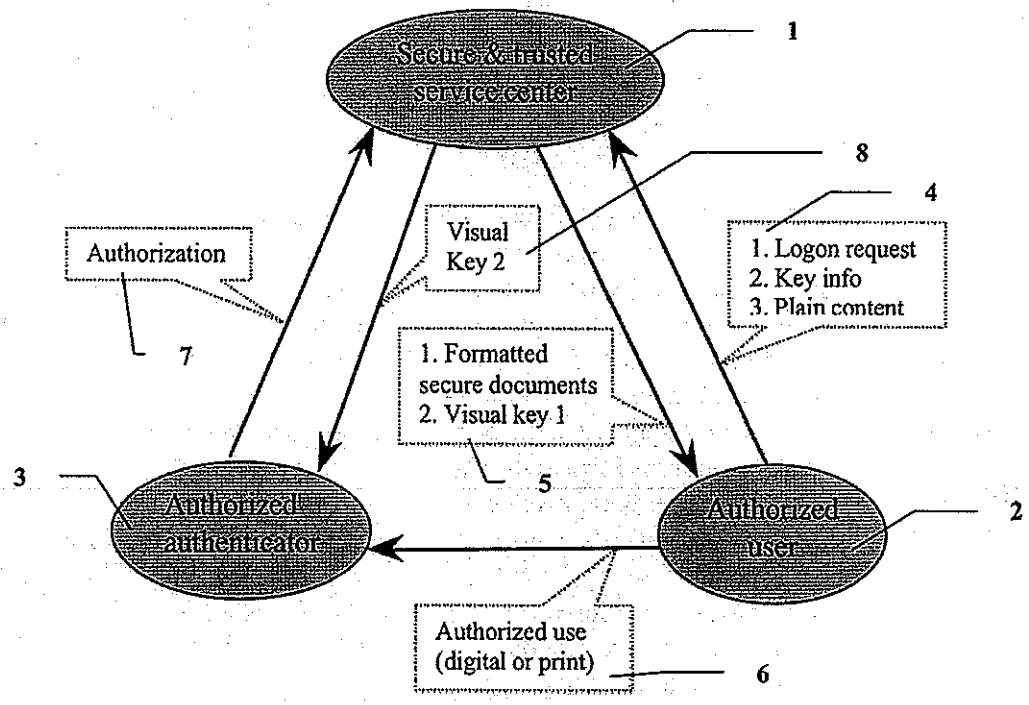
Secure & trusted service center
1
8
4
Visual Key 2
Authorization
1. Logon request
2. Key info
3. Plain content
7
1. Formatted secure documents
2. Visual key 1
5
3
Authorized authenticator
Authorized user
2
Authorized use (digital or print)
6

