RETURN TO TABLE OF CONTENTS

LOCKSMITH LEDGER International

RETURN TO INDEX

Special Report

by Laurence Simon

"Build Me One!"

Your firm has been asked to build a Great Grand Master Key system for a large complex of buildings such as a University. The requirements are:

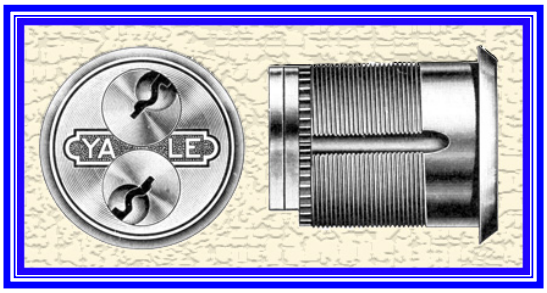
1 Great Grand Master Key
24 Grand Master Keys
11 Master Keys per Grand
264 Master Keys
720,000 key changes

Yes, you are seeing correct. They have requested you to create the system and key 720,000 Mortise, Rim Cylindrical lock cylinders and even Padlocks.

Leaving your customer and driving back to your shop, you are thinking, "this is a once in a lifetime opportunity to really do one massive keying job." How can I possibly say no?

But still thinking, "it's impossible, it cannot be done." There is no way that a mechanical cylinder can be combinated to achieve these figures.

The fact is that you could have said "yes, certainly" up to just a short few years ago. But alas, Yale discontinued the manufacturing of the cylinder known in the industry as "Bicentric." The concept and production of these cylinders came years before the computer and the systems were calculated out by hand. Can you imagine how many more changes could be achieved if they had the computer to work with?



The year was 1913, our country was growing. Large complexes of office buildings, universities, hotels, etc., were being constructed and required a special type of cylinder lock. The Bicentric cylinder was born. It consisted of two cores in a single lock cylinder. The back of the cylinder had gear(s) to actuate either the cams of the mortise cylinder or tail bars on the rim and cylindrical locks. At that time the Yale cylinder lock, with bicentric cylinders, affords greater facility than any other master key systems, and the highest security.

Now with the information and a little history behind it, you ask, "just how can you get 720,000 changes?" Easy.....

The Yale "Surety Sectional" keyway system is employed. A total of 24 keyways utilizing for example, the "G, S and T" Surety Sections.

The Great Grand Master then would be cut on a GST Composite key and could be broken down to 3 Great Grand Masters to operate its respective Surety Section. In order to obtain 720,000 changes, a 7 pin cylinder system must be used. From that point the balance of the various master keys are as noted above.

If you were to select to use a 6 pin system, with the same amount of Master Keys, the bottom line would change to 144,000 key changes.

1 Great Grand Master Key
24 Grand Master Keys
11 Master Keys per Grand
264 Master Keys
144,000 key changes.

(more key changes are still possible)

To break the 6 pin system down a little further, using conservative figures (many more key changers are still possible). There is **545** bicentric changes per Master as long as the total used does not exceed **6,000** changes per keyway. The **144,000** key changes are a total figure for the entire system.

What is truly amazing that the 7th pin in these cylinders increases changes by **576,000** possible combinations.

The Yale "Surety" system is also known by other words such as "multiple" or "sectional" keyways. The most known of the "surety" system is the G, L, P, S, T, V, Y and Z keyways. There are a number of other proprietary systems available. Each

one of these systems contain nine different keyways with a master to fit all. These are used to expand a master key system by either repeating the same or similar key bittings on different key sections.

(Editors Note) For the above reason, a professional Locksmith should never duplicate a key on the master key blank (GMK) when a GA or GC key is handed to them to make. This applies to any lock manufacturer who employs sectional keys.

Composite key blanks are also made to fit only the sections designated.

A key blank lettered "GAH" would operate all the cylinders with the GA and GH keyways.

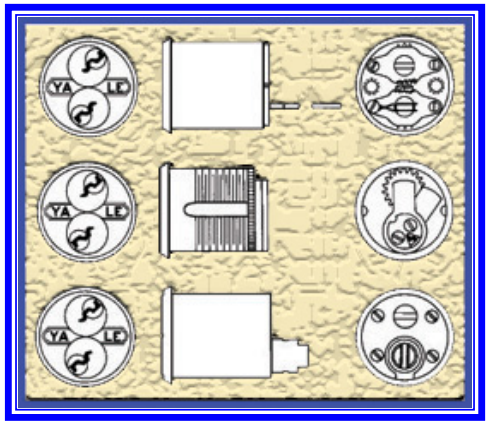
To expand the system, a key cut on the "GV" key blank would operate four keyways, GA, GB, GG and GH.

Although it is not advised nor recommended, a simple master key system could be expanded into a grand master key system. (i.e.) Six sections are used.

Keyways - GA, GB, GC, GG, GH, GK

GMK - cut on the GMK key - fits all sections
MK - cut on the GV - fits only GA,GB,GG,GH
SMK - cut on the GAH fits GA, GH
GBG fits GB, GG
"GK" stands alone

OPERATIONS



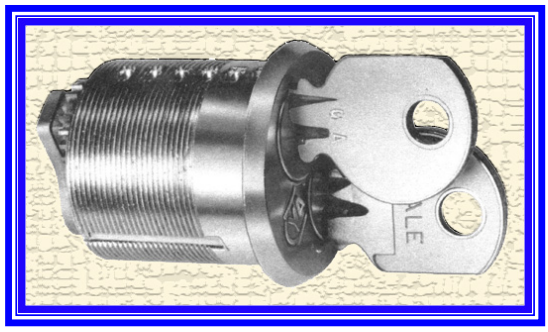
Mortise cylinders had two cams. The bottom cam had a gear that meshed with the main gears mounted on the back of the cylinder. The cam closest to the gear operated off of the top core and had a gear wedged into it. The top cam worked directly off of the bottom core.

The same operation applied to the rim cylinder but with only a single tail bar to turn.

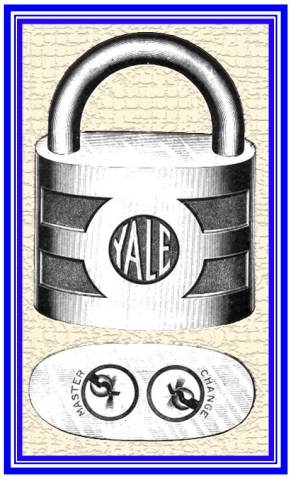
For the cylindrical and Monolocks, the gearing was concealed but functioned in the same manner.

SAFE DEPOSIT FUNCTION

Note: Key Bow Modified



Another function of both the mortise cylinder and padlock was that it could also operate like a safe deposit lock. Two five or six pin tumbler keys to operate separate cylinders in one padlock.



The Bicentric cylinder also had another exciting feature. If the top cylinder core was set to operate master keys and a master key was lost, the entire system would not have to be rekeyed. Only the top cylinder would be necessary, all the change keys that were used on the bottom core would remain.

To add to the distinction of the system, Yale used to have different bows that would be assigned to the various master keys. Those days are long gone with Yale and the other major lock manufacturers that made a distinctive key for the masters.

Staggering isn't it?

But lets close with one other thought. Can you imagine how much time it would take you to hand set 720,000 locks?

Don't lose any sleep on the thought **for they are** ***no longer in production.*** **Yet there are thousands upon thousands of these cylinders currently in use. Just maybe, you will get the "job of your dreams."**

Different Bows for Different Functions

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RETURN TO TABLE OF CONTENTS
RETURN TO INDEX