

1	AFSA-0357	COORDINATION
2	REF ID: A72380 AFSA-02	FILE
	Mr River	INFORMATION
3	Mr Shepard	NECESSARY ACTION
	and others interested	NOTE AND RETURN
4	RR 0212	SEE ME
	BDS	SIGNATURE

## REMARKS

I think you'll find this rather interesting. I had to make one correction on the drawing to make it fit the keyboard displacements mentioned at bottom of the drawing.

& to see if there are already in the Friedman collection

FROM NAME OR TITLE	Friedman	DATE	12 Sept 50
ORGANIZATION AND LOCATION		TELEPHONE	

NME

Declassified and approved for release by NSA on 07-08-2014 pursuant to E.O. 13526

-3 GPO

Extract from letter dated  
24 Aug. 1950 from Hagelin

With regard to the M-209: There is a chance that the machine for you may be finished in about a months time. I will keep you posted on the progress.

Now with regard to the action of the new displacement mechanism: We have still a bar drum, it carries now 30 bars, and these bars are used not only for the displacement of the type wheel, but also for the displacement of the key wheels, which are displaced in the same way as the type wheel, i.e. with a driving tooth on the bars, over an intermediary gear wheel, the proper functioning being assured with the aid of the same kind of check pawl as is used for the type wheel. The bars therefore are normally provided with two driving teeth, one for one of the key wheels and the other for the type wheel. The bars are displaced from their inactive to their active position in the same way as in the M-209, i.e. with the aid of guide arms, which are positioned by the pins in the key wheels, and which act on moveable lugs on the bars. While the lugs are moveable, the driving teeth for the displacement of the key wheels have to be fixed (and aside from the difficulty of arranging moveable driving teeth, there would be too many modifiable elements in the machine). To be candid, I do not know as yet which groupings of the driving teeth for the key wheels will be the most effective, and therefore we are arranging them on the prototype in the manner, that the first five bars carry driving teeth to work with key wheel n:o 1, the next five bars to work with key wheel n:o 2, etc., with five bars for each key wheel. We also put in one special driving tooth on one of the bars in each of the six groups, which is in active position, when the bar is in its inactive position. Thus when none of the guide arms displace the bars, all the six key wheels will be displaced one step. On the enclosed rough sketch I have shown the 30 bars, and have indicated on them the driving teeth for the type wheel and the driving teeth for the key wheels, and also an arrangement of the lugs, chosen at random. You will find that this new displacing mechanism (which was developed for use with our new teleciphering machines) works on a novel principle: while the key wheels and the position of the pins determine which of the bars are to be displaced each time, the bars and the position of the driving teeth determine, which of the key wheels are to be displaced and how much. We have thus an interaction between drum bars and key wheels.

As I have already mentioned, we do not know as yet how the driving teeth for the key wheels should be best grouped, but this will of course be made subject of a study. Probably the groupings should not be made identical for the different key wheels, and there would probably also be no reason for placing driving teeth for the key wheels on all the bars, as the number of displacement combinations is only 64 (which should in itself be plenty).

I hope that this first "lesson" has not been completely unintelligible, and I trust you will ask me for explanation of such points which may not be clear to you.