FIG. 1

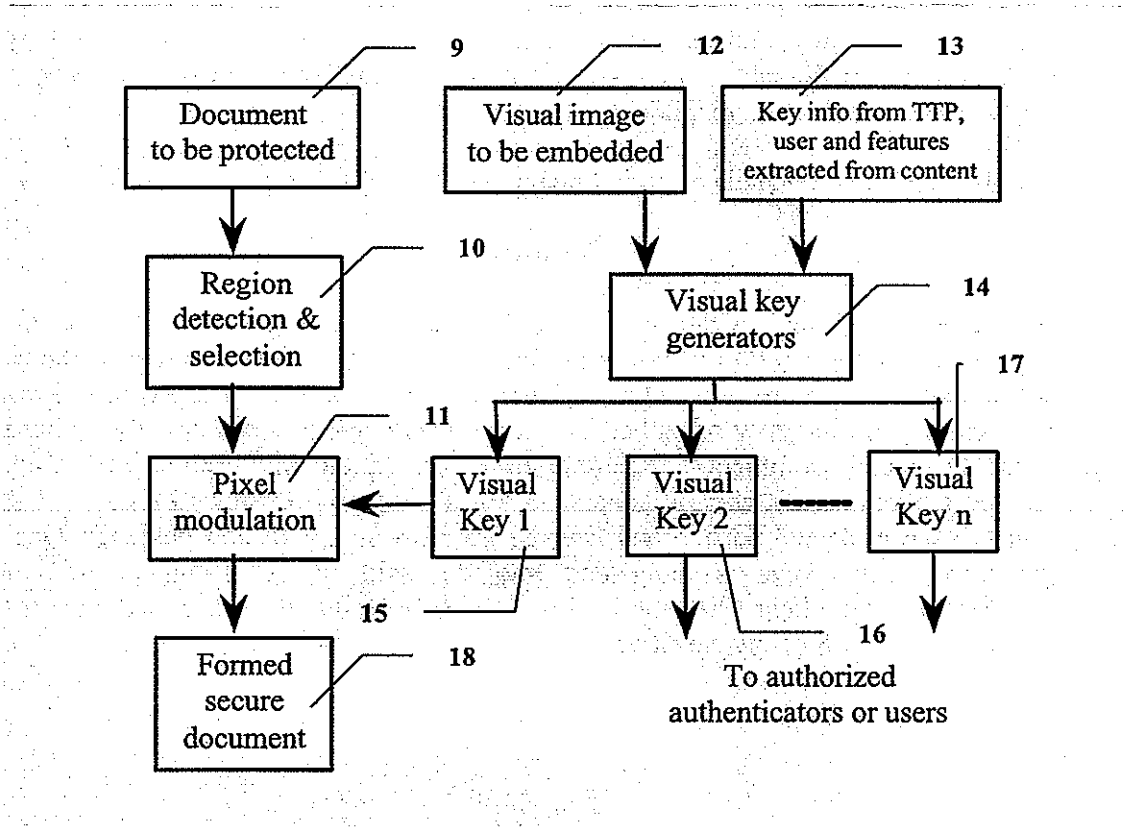
9
12
13
Document to be protected
Visual image to be embedded
Key info from TTP, user and features extracted from content
10
Region detection & selection
Visual key generators
14
17
11
Pixel modulation
Visual Key 1
Visual Key 2
Visual Key n
15
16
18
Formed secure document
To authorized authenticators or users

