#2

<table>
<thead>
<tr>
<th></th>
<th>Δ</th>
<th></th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>H, Δₙ₊₁</td>
<td>A₁, Δₙ</td>
<td>B₄, Δₙ</td>
</tr>
<tr>
<td>A₁</td>
<td>A₂, Δₙ</td>
<td>A₁, aₙ</td>
<td>A₄, bₙ</td>
</tr>
<tr>
<td>A₂</td>
<td>R, Δₙ</td>
<td>Z, Δₙ</td>
<td></td>
</tr>
<tr>
<td>B₁</td>
<td>B₂, Δₙ</td>
<td>B₃, aₙ</td>
<td>B₄, bₙ</td>
</tr>
<tr>
<td>B₂</td>
<td>R, Δₙ</td>
<td>Z, Δₙ</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>S, Δₙ</td>
<td>Rₐ, aₙ</td>
<td>Rₐ, bₙ</td>
</tr>
<tr>
<td>Z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>A, C, C, E, P, T</td>
<td></td>
</tr>
</tbody>
</table>

S - pick next left char
A₁ - skip to find a at end
A₂ - find a at end
B₁ - skip to find b at end
B₂ - find b at end
N - rewind to next char
N - accept
Z - crash
Input \( \Delta 1 \cdots 1 \Delta \cdots \frac{1}{n} \)

1) Given \( \Delta 1 \frac{1}{n} \) on Tape 4. Write \( 1 \frac{1}{n} \) on Tape 2.

2) Move \( \frac{1}{T} \), head before the first 1.

3) If \( T_1 \) sees 1, copy \( T_2 \) to the end of \( T_3 \).

4) Advance \( T_j \) to 6, go to 5.

5) Copy \( T_3 \) to \( T_1 \) as answer.

#4
Run \( T_1 \) on Tape 1 of \( T \), leaving the result on Tape 4.

Run \( T_2 \) on Tape 2 of \( T \), leaving the result on Tape 2.

Append Tape 2 to Tape 1.
5) 2-way infinite simulated a new TM by filling in $s$ based on current cell, using all combinations of symbols for the left and right of current cell.

If $d(q, s) = (p, X, \text{dir})$

then

$$\forall \ell \forall r \forall n \quad d_n(q, [\ell\ a\ r]) = (p, [\ell\ x\ r], \text{dir})$$

New TM simulated a 2-way infinite TM by encoding triples of symbols

$$\Gamma' = \Gamma^3$$

if new TM has more

$$d(q, [\ell\ a\ b\ c]) = (p, [\ell\ x\ y\ z], \text{dir})$$

2-way TM uses $a' = \text{encoding of } [\ell\ a\ b\ c]$

$x' = \text{encoding of } [\ell\ x\ y\ z]$

$$d(q, a') = (p, x', \text{dir})$$