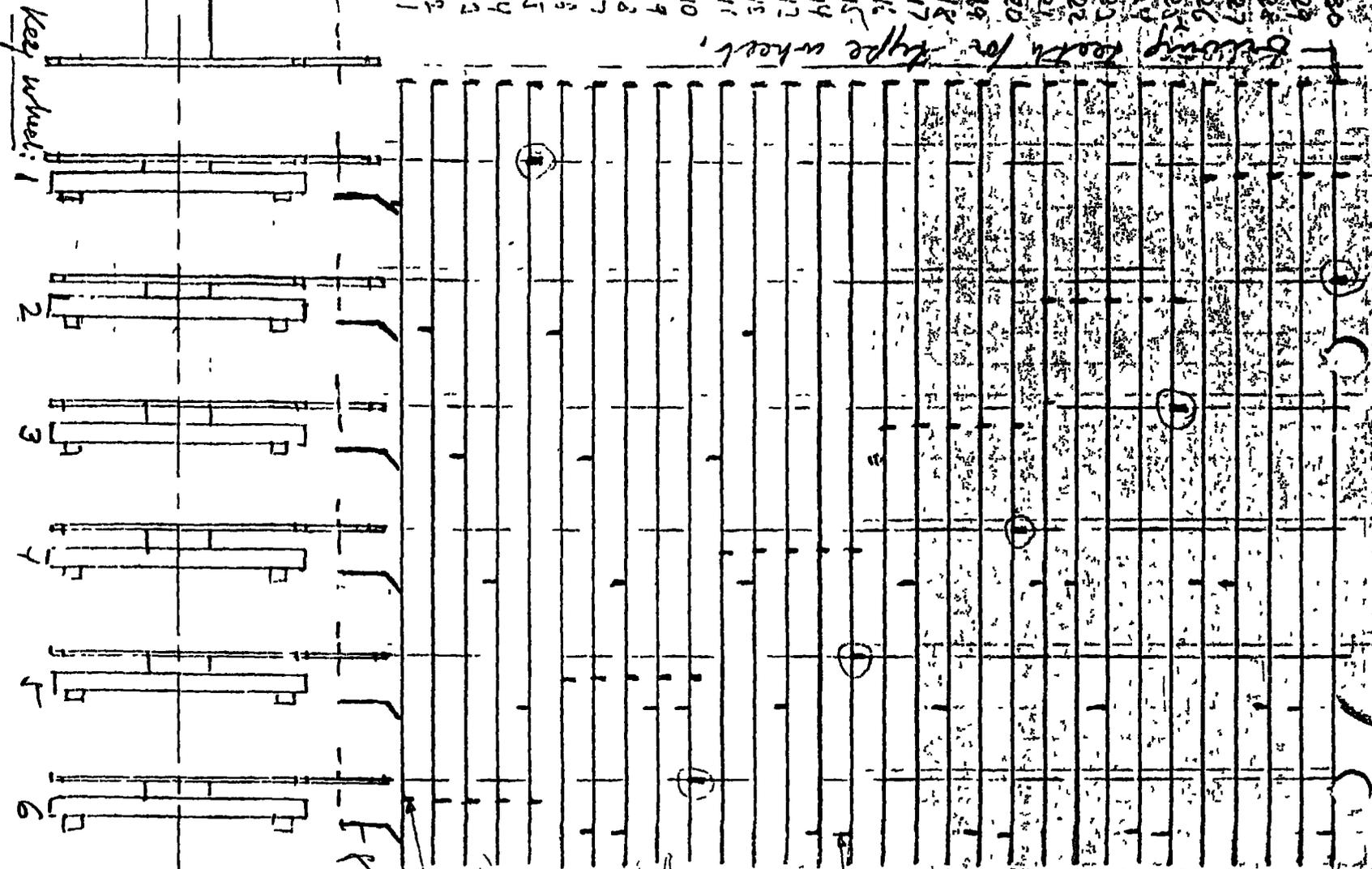
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*[Handwritten signature]*

Type wheel

Driving teeth for type wheel, 29 31 33 34 35 & 32



Driving teeth for the displacement of the key wheels.

Keys to be acted on by the guide arms for the displacement of the bars.

The key wheels have 29, 31, 33, 34, 35 & 32 pins, and can be placed (and rearranged) in any sequence while the driving teeth for the key wheels are fixed.

Output 27 28 29 30 31 32 33 34 35 36

The driving teeth numbers 29 are the special teeth, which keys the key wheels for even if none of the bars are displaced

29 For: there is an active pin in position. For key wheels 2, 3, 4, 5, 6 the following bars will be displaced: 2, 3, 6, 7, 11 & 12. The type wheel will be displaced 6 steps, the key wheels 1, 2 & 3 will be displaced 1 step each, and the key wheels 4, 5 & 6 three steps each. There are 63 other displacements depending on the position of the pins in the key wheels.

APM