FIG. 2

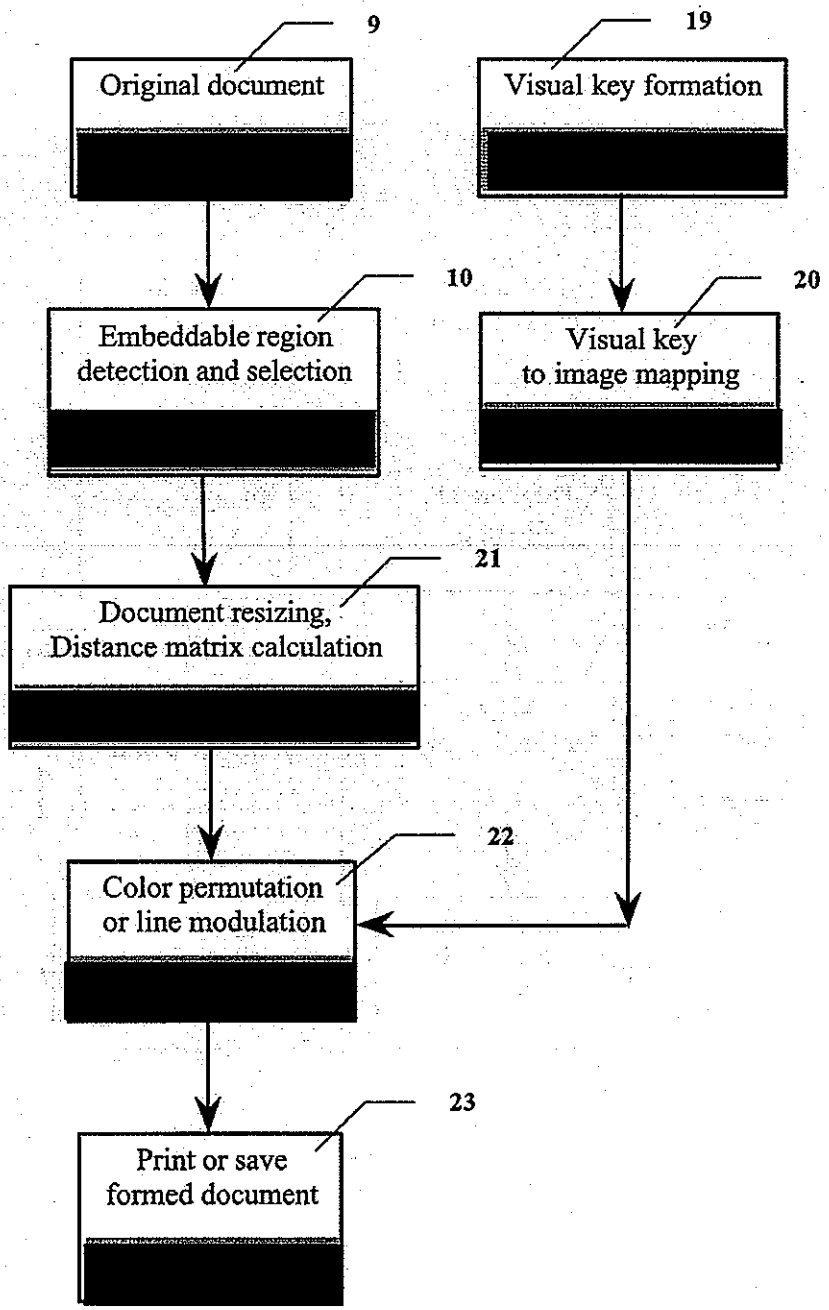
9
Original document
19
Visual key formation
10
Embeddable region detection and selection
20
Visual key to image mapping
21
Document resizing, Distance matrix calculation
22
Color permutation or line modulation
23
Print or save formed document

