obverses, were sold back to Melbourne. The pence struck with the date 1926 follow the pattern which would be expected if only newly produced dies were employed, E/L. However, after 1926 the use of the "Indian" obverse becomes a feature, even though sometimes only in small numbers, until new master tools supplied from London in late 1930 came into use in 1931.

This re-appearance of the "Indian" obverse in 1927 is attributed to the re-surfacing of dies from Sydney. It could be suggested that there was a link between the use of these old dies and the employment of old coining presses to strike pence at Melbourne. By the mid-1920s Melbourne had added some more powerful presses to its minting capacity. These, it could be argued, would have had different fittings and therefore die shapes to the older machines which Sydney and Melbourne had shared. If Melbourne brought one of these older machines into use for penny work at different times from 1927 until 1931 whenever there was an urgent demand, one would expect to see the old dies used in it and therefore the products of the "Indian" master.

This sounds reasonable, but judging from the survival rate of coins struck from the Indian obverses in that period, the actual

4. VPRO. Series 643, Unit 116, letter of 1 May 1924.

number of coins struck is too great, even if all ten dies returned from Sydney were of the “Indian” type and that seems very unlikely. It is proposed that this scenario actually explains only the 1927 I/L production.

A clue may lie in what is now known of the 1930 penny production. The source of the reverse was the 1923 master tools supplied from London. The main 1930 penny obverse die is derived from the “Indian” master, as were a number of 1929 dated pence. Perhaps too much attention has been paid in recent works to the destruction of the Calcutta supplied “Indian” obverse hub at Melbourne in 1921. After all, those tools were originally supplied to Calcutta from London. The masters from which they were made should still have been available in London when Melbourne requested hubs and master dies.

A likely scenario is that one or both of the two new hub provided to Melbourne, one in the second half of 1928 and the other in June 1929, was derived in London from the “Indian” master. Whenever this new tool was employed “Indian” obverse dies were the result.

If this proposal is correct no problems remain in our understanding of the use of the “Indian” obverse. It can be argued that use of the “Indian” obverse in Australia falls into three categories. The first relates to the dies and hubs supplied from Calcutta in 1920. This together with the known distribution patterns between the three Australian mints would explain all issues and relative scarcities up to 1924. There are no 1925 or 1926 occurrences of the “Indian” obverse and the second phase, involving very few coins all dated 1927, related to old dies coming back from Sydney to Melbourne in October 1926. The third and final phase began in 1929 at which time Melbourne began experiments to improve die life and employed a new “Indian” hub then recently arrived from London.

The only problem with this three phase concept would be the existence of 1925 pence with “Indian” obverse. Although this proposal presents a hypothetical pattern of usage, it seems to offer a very neat explanation of the observed penny production pattern. This adds weight to the argument noted above that Melbourne should not have had any “Indian”

based dies in 1925 while Sydney which did have “Indian” obverses did not have 1925 dated reverses. Again all indicators seem to deny the existence of the 1925 “Indian” obverse. It is again necessary to suggest that they do not exist⁴.

Phase 4

Date	Mint	Obverse	Reverse
1931	Melbourne	I	B
1931	Melbourne	E	B
1932	Melbourne	E	B
1933	Melbourne	E	B
1933/2	Melbourne	E	B
1934	Melbourne	E	B
1935	Melbourne	E	B
1936	Melbourne	E	B

Table 8 Recorded die combinations, Phase 4 – 1931 to 1936

As Table 8 indicates during 1931 the Melbourne Mint at last managed to achieve its goal – consistent production with dies all based on the same masters (E/B). The variety I/B was the turning point. New master tools had arrived from London in late 1930, this time based on the 1912 “Birmingham” masters which were clearly still in London. The last of the “Indian” obverses based on the tools supplied to Melbourne in 1928 and/or 1929 was used up and the E/B combination which had last been used in 1922 became the standard.

A TEST IF DATE MODIFIED TO 1930

Attempts to employ any coins from this final phase to produce imitations of the rare 1930 penny are doomed to easy recognition no matter how carefully the last numeral is modified. Even the argument that the “English” obverse occurs with the 1930 reverse is of no importance. The 1930 penny reverse die is based on a different master tool to almost all others in the 1930s. Both obverse varieties of 1930 pence share a common reverse and are from the “London” master. The reverses all have the last “A” of AUSTRALIA pointing between two beads (Fig. 3). From late 1931 until 1936 all pence were from the “Birmingham” master, the last “A” points directly to a bead.

5. Dean, John *op.cit.*, p. 42. does not give this variety a number, he simply states that it has been reported but not confirmed.