FIG. 3

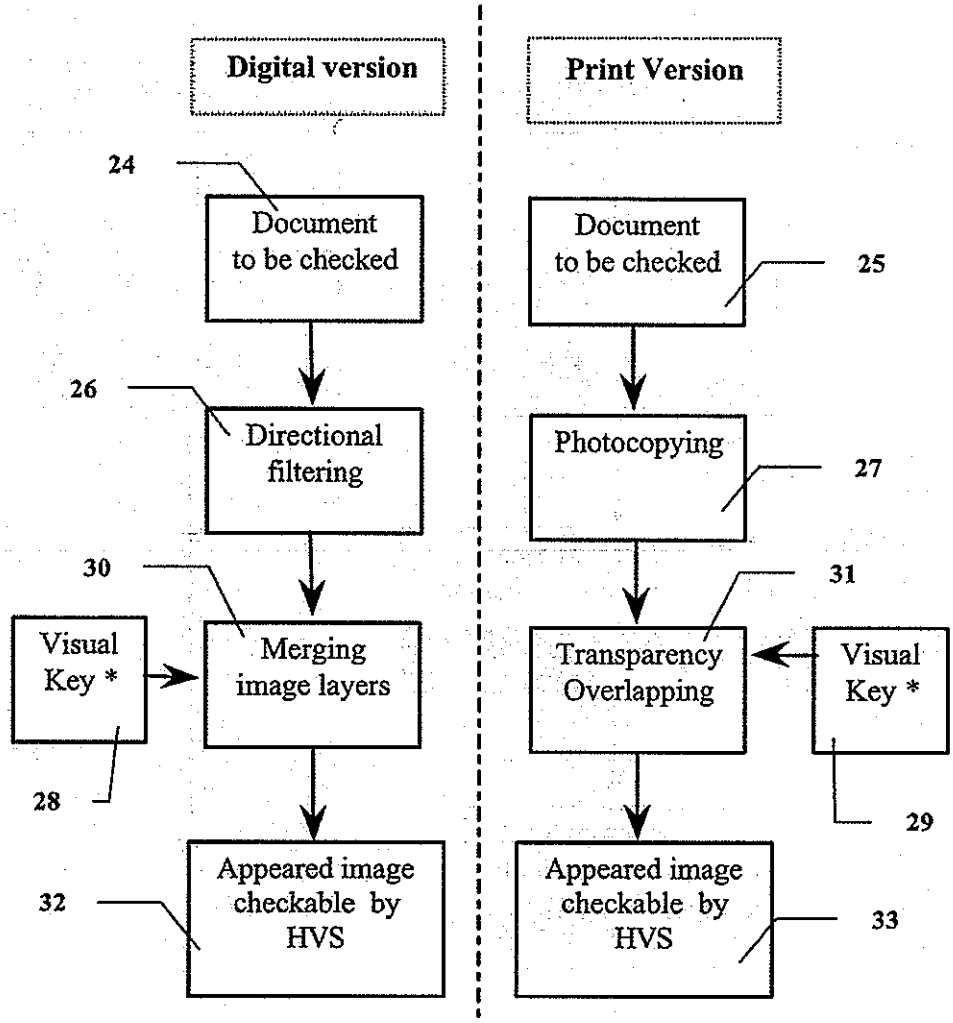
Digital version
Print Version
24
Document to be checked
Document to be checked
25
26
Directional filtering
Photocopying
27
30
31
Visual Key *
Merging image layers
Transparency Overlapping
Visual Key *
28
29
32
Appeared image checkable by HVS
Appeared image checkable by HVS
33

FIG. 4

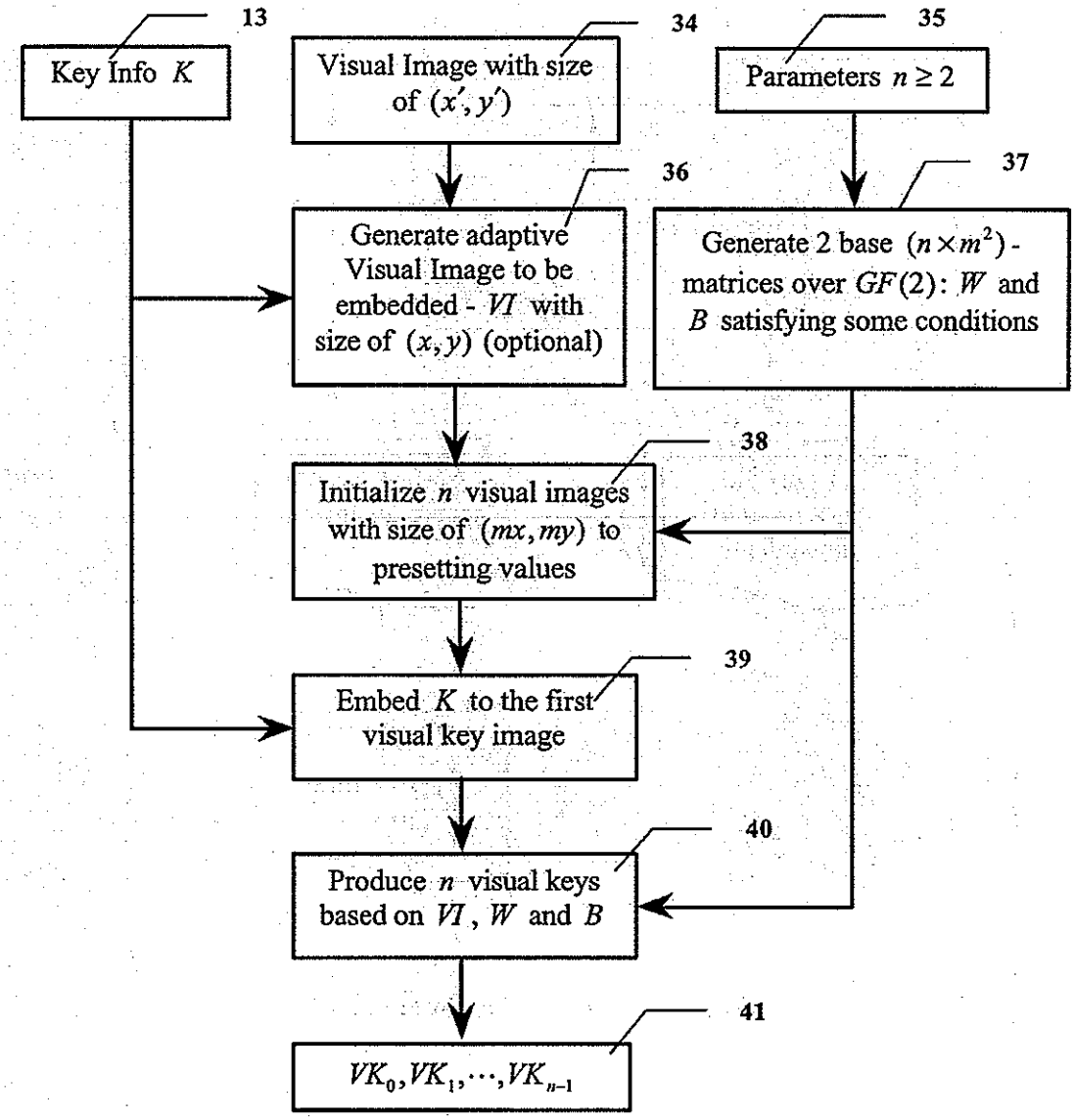
13
Key Info K
34
Visual Image with size of (x', y')
35
Parameters $n \geq 2$
36
Generate adaptive Visual Image to be embedded - VI with size of (x, y) (optional)
37
Generate 2 base $(n \times m^2)$ - matrices over $GF(2)$: W and B satisfying some conditions
38
Initialize n visual images with size of (mx, my) to presetting values
39
Embed K to the first visual key image
40
Produce n visual keys based on VI, W and B
41
$VK_0, VK_1, \cdots, VK_{n-1}$

FIG. 5

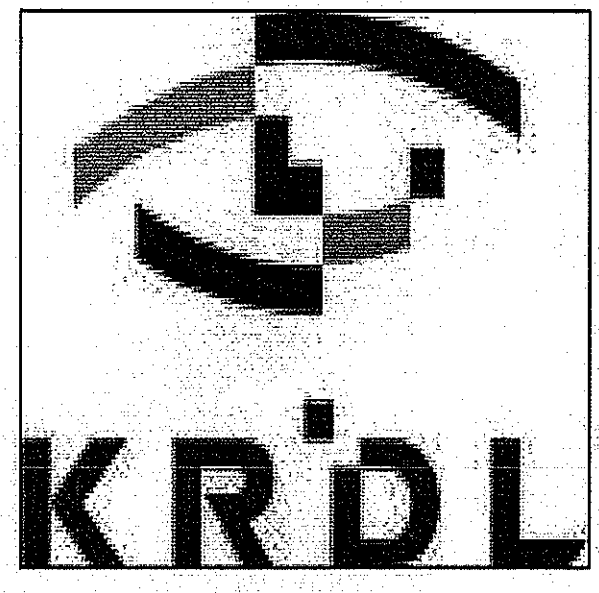

FIG. 6

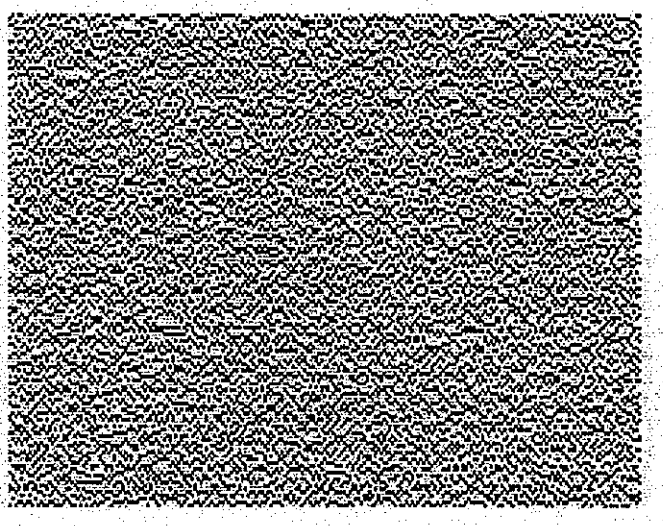

FIG. 7

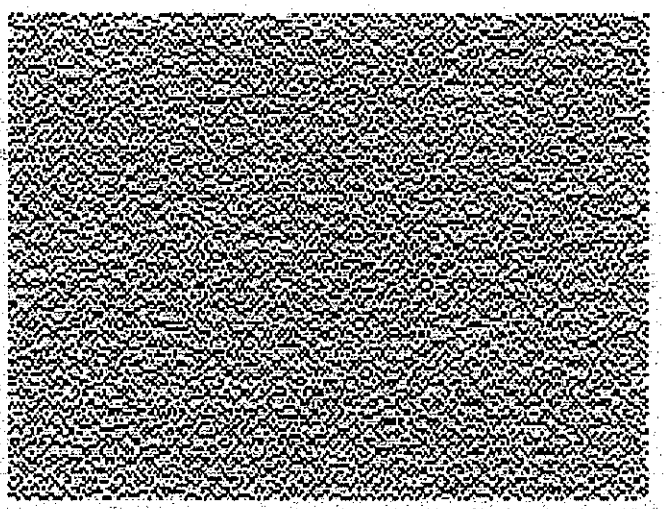

FIG. 8

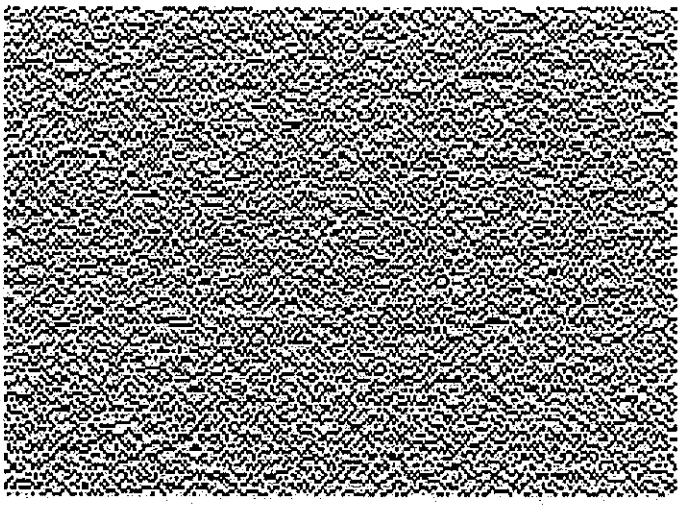

FIG. 9

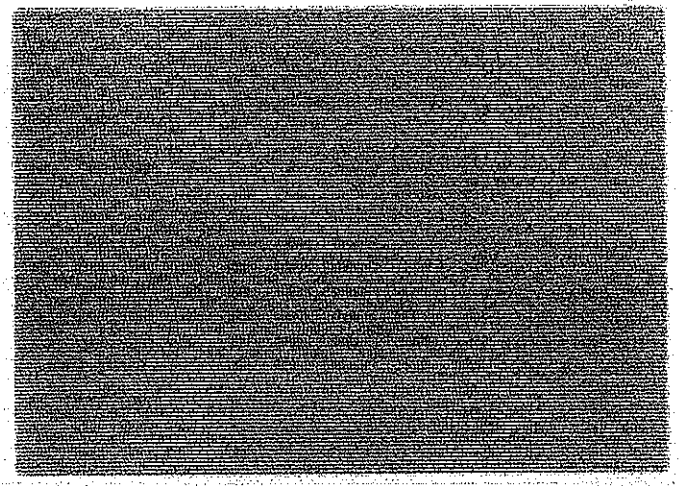

FIG. 10

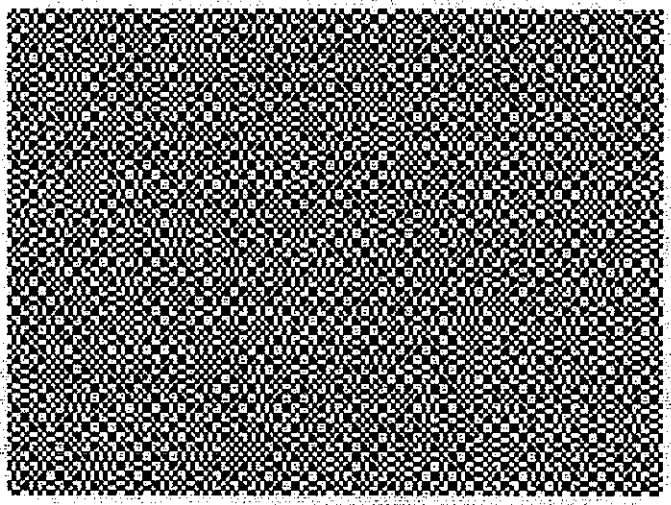

FIG. 11

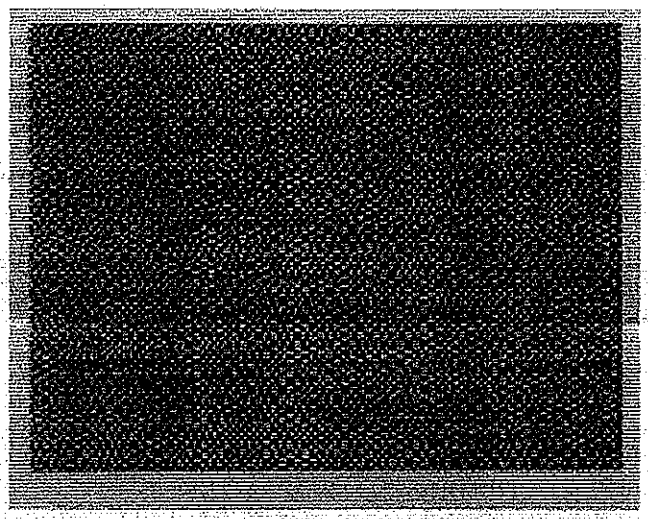

FIG. 12

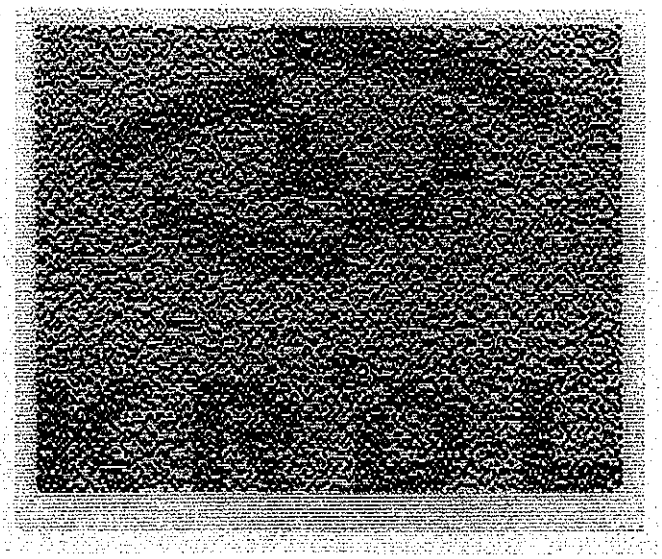

FIG. 13

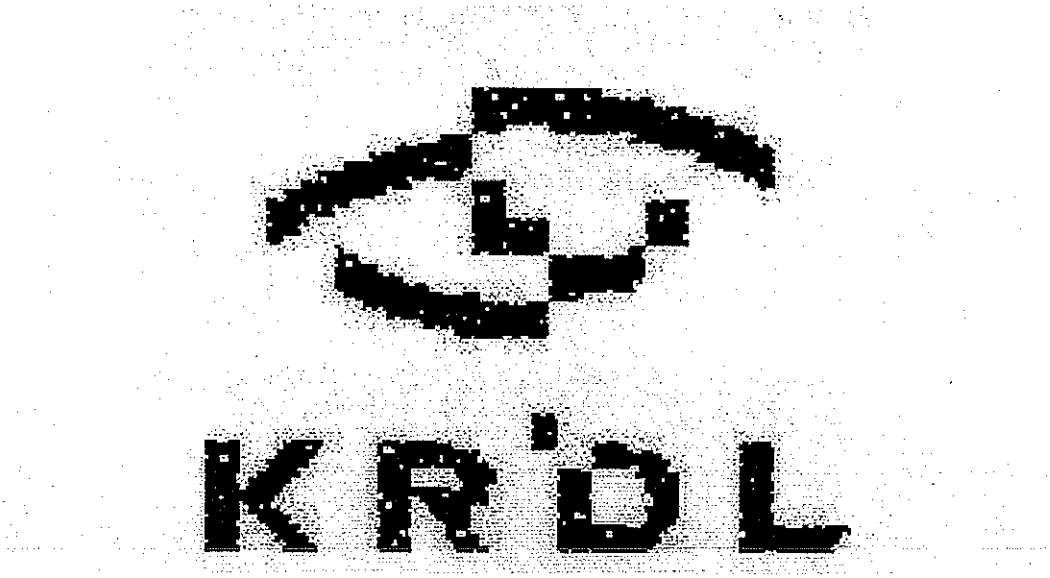

FIG. 14

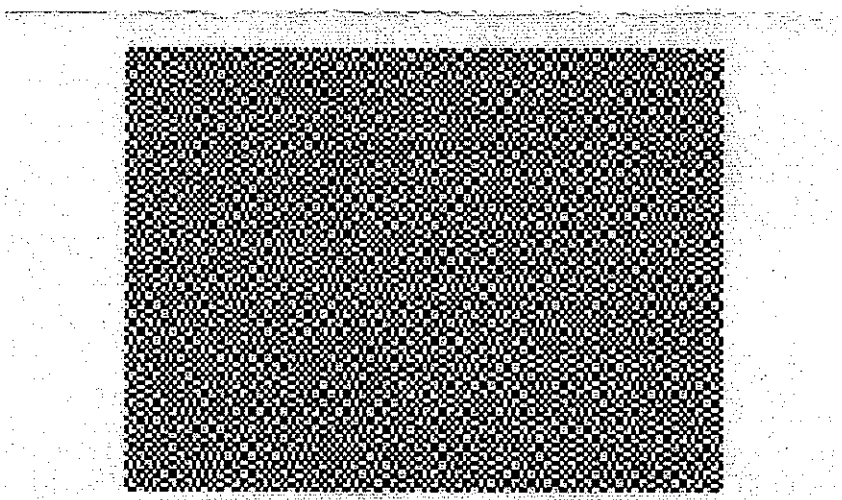

FIG